CULTURE-DRIVEN INNOVATION

Acknowledging Culture as a Knowledge Source for Innovation

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Motivation for Dissertation Project

Innovation has become key for economic growth and competitive advantage in today's dynamic markets. But innovation and the context of innovation are changing, calling for new approaches in research and practice. While innovation is still associated mostly with technological outcomes, such as those of the bubbling Silicon Valley, a broader view of innovation is establishing: This view recognizes innovation beyond technological artifacts and technological innovation (Hutter et al., 2015; Mortensen & Bloch, 2005; Ravasi & Rindova, 2008). Here, technology is becoming less a driver than an enabler of innovation (Rosted et al., 2009; Öberg, 2012). OECD's Oslo manual with guidelines for collecting and interpreting innovation data reflected this development by leaving a solely technological product and process definition of innovation (Mortensen & Bloch, 2005). Therefore, the manual integrated service innovation, organizational innovation, and marketing innovation as well as took account for the essential role of design in innovation. Also, the notice of growing "soft innovation" points to favoring products and services due to aesthetic and intellectual attractiveness compared to functional features (Stoneman, 2010). Furthermore, we are witnessing an increase of user-centeredness and differentiation through user experience and other non-tangible aspects in product and service development.

However, the innovation management literature has not yet reflected this change accordingly. Most research deals with innovation in terms of technology and R&D and focuses on the outcomes of innovation (Crossan & Apaydin, 2010). To acknowledge a broader view of innovation, we have to adopt a holistic approach and account for innovation on different levels and in different forms beyond technological innovation. Besides the outcomes of innovation, we have to shed light on the underexplored process view of innovation and admit micro and macro levels of innovation, extending the dominant organizational unit of analysis (ibid.).

This dissertation picks up knowledge sources as foci of analysis and introduces culture as non-technological knowledge source external to organizations. The thesis describes where we can find such cultural sources and how to unlock them. The focus lies on the potential of these sources and the antecedents for tapping into them. While I touch topics about transformation, integration, and utilization of knowledge, the study will not dive into them and concentrate on knowledge acquiring.

In the following, I give an overview of the dissertation by introducing the research topic, its theoretical background, conceptualization, goals, and contributions. First, I describe in separate chapters the underlying understanding of first knowledge and then culture and cultural sources. Then, I depict communities as a central place for cultural sources, followed by the concept of absorptive capacity as the prerequisite of an organization to act upon external sources. Leaving the level of organizations, the chapter continues with the role of individual intermediaries in unlocking external knowledge sources. Next, I provide the theoretical framework of this dissertation, which is built on practice and structuration theory. This leads to the conceptualization and goals of my study and finishes with its contributions, demonstrated by an introduction into the three different papers this dissertation is based on.

Knowledge and its Utilization

Knowledge is the prerequisite for innovation – be it for such as acquisition, idea generation, or exploitation of innovation – and is thus crucial for companies to stay ahead in the game. We even speak of our modern society as a "knowledge society" (Drucker, 1993), which shows the importance of knowledge and the need for continuous learning. While long philosophical discussions could be started about the nature of knowledge, one notion is of particular interest to knowledge management and innovation research: the difference between explicit and tacit knowledge (Grant, 1996; Howells, 1996; Nag & Gioia, 2012; Nonaka, 1994; Nonaka & von Krogh, 2009; Polanyi, 1966). These two forms of knowledge can be seen on a continuum. Explicit knowledge compares to "know-what" (*wissen*), that is theoretical knowledge and can be codified and written down. Tacit knowledge compares to "know-how" (*können*), is embedded, subjective, contextual, and cannot easily be communicated. It is practical knowledge that has to be applied and embodied, like knowing how to ride a bike through practice (Polanyi, 1966). Know-how is created out of practice and experience and helps to put know-what into practice (Brown & Duguid, 1998, p. 95). In this practice theory approach to knowledge (Reckwitz, 2002), knowledge does nor sit solely within the minds of individuals nor solely within the organization. It is collective and shared knowledge in social interaction, largely historically-culturally specific and more than just the sum of the content of single minds (ibid.).

As knowledge has become one of the most important assets of firms, organizations open up for external sources of knowledge because a broader and new scope of knowledge helps to not miss out on innovations (Grover & Davenport, 2001; von Hippel, 1988; Nonaka 1994; Rosenkopf & Nerkar, 2001). They access different sources of knowledge, such as customers, technology experts, universities, or other companies (von Hippel, 1988; Leonard-Barton, 1995). The open innovation

approach called for making use of sources external to an organization and integrating these into the innovation process, mostly to solve problems (Chesbrough, 2003; West et al., 2014). In a similar way ("open foresight"), foresight research has recently stressed to open up to broader and more diverse external knowledge sources beyond the known and closely related domains of organizations (Ehls et al., 2016; Heuschneider & Herstatt, 2016). This also includes recognizing the everyday life context and application of products and services (Daheim & Uerz, 2008). Furthermore, beyond an opening in terms of topics, the whole foresight process should open up towards the participation of internal and external actors, making it a highly interactive and communicative task. Entrepreneurship research focused on networks as external sources like the benefits of weak ties for venturing (e. g. Sullivan & Ford, 2014) and discussed the sources of opportunities. However, still most knowledge searches of organizations target external sources for technology and/or lie within the domain of the organization. Then, organizations are already missing opportunities at the beginning of knowledge creation and omit a broader view of innovation.

Culture and Cultural Resources[1]

While technological and domain related knowledge sources are in focus for many organizations, culture is an underexplored source (Dalpiaz, Rindova & Ravasi, 2010; Giorgi, Lockwood & Glynn, 2015; Miettinen, 2006; Ravasi, Rindova & Dalpiaz, 2012; Weber, 2005). Culture depicts a vague concept and within management research mainly was discussed limited to organizational culture (Weber & Dacin, 2011) or operationalized as moderating value systems of individuals, or on a national level, such as Hofstede's national culture dimensions (cf. Huggins & Thompson, 2014). Zott & Huy (2007) recognize a growing research stream that acknowledges entrepreneurs' strategic use of culture. Culture as a resource for organizations was introduced by Weber (2005), transferring Swidler's (1986) "cultural toolkit" perspective from the individual to the organization.

The culture as a toolkit perspective adopts the emerging view of culture as flexible, diminishing earlier concepts in which individuals are more constrained by culture in their action. Drawing on Geertz (1973), culture serves as extrinsic sources of information. In this sense, culture is like a "grab bag" or toolkit people draw on to guide the strategy of their actions. It consists of such elements as habits, skills, symbols, and styles and can be divided into "symbolic vehicles of meaning" (beliefs, art forms, ceremonies, etc.) and "informal cultural practices" (language, stories, daily life rituals, etc.) (Swidler, 1986). For an organizational perspective, Weber (2005) introduced the difference

1 I use the terms "source" and "resource" interchangeably. Although distinctions could be made, e. g. between the very beginning (source) and later processes (resources) of innovation, I tend to use "source" to account for the dynamic and neutral use of cultural sources for different purposes in opposition to the latent association of the term "resource" with including their simple acquisition and monetary value.

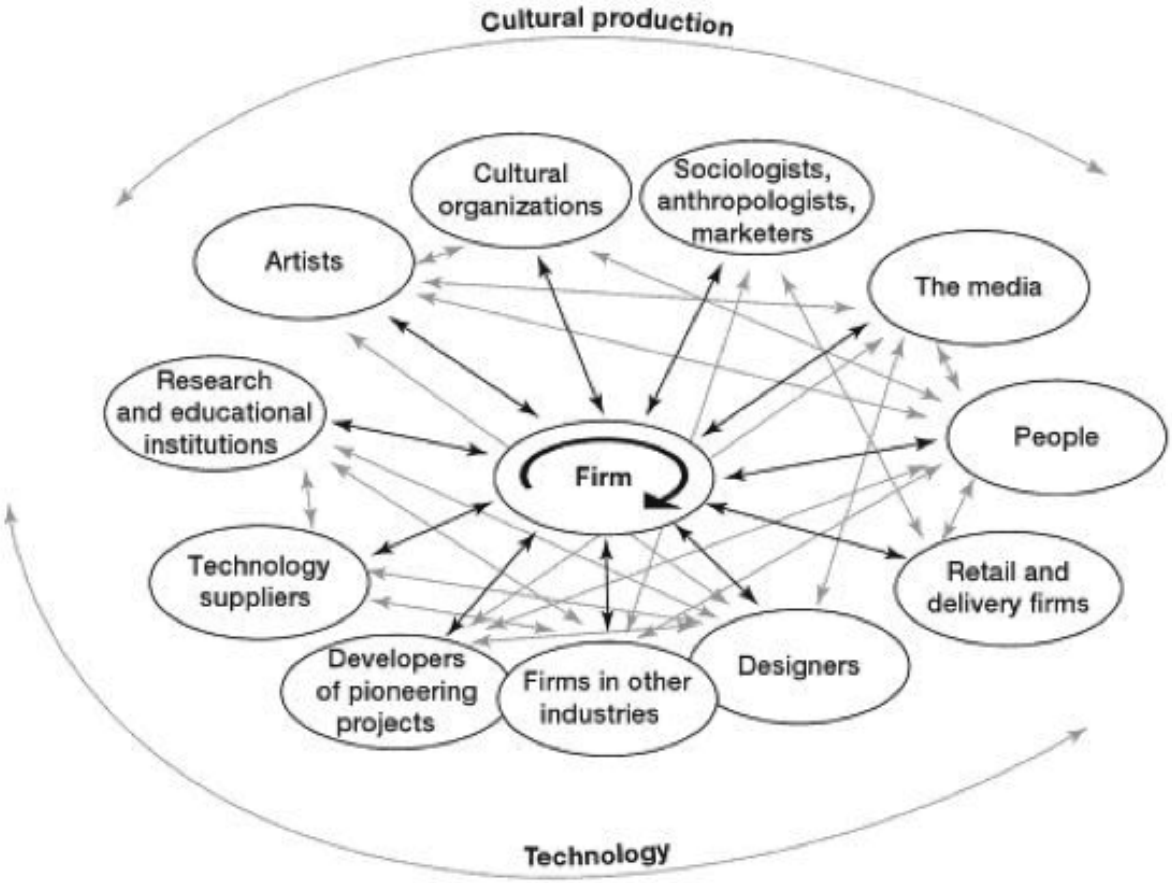
between cultural resources as a register on a collective level and cultural resources as a repertoire on an individual level with subsets of toolkits. Such a register is like a library people can draw from and although they know about many registers, they do not use all (ibid.). However, individuals cannot "make up" culture on their own – cultural meanings are organized and created in groups (Eliasoph & Lichterman, 2003; Swidler, 2008). Making use of many and diverse cultural sources has been associated as beneficial for individuals because they allow for more suitable and successful strategies to choose from, similar to the description of the concept of cultural capital by Bourdieu (Bourdieu 2011; DiMaggio 1997; Erickson, 1996). Still, culture might be both constraining and enabling for actors (e. g. Ortner, 2006).

On an organizational level, few authors (Rindova et al., 2011; Verganti, 2009; Verganti & Öberg, 2013) describe outlandishly, domain-distant cultural sources as a prerequisite for firms to succeed in (radical) innovation development. Here, cultural resources serve the creation of symbolic value of a product. Firms like Kuka, a producer of robots (Verganti & Öberg, 2013) or Alessi, a household application manufacturer, (Rindova et al., 2011; Verganti, 2009) made use of distant registers of entertainment (Kuka), or psychology and art (Alessi) to tap into new markets. This was achieved by changing the symbolic meaning of products – the reason why people use products. Beyond this, the use of cultural resources can influence a firm's strategy and its identity management (Rindova et al., 2011). In the form of socio-cultural trends, cultural resources can also inform foresight activities of organizations (Liebl & Schwarz, 2010).

If we want to make use of cultural sources, we have to understand where and how to unlock them. Different than technological knowledge, knowledge from cultural sources is harder to access because meanings and cultural practices are tacit knowledge and cannot be written down like, e. g., in a report on the newest technologies. This lack of tangible factors might also be a reason, why cultural sources are underexplored in innovation management (Verganti & Öberg, 2013). As tacit knowledge is shared collectively in practice and interaction, networks and communities mark the loci of cultural sources. Organizations and entrepreneurs are embedded in their socio-cultural environment – this provides them access to networks and communities. Following Verganti (2009), the more diverse these networks, the greater the opportunities for firms in creating radical innovations. He introduces various sources in the field of an organization from technology as well as from cultural production, such as artists, cultural organizations, sociologists, designers, firms in other industries, or the media (see Fig. 1). Nonaka & Toyama (2003; 2005) draw a similar picture of an "ecosystem of knowledge" they call "ba" and which is not restricted to the frame of a single organization. It is an open place, "in which knowledge is shared, created, and utilized" (Nonaka & Toyama, 2003, p. 6). In interactions with its environ-

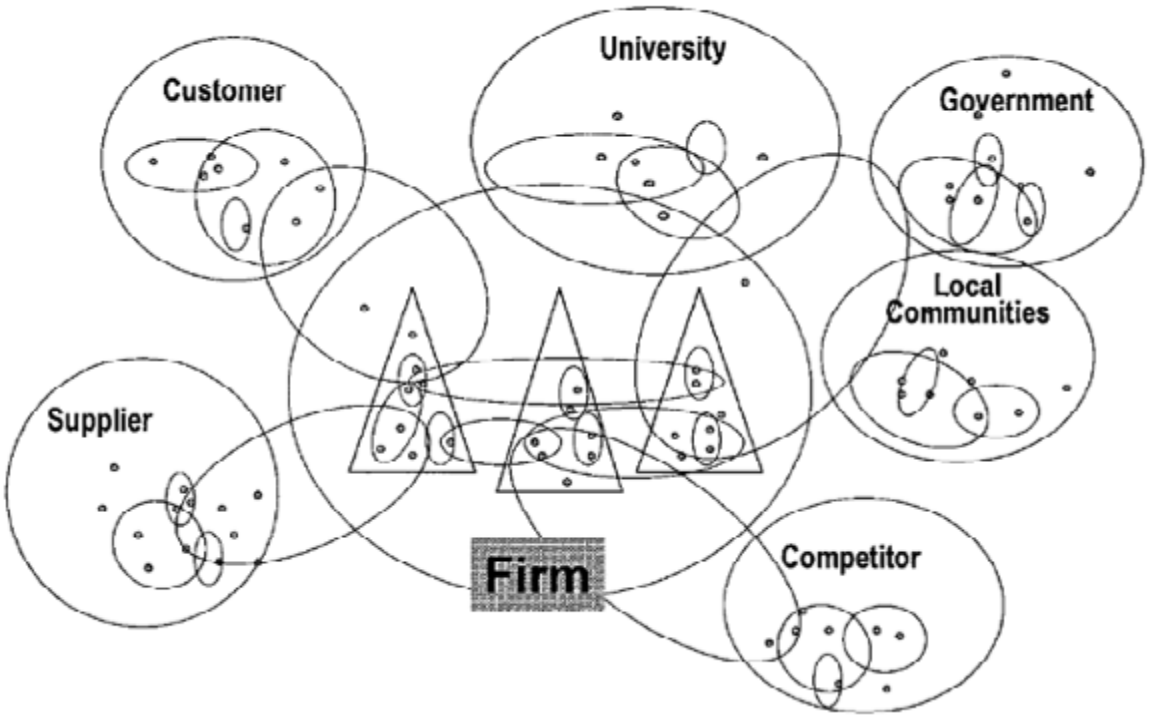
ment, such as suppliers, customers, universities, or local communities, a firm creates knowledge (see Fig. 2). For Verganti as well as Nonaka & Toyama, this process of knowledge creation is dynamic and bidirectional.

Figure 1: The Design Discourse (Verganti, 2009, p. 120)



While these authors consider the vast socio-cultural context in which organizations are embedded as sources for knowledge and innovation, others point to specific locations of cultural sources. Borrowing from cultural studies, subcultures and scenes describe a "social embedding ground" of loosely linked networks (Lange 2011; Lange & Bürkner, 2013) broadly associated with creativity and newness. Such networks can even provide the foundations for market formations (ibid.). Furthermore, research describes subcultures as sources for the creation of new meanings and practices (Hebdige 1981; Liebl & Schwarz, 2010; Ravasi & Rindova, 2008). This is due to their oppositional expressions towards dominating cultural meanings and practices, which leads to productive tensions. Some styles, practices, etc. make it as trends from subcultures into broadly adopted styles and practices.

Figure 2: Organisation as Organic Configuration of "Ba" (Nonaka & Toyama, 2003, p. 8)



Urban regions serve as a concentrated place for a variety of subcultures and scenes with large cultural complexity (Hannerz, 1991). Florida (2002) and recently Weiner (2016) pointed to the creative sources located in cities as the driving force for economic growth and innovation. Also, Saxenian (1996) explained that the success of Silicon Valley is significantly based on the local networks and more or less formal communities. Similar background and professional experience oftentimes build the foundation of such communities, e. g. the Homebrew Computer Club. Saxenian (ibid.) describes this hotbed of the computer industry as like-minded enthusiasts who were influenced by the sixties' counterculture (cf. Turner, 2006). Meanwhile, entrepreneurship research has noticed the embeddedness of entrepreneurs within their environment and thus the crucial factor of place and local communities, although this is still underexplored (Jennings et al. 2013; Johannisson 2011; Lyons 2012; McKeever, Jack & Anderson, 2015; Steyaert & Katz 2004; Thornton & Flynn 2003; Welter 2011). Likewise, the general innovation literature has acknowledged the importance of geography for innovation processes (Audretsch & Feldman, 2004; Vanhaverbeke, 2006). Also, Verganti (2009) and Nonaka & Toyama (2003) underscore the benefits of geographic proximity to the different communities in an organization's environment due to direct interaction being more effective when dealing with tacit knowledge.

Communities

This leads us to the importance of communities as the level of analysis for studying knowledge creation and sources of knowledge. Compared to the networks of subcultures and scenes described above, communities describe smaller entities. Thus, actors within communities are stronger connected to each other than actors within networks or subcultures. But, the definition of what constitutes a community is a moving target. Gläser (2001) notes the continuous softening of the classic sociological notion about communities that tie members to shared values, mutuality, emotions, and frequent interactions. Similar to the changed view on culture as a less constraining influence on individuals, the notion about communities changed towards less constraining and value-bound structures. Following Gläser (ibid., p. 6), a community can be broken down into the following:

> *"A community is an actor constellation that consists of individuals who perceive to have something in common with others, and whose actions and interactions are at least influenced by this perception."*

Gläser differentiates between four subtypes of communities: traditional communities, social movements, producing communities, and communities of practice. He introduces producing communities as a new concept that accounts for the notion of such as scientific communities or open source communities. Members of these communities relate to each other through a common subject matter of work (i. e. a common body of knowledge) and their actions are coordinated by this subject (ibid., p. 7). Membership can be generated by individual perception or ascribed by collective perception. In this sense, producing communities share similarities with scenes and subcultures. However, the latter are associated with urban space and creative lifestyles. Compared to producing communities, communities of practice follow a less softening and broad definition: Members relate to each other through a common activity and institutions might coordinate this activity.

Communities of practice have been studied intensely on the firm level as a place for knowledge in practice and for learning. But, they have also been discussed beyond the firm level and introduced as sources for innovation (Duguid & Brown, 2001; Müller & Ibert, 2015). Creating knowledge through shared practice is happening in diverse social contexts. Also, Wenger, McDermott & Snyder (2002) noted they exist anywhere, such as at home or in the realm of our hobbies. We might even not recognize some communities of practice and belong to a number of them, more or less strongly (ibid.). Indeed, we live in a dynamic "landscape of different communities of practice" (Wenger-Trayner et al., 2015, p. 15) or "networks of practice" (Duguid & Brown, 2001). In their original definition (Wenger 1998a; Wenger 1998b), communities of practice are characterized by

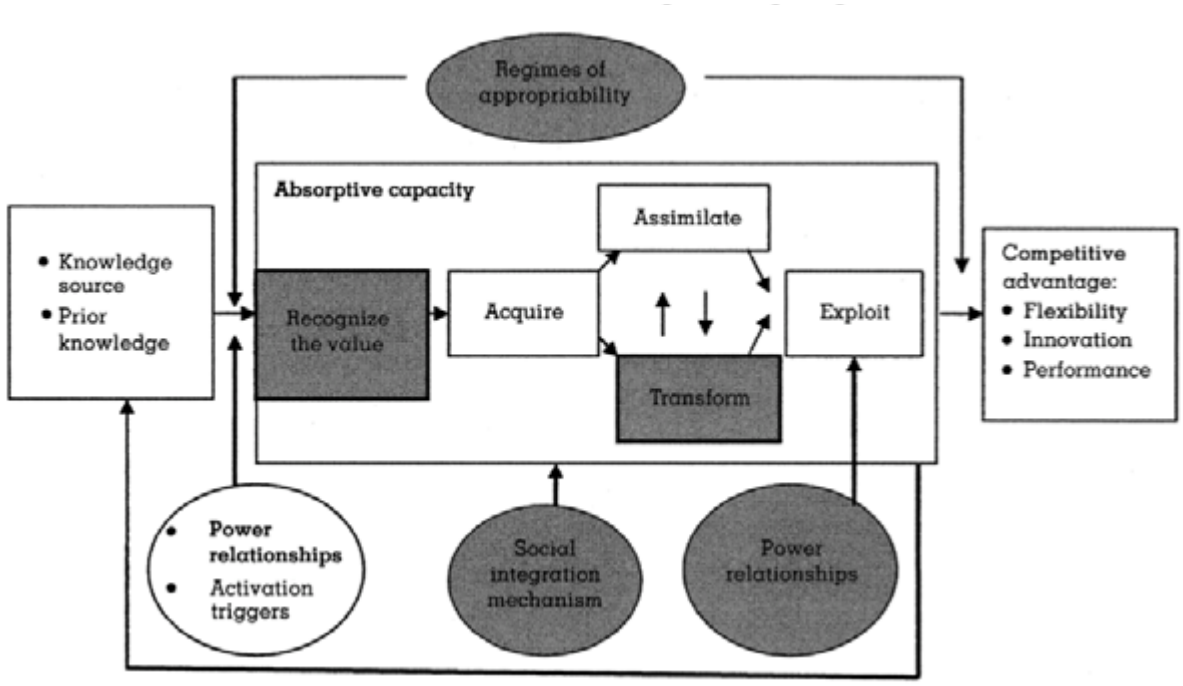
a joint enterprise, mutual engagement, and shared repertoire. Joint enterprise describes what the community is about, mutual engagement how it functions, and the shared repertoire describes what capability it has produced. The shared repertoire reflects the history of mutual engagement and entails styles, actions, artifacts, discourses, concepts, tools, stories, historical events, etc. (ibid.). In this way, it reflects the toolkit perspective of the cultural theory discussed above.

Verganti & Öberg (2013) reject the denoted expertise of communities of practice in its original definition due to experts' closeness to a company's industry domain. Nonaka & Toyama (2003) notice some similarities between communities of practice and their approach of "ba" as an ecosystem to organizational knowledge creation. However, they stress knowledge creation taking place within "ba" compared to knowledge learning in communities of practice. Also, they claim communities of practice are more stable when it comes to membership, identity, and boundary. "Ba" has a fluid boundary and participants change often. In this sense, it shares characteristics with producing communities described by Gläser (2001). Altogether, communities have been acknowledged as the central social unit for practices and interactions. Organizations entail their own communities and are connected with many communities beyond the organizational boundaries. As communities mark the crucial place where knowledge creation takes place, let us now consider how organizations can access such external sources for innovation.

Absorptive Capacity

The concept of absorptive capacity was introduced by Cohen & Levinthal (1990) as a crucial capability of firms for innovation and described as "the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends" (ibid., p. 128). The innovation literature published many articles on absorptive capacity between 1990 and 2010 and the concept was refined several times (van den Bosch, Volberda & de Boer, 1999; Lane, Koka & Pathak, 2006; Todorova & Durisin, 2007; Zahra & George, 2002). Here, the more recent literature walked away from the focus on absorptive capacity and its application in technology firms and their research and development departments towards a broader understanding. The authors stress the process character of a dynamic and evolutionary absorptive capacity, which is strongly tied to newer approaches to organizational learning (Lane et al., 2006; Todorova & Durisin, 2007; Volberda, Foss & Lyles, 2010). Furthermore, they underscore a multidimensional view of absorptive capacity, which includes a stronger focus on the role of individuals and social relationships. In this regard, Todorova & Durisin (2007) propose a reconceptualization of absorptive capacity (see Fig. 3) drawing on the original framework of Cohen & Levinthal (1990) and that of Zahra & George (2002).

Figure 3: A Refined Model of Absorptive Capacity (Todorova & Durisin, 2007, p. 776)



The organizational process of absorptive capacity starts with the recognition of the external knowledge source or prior knowledge. To value the potential of this knowledge is a precondition for the acquisition process. Acquisition of knowledge takes place through the processes of assimilation, respectively transformation. If new knowledge fits into the given context of an organization and it is easy to connect it with prior knowledge, assimilation processes are usually sufficient. Otherwise, new knowledge has to be transformed through reframing etc. before it can be exploited – the last step within absorptive capacity. Todorova & Durisin (2007) state that pieces of information may move between both processes before they can be exploited. They adopt previous conceptions about contingent factors that influence the absorptive capacity process: activation triggers, social integration mechanisms, and regimes of appropriability. Different to Zahra & George (2002), they claim that social integration mechanisms play a role not just during assimilation and transformation. This is because social interactions and its positive, as well as negative effects, take place throughout the whole process of absorptive capacity. For a positive influence, these interactions require social integration initiatives and fostering of social networks. To stress the individual level of this process and reflect research on innovation and learning, Todorova & Durisin also introduce power relationships as a contingent factor. While it is beyond debate that such relationships have an influence within the organization, as an external factor power relationships might also influence the absorption and exploitation of new knowledge by organizations. This could be relationships with, e. g. suppliers or

customers. When it comes to the absorption of new knowledge, activation triggers describe events, like a crisis or new technology. Regimes of appropriability depict the ease of imitation and may influence the antecedents (knowledge sources) as well as the outcome of absorptive capacity – an organizations' ability for competitive advantage. This advantage can lie in flexibility, innovation, or performance. In summary, without a certain degree of absorptive capacity, organizations will not be capable of acquiring new sources of knowledge.

Brokers and Intermediaries

While I described communities as the loci for external sources of an organization, absorptive capacity describes the prerequisite and process of integrating these sources into the organization. I now leave this structural view of communities and organizations and account for newer concepts of absorptive capacity and a practice approach to knowledge, which point to the role of individuals and interactions. The community literature, as well as the absorptive capacity research, paid attention to individuals spanning the boundary between communities and organizations. Aldrich (1979) and Cohen & Levinthal (1990) noticed the crucial boundary-spanning or gatekeeping role of individuals sitting at the interface between an organization and its environment. Lane, Koka & Pathak (2006) pointed to the need of boundary spanners due to increasingly dynamic environments of organizations and the growing complexity of knowledge. According to Leonard-Barton (1995), these people excel by understanding the world of the source and the world of the receiver. Boundary spanners are usually described from the view of the organization and represent members of this organization (Aldrich & Herker, 1977; Leonard-Barton, 1995). Within the community literature, communities of practice lie at the intersection; even more they inhabit the double function of maintaining the boundary while also creating connections between the organization and its environment (Duguid & Brown, 2001; Wenger, 1998a). People are part of multiple communities and provide the connections through complex brokering activities – the transfer of an element of practice into another (Wenger, 1998a). Verganti (2009) describes a firm's actors from external sources as interpreters. These "conduct research on how people [...] could give meaning to things" (ibid., p. 119). Interpreters can be people from various fields of cultural production and technology, like artists, anthropologists, or suppliers (see Fig. 1 above). Designers proved to be especially beneficial as interpreters because they are good language brokers; that is they bring in knowledge about meanings that are not available for the company, such as an emerging design language from another industry and integrate it into their product design (cf. Zurlo & Bohemia, 2014). Verganti (2009) also introduces the role of mediators as another bridging actor who provides access to other interpreters to an organization. While it is most effective if members of an organization directly interact with

interpreters and knowledge sources, mediators might be necessary for firms without broad connections to start making use of new sources. Such an intermediating role has been discussed broadly in innovation management and covers individuals (e. g. consultants), but also organizations (e. g. agencies offering crowdsourcing services for finding ideas to solutions) (Howells, 2006). Intermediaries can support along the whole innovation process, similar to the absorptive capacity process described above. For early phases of knowledge absorption and innovation, the literature mentions four functions of intermediation: foresight, scanning, knowledge processing/combination, and gatekeeping/brokering (ibid.). A small and more recent research stream calls for opening the concept of the innovation intermediary the following: first, in terms of detaching it from a constrained technology and organizational view and second, regarding a stronger proactive role of the intermediary, which comes with a focus on the individual and his/her relationships (Agogué, Yström & Le Masson, 2013; Howells, 2006; Parker & Hine, 2014; Steyaert & Hyysalo, 2008). Here, Agogué et al. (ibid.) describe intermediaries as architects in co-creation and knowledge creation who also undertake exploration activities such as setting up collaborations or researching ideas.

Practice and Structuration Theory

This chapter started with the notice that innovation has moved beyond a constraining view in which technology accounts for the main driver of innovation. Accordingly, a broader view of innovation acknowledges innovation as a dynamic process happening at the micro and macro levels within its socio-cultural context. This perspective is increasingly reflected by the recent literature of the different research streams discussed above and serve to frame my research objective of culture as a source for innovation: The outlook on knowledge as a practice points to the large, but often unconscious tacit knowledge that is generated in interactions and practices. Knowledge, as well as culture, is not reducible to preconceptions of our minds. The culture as a toolkit view assigns greater agency to individuals whose actions are not solely determined by stable values and their surrounding structure. In this regard, the definition of communities has also opened up towards ascribing communities a less constraining influence on individuals. Scholars studying absorptive capacity and intermediaries adopted the practice view on knowledge and pointed to dynamic social relationships, as well as expanded the research focus beyond technology, respectively research and development.

All of this research reflects an underlying conceptual foundation in practice theory within the broader frame of structuration theory. These theories derived from cultural and social theory and accordingly consider a socio-cultural view of economics. Organizations like firms as well as entrepreneurs are recognized as embedded within their environment. The firm is seen as a dynamic, knowledge-creating entity, which actively shapes and is shaped by its environment (Nonaka &

Toyama, 2005). This view challenged neoclassical assumptions about the firm as "static information processing machine" (ibid., p. 420). In this way, practice and structuration theory question the ideal of the homo oeconomicus, which stresses the rational individual and her interests, reflected in utilitarianism and rational choice theory (Reckwitz, 2002). According to Reckwitz (ibid.), the contrary concept would be the homo sociologicus, who is driven by collective norms and values, represented by the writing of sociologists like Parsons and Durkheim. While the latter is rather constrained by the social, the homo oeconomicus is seen as shaping the social. However, practice and structuration theory neither favor the homo oeconomicus nor homo sociologicus; they try to overcome this dualism of agency and structure. Instead, these theories take into account the complex interplay between agency on a micro-level and structure on a macro-level. This is similar to the notion above on the embeddedness of organizations and entrepreneurs in their socio-cultural environment while acknowledging the active and important role of individuals and their relationships. In a dialectical approach, Giddens' structuration theory (1984) describes human agency and structure as interdependent – woven into each other through reciprocal interactions. Likely, Schatzki (1996; 2005) named the dualism to overcome "individualism and societism" or "mind and body". Reckwitz (2002) sums up practice theory and structuration (Giddens' "version of practice theory", ibid., p. 243) as cultural theory, which provides an alternative to the conception of the homo oeconomicus and the homo sociologicus. While the last one's actions are shaped by norms and the social is a consensus of norms, the actions of the homo oeconomicus are purpose-oriented and the social is the product of individual interests. However, cultural theory sees actions as "constructing the symbolic structures of knowledge which enable and constrain the agents to interpret the world according to certain forms" (ibid., p. 245). Here, the social is embedded in symbolic structures and "shared knowledge", which provide meaning. This shared knowledge is largely tacit, a point neglected by the homo oeconomicus and homo sociologicus view, according to Reckwitz. Following his review, cultural theories draw on structuralism, semiotics, phenomenology, and hermeneutics (ibid., p. 245). Thus different perspectives fall under the umbrella of cultural theories and highlight the meaning of daily life situations, but not all cultural theories are regarded as practice theories. Non-surprisingly, no unified definition of practice theory exists nor what exactly makes a practice and how much practice is framed by language (cf. Rouse, 2006). Therefore, Reckwitz (2002) contrasts theories in an "idealized" way to sharpen understanding when he differentiates between four basic research streams of cultural theory. These are based on where the social and symbolic structure predominately is seen: in the human mind (mentalism), in discourse and text (textualism), in interactions between subjects (intersubjectivism), or in practice (practice theory). Following this, a practice is the smallest level of analysis for practice theory and "a routinized type of behaviour

which consists of several elements, interconnected to one other: forms of bodily activities, forms of mental activities, 'things' and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge" (Reckwitz, p. 249). This could be, e. g. a certain way of cooking or working. Through the body and mind, through the acting and saying of a single individual, practices are conveyed in routines. Bourdieu's concept of habitus stands for such bodily-mental routinized and largely unconscious practices such as a certain lifestyle, language, or taste and ascribes them with meanings (Bourdieu, 1984). In the light of practice theory, knowledge is a background for practices and collectively shared as well as understanding is collective. According to Gherardi (2000, p. 221), knowing happens in discursive practice, that is a community of listeners and speakers. Thus, knowledge belongs to groups; it is not the sum of individual knowledge (Schatzki, Knorr-Cetina & von Savigny, 2001). In conclusion, cultural theories allow seeing agency and structure as interdependent and leaving behind a limited view of a pure homo oeconomicus or that of a homo sociologicus.

Different research streams from the broader management literature picked up on practice and structuration theories, such as strategy (Whittington, 2006).[2] The community of practice literature and Nonaka & Toyama's (2003) perspective on organizational knowledge largely reflects the practice approach to knowledge. Other scholars adopted the practice approach to organizational knowledge, too (Duguid & Brown, 2001; Dougherty, 2004; Orlikowski, 2002; Schatzki, 2005; Spender, 1996; Yates & Orlikowski, 1992). Verganti (2009), although not referring to her, adopts Gherardi's (2000) notion of discursive practice of knowing through communities of listeners and speakers when he writes about the "design discourse" firms should listening to and also address through interpreters. The works of Gherardi (e. g. 2000; 2006) have spurred much research in organization studies adopting a practice theory lens. Entrepreneurship research started applying practice approaches and Steyaert (2007) suggests building on them for developing a social theory of entrepreneurship. Johannisson (2011) proceeds on this and highlights the local context of entrepreneurs and organizations ("organizing context"), including personal networks and communities of practice as well as processes of sensemaking and learning to generate practical knowledge ("phronesis"). Also, Shepherd (2015) connects to cultural theories when calling for the future research of entrepreneurship. Here, and among other scholars, practice and structuration approaches have been resonated well in the realm of entrepreneurial opportunities: Sarason, Dean & Dillard (2006) introduced structuration to frame the entrepreneurial process and to stress the duality of entrepre-

2 Also creativity research increasingly draws on practice theory and acknowledges the socio-cultural embeddedness of creativity as well as ascribing its creation to groups and communities instead of solely creative minds (e. g. Miettinen, 2006; Glăveanu, 2011a, 2011b; Reckwitz, 2016).

neurs and opportunities, building on Shane & Venkataraman's (2000) prevalent definition of entrepreneurship as the nexus of opportunities and entrepreneurs. The discussion whether opportunities are discovered or created dissolves in a dialectical way: Entrepreneurial opportunities do not exist independently of the entrepreneur and entrepreneurs do not exist separately from their structural context, they are enabled and constrained by the opportunity sources (Sarason et al., 2006, p. 288, 303; cf. Chiasson & Saunders, 2005). Dodd & Anderson (2007) suggest structuration approaches to overcome the individualistic stance of entrepreneurship research and notice that network research increasingly does so. Jack (2010) calls for structuration approaches to be applied in network studies of entrepreneurship and underscores to integrate the role of qualitative network research methods to a larger extent. Similarly Slotte-Kock & Coviello (2010) promote multi-dimensional network research in their entrepreneurship literature review. While entrepreneurship research has always paid much attention to the individual, practice and structuration approaches point to the neglected consideration of the embeddedness of entrepreneurs, other management research streams, like absorptive capacity or strategy, has discovered the microfoundations of human agency within practice theories. In the dualism of practice and structuration theory, the different research streams could provide a valuable addition of each other to account for both the interdependent micro-level of agency and the macro-level of structure. However, innovation management is still by and largely dominated by neoclassical theories, which are often not discussed. The adoption of cultural theories is gaining momentum, referring to practice and structuration theories while also borrowing from intersubjectivism and partly textualism.

2 Conceptualization, Goals, and Contributions

As was shown above, organizations need to open up towards external sources of knowledge to not miss out on opportunities and gain competitive advantage. The broader and more diverse these sources, the greater the chances to tap into new knowledge and opportunities. Additionally, as technology is changing its driving role for innovation, we should pay more attention to the role of culture and socio-cultural changes as a driver for innovation. Because knowledge about the latter is largely tacit, we need to account for its conditions and cannot treat it like a stock of material resources. Here, recent literature pointed to the critical role of creating knowledge in practice within communities and through interactions with the organizational environment. As a prerequisite, organizations have to develop an absorptive capacity that considers communities and their culture as a resource – a cultural absorptive capacity.

Culture-Driven Innovation

Drawing on this, I claim for "culture-driven innovation" and understand it as process and output of making use of cultural sources for knowledge creation in organizations and for entrepreneurs. I acknowledge a broad view and usage of culture as a source, including opportunity recognition, foresight, strategy, and various phases during the innovation process. Following recent literature in innovation management and entrepreneurship, the conceptual frame of this thesis builds on practice and structuration theory. Knowledge creation and culture-driven innovation are enacted in the interactions of groups and communities. The concept of knowledge as a practice and culture-driven innovation challenges neoclassical views of management research in which knowledge is a resource a firm owns and can easily be acquired through such as reports, databases, or experts. But to answer the challenges of an increasingly dynamic environment, innovation management should adopt theoretical approaches that reflect these dynamics, understanding the firm as constrained and enabled through agency as well as structure and seeing innovation as a process. The notion of culture-driven innovation stresses the potential of cultural sources such as practices and meanings derived in daily (sub)cultures and communities. While the concept points to non-technological fields of art, design, etc. ("culture" in a narrow sense), practices revolving around technology are also part of it. As the tacit character of know-how knowledge helps to put the know-what knowledge into practice, knowledge about technology may be enhanced through knowledge about the socio-cultural practices and meanings connected to this technology. Thus, culture-driven innovation is not denying the impact of technology. Here I draw, not just literally, on Verganti's (2009) strategy of "design-driven innovation", which describes "the R&D process for meanings". This research process also involves actors and areas of technology besides the field of cultural production (see Fig. 1).[3] I also agree on Verganti & Öberg's (2013, p. 89) notion of innovation as a process of interpreting and envisioning beyond previous concepts of innovation as a problem solving or ideation process. Still, Verganti (Norman & Verganti, 2013, p. 92) focuses on the application of the envisioned new meanings (derived through the design-driven innovation process) in products. He targets the development of radical innovation and underscores the role of the manager in conducting the process as well as the designer in interpreting through language brokering. Also, the strategy of design-driven innovation encompasses not only listening to access knowledge and interpreting that knowledge, but also addressing and influencing customers (Verganti, 2009). Culture-driven innovation points to the cultural sources of knowledge and innovation and broad fields of application beyond product innovation. As Heuschneider & Herstatt (2016, p. 1) notice,

3 It also comprises users as a source, respectively user-driven innovation.

there is the need for external search beyond product innovation to detect future discontinuities and trends. And Rindova et al. (2011) demonstrated the use of cultural sources for strategy and identity redefinition. Furthermore, culture-driven innovation denotes culture in practice embedded in communities as the locus for knowledge creation and refers to the theoretical framework of a cultural theory.

Goals, Questions, and Contributions of Dissertation

The goal of this dissertation is to shed light on culture as a resource within the frame of practice and structuration theory. It aims to introduce culture as a resource in innovation management, where culture has largely been neglected as a knowledge source and limited to, e. g., a moderator in research studies, operationalized as values. To unlock the potential of culture as a source for knowledge and innovation, at first one has to map the field and gain a better understanding of cultural sources and their application. In this way, the dissertation mainly is of explorative and descriptive nature and asks: *What are cultural sources for knowledge and innovation? Where can one find cultural sources and how to tap into them?*

As shown above and mentioned by various scholars, communities and the broader network of communities are the central element for knowledge creation as knowledge happens in shared practice. Therefore, we should study networks and communities to learn more about cultural sources.[4] The first paper of this dissertation approaches networks from a methodological perspective. Network studies have gained popularity among many scholars from various fields. This is also true for entrepreneurship research, where networks constitute a key entity. Nevertheless, the potential to use network research within the emerging research areas about the context and environment of entrepreneurship, as well as its opportunities, has not been unlocked. These areas sound promising to learn more about cultural sources as the latter could unfold valuable opportunities and the context and environment of organizations point to the neglected embeddedness of entrepreneurs and firms. The paper shows how to account for these research fields with mixed network research methods. It also demonstrates how mixed methods are able to reflect a structuration approach to network studies. However, the paper notes that most network research, even within mixed methods studies, focuses on the structure of networks, that is the macro level, and overlooks the micro level of agency. This is related to the dominance of quantitative methods of network research. For this reason, the paper concentrates on the contribution of qualitative network research methods to guide

4 Networks describe relations between nodes (usually actors) foremost in a neutral way while the term communities connotes a smaller entity of actors connected by interests, etc. Paper two will depict on the features and differences between communities and networks.

the design of mixed methods studies. Qualitative methods add to understand the "why and how" of networks, dealing with such as the content, context, quality, practices, and meaning of interactions within networks. They are particularly useful in exploring networks and reflecting network dynamics. They can provide detail and an inside view on networks while quantitative methods give an outside perspective with an overview of networks, which simplifies what is going on in the network. Following a structuration approach both perspectives help to overcome a one-dimensional view and increase our understanding of the complex interplay between agency and structure. Combining multiple methods also can outweigh the weaknesses of the other methods and thus enhance the validity of research. To sum it up, mixed methods network research show a promising way to study cultural sources with a structuration lens.

The second paper of this dissertation also deals with the crucial role of networks and depicts communities revolving around the startup scene in Berlin. It thus adds to the research question of where to find cultural sources. As data basis serves the online platform Meetup, which supports the establishment and management of local communities. The platform gained increasing popularity among professionals and interested parties from the tech and the start up sector, as well as attracted people with other interests organizing their leisure activities, etc. through this platform. The groups organized via Meetup usually are self-organized. Driven by interests, their members meet to learn, network, and exchange knowledge, e. g. pitching their business ideas or support each other in progressing with programming skills. As such, they form producing communities, respectively communities of practice where knowledge is created. The paper provides an overview and insights into clusters of these communities by mapping them and their content according to affiliation data and group topics. This is done via community detection method and network visualization. They depict into which sub-fields groups "organize themselves" by co-attendance of members to events, respectively co-reference of topics by groups. Here, the analysis discusses the possible implications of connected or overlapping clusters. Furthermore, the paper shows the changes in the structure throughout the last years by a so-called alluvial diagram. Also, the study makes use of the topics of new groups to detect possible emerging trends within the interests of the Meetup groups. In conclusion, the paper gives a concrete example for external cultural sources of knowledge and innovation on the regional level – a perspective scholars have pointed to as promising, but largely overseen. The example of Berlin demonstrates the potential of data from the platform Meetup to detect local communities, their structure, and content, and guides researchers and practitioners to apply similar kind of analysis for other cities as well as compare cities. The paper ends with recommendations and possible benefits for firms, entrepreneurs, and other practitioners to make use of these regional knowledge sources. In conclusion, the paper reveals the case of Berlin's Meetup network as

cultural source and contributes to a structural/macro level view of regional sources. It thus reflects one important view of a structuration approach towards external sources of knowledge. While the analysis is of quantitative nature to a large extent, it also embeds qualitative data about the content of networks.

A qualitative lens to meet the overall research goal is added by the last paper about the role of intermediaries in absorbing cultural sources. Thus, the paper deals with the question how firms can tap into these external sources. As was discussed above, obtaining cultural sources requires a different approach than the predominantly non-cultural sources. Cultural resources are harder to grasp and act upon, as knowledge about them is tacit. Furthermore, little experience exists in innovation management about accessing them because they have been neglected to a large extent. Therefore, the third paper examines requirements and ways for firms to tap into these new sources and starts with examining the "culture as a resource" concept. As shown above, the absorptive capacity of an organization defines the ability and thus success to the creation of new knowledge. For the purpose of this dissertation, the paper concentrates on the early phase of acquisition of knowledge. Latest literature pointed to the dynamic character of absorptive capacity and stressed the role of social interactions and individuals. When accessing and translating external sources, boundary spanners within organizations and intermediaries outside of organizations proved as beneficial. Hence, the paper scrutinizes different concepts of intermediaries from the literature and evaluates their ascribed roles, considering a fit for the application of cultural resources. This view on an intermediary for cultural sources plus the concept of an internal boundary spanner fuels an adapted model of cultural absorptive capacity. Largely build on the refined model of absorptive capacity from Todorova & Durisin (2007) and a tentative concept of cultural absorptive capacity from Dalpiaz et al. (2010) and Ravasi & Rindova (2004), I elaborate on an extended version of cultural absorptive capacity. Then, two cases demonstrate the crucial role of intermediaries in the absorption of cultural resources. They describe how intermediaries from agencies for PR and branding fulfilled various key active roles to enhance the cultural absorptive capacity of SME's from the premium interior sector. The cases focus on the dynamic relationships between intermediary and boundary spanner and thus contribute to a practice theory lens on knowledge intermediation. The cases describe how the intermediaries connect more or less traditional companies with cultural sources from distant domains through collaborations with artists. They depict two different ways these organizations opened up towards input from the artists and stress the crucial role of intermediaries to understand both worlds of the firm and the artists. Furthermore, the cases show how the cultural sources, through the interaction with artists, had a positive impact on the competitive advantage of the firm beyond product innovation. The study also revealed the impact

on organizational learning and change. In conclusion, the paper adds to the theoretical understanding of the use of cultural resources for knowledge and innovation by providing a framework for absorptive capacity of those cultural resources. It follows recent calls to integrate the individual perspective and role of social relationships. From a practical perspective, the paper gives valuable insights into how firms can open up towards external sources that held promise to challenge their previous knowledge domains and repertoires in various ways. Through studying the cases, practitioners from management, intermediary agencies, etc. are better prepared when opening up to cultural sources. This will help companies to tap into new, valuable sources earlier and more successful than their competitors.

Altogether, the three papers provide differently, but complementary contributions to enhance our understanding of using cultural sources in knowledge creation from a structuration and practice approach. The first two papers address networks and communities as the central foci of cultural sources and knowledge creation and add to the understanding where to find cultural sources. Paper one describes how mixed methods of network research especially fit a structuration approach and sheds light on the underrepresented qualitative network methods. The second paper focuses on the promising regional environment of firms and entrepreneurs in providing knowledge sources. Through network and topic analysis of Berlin's tech and start up scene, the study detects the different communities and tracks their development as well as content. While the first two papers contribute to our understanding where to find cultural sources, the last paper gives insights on how to tap into cultural sources. It introduces a model for cultural absorptive capacity and points to the crucial role of social relationships. Here, the paper contributes to the question of how to tap into cultural sources and focuses on intermediaries and boundary spanners. Additionally, the paper analyzes two different approaches of absorbing cultural sources through case studies. Whereas this paper centers on micro-processes of individuals, the second paper touches on the macro-level of structure. Thus, the dissertation offers complementary views on cultural sources and their acquisition (where and how) to grasp the complex, dynamic interplay of agency and structure among knowledge in practice. It will help practitioners to make use of cultural sources in areas such as for foresight, product and service innovation, or strategy. In this way, they can gain important knowledge for competitive advantage. This dissertation also adds to act on Shane's (2012) notice of lacking research on the sources of opportunities and their exploration. It is an answer to various calls for opening up innovation processes and embraces external sources beyond domain-specific, technological, and codified knowledge. It offers theoretical underpinnings, a framework, as well as suggestions where to find these sources and how to open up for them.

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Paper One

Applying Mixed Methods in Entrepreneurship to Address the Complex Interplay of Structure and Agency in Networks – A Focus on the Contribution of Qualitative Approaches[1]

Abstract

Networks define a key entity in entrepreneurship and have spurred an enormous amount of research. Nonetheless, research lacks studies on entrepreneurial contexts and opportunities. This is due to the common separation of research on networks between the macro-level of structure, conducted by quantitative methods, and the micro-level of agency, conducted by qualitative methods. Mixed methods provide ways to bridge this separation of structure and agency and grasp the complexity of entrepreneurial action from a multidimensional perspective. Hence, mixed methods are crucial for conducting studies to answer urgent questions of the research field and inform theory building. This chapter guides researchers in applying mixed methods of network research in entrepreneurship. It gives an overview of different research designs with several examples and recommendations. The chapter focuses on the integration of qualitative approaches into mixed methods because first of all, they have been neglected and training is required, and secondly, qualitative approaches show promise to address current gaps in entrepreneurship research.

Keywords: Entrepreneurship; Mixed methods; Networks; Qualitative methods, Study design

1 Introduction

Following a recent literature review (Busenitz et al. 2014), papers that belong to the most emergent research areas of entrepreneurship deal with the environment or contexts of entrepreneurship and its opportunities. Their authors acknowledge the embeddedness of entrepreneurial processes in dynamic socio-cultural contexts – what McKeever, Jack, & Anderson, (2014, p. 454) termed "the social turn of entrepreneurial research" This view accounts for entrepreneurship happening in an

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open system and the complex interdependence between individuals (agency), like entrepreneurs, and their environment (structure). Nevertheless, scholars note that entrepreneurship research lacks studies that apply this view due to missing methodological implementation. Their call gains momentum for qualitative and mixed methods to address the complexity of entrepreneurship (Gartner & Birley, 2002; Hoang & Antoncic, 2003; Hoang & Yi, 2015; Jack, 2010; Jennings et. al, 2013; Molina-Azorín et al., 2012; Slotte-Kock & Coviello, 2010).

Social networks play an important role with a dramatically increasing body of literature to understand the contexts and opportunities of entrepreneurs. They are now established as a focal entity of analysis in entrepreneurship (Jack, 2010). Economic action is embedded in social interactions and shaped by relationships, which also provide access to required resources and opportunities.

A huge body of literature in entrepreneurship analyzes the structure of networks and causal factors, such as the effects of networks on entrepreneurial outcomes. Such a structural view in entrepreneurship in particular considers a macro view from outside networks. This structural research builds on tools of numerical social network analysis and causal factors.

Acknowledging the complexity of social worlds, a growing number of network researchers turn towards a qualitative methodological approach – non-numerical social network analysis. They criticize numerical methods for leaving out the culture and social world of meanings and narrowing the view on causal factors in an abstract and formal matter (Crossley, 2010a; Fuhse & Mützel, 2011). On the other hand, qualitative approaches seek to understand and explore the content, quality, and meaning of relationships: The context and nature of interactions, the practices, and how networks matter, come into play – what is going on within a network (Jack, 2010; Weishaar, Amos, & Collin, 2015). In this regard, qualitative approaches account for an agency and micro view on entrepreneurship from the inside of networks.

If we want to tackle the complexity of networks in entrepreneurship, we should acknowledge both views – those of structure (macro) and agency (micro). Therefore, mixed methods offer a silver bullet to integrate both views in research (Edwards, 2010; Jack, 2010; Fuhse & Mützel, 2011).

Combining both views enhances the generalizability and explanatory power of network studies. According to Molina-Azorín et al. (2012), another advantage of mixed methods lies in the chance to generate and verify a theory in one study and explore outcomes and processes. Mixed methods can also provide better inferences and provide diverging views, which help to modify conceptual frameworks.

Nevertheless, mixed methods are rare. The biggest barrier in conducting mixed methods refers to the absence of training and skills (Bryman, 2007; Molina-Azorín et al., 2012). Thus, this chapter will introduce the diverse practices and latest developments in mixed methods network

research from different disciplines, especially sociology. The chapter will focus on integrating the neglected qualitative approaches into mixed methods network-based research in entrepreneurship due to their potential for future studies. As noted, qualitative approaches have been disregarded in network research and in entrepreneurship – even within mixed methods (Bryman, 2007; Giddings, 2006; Johnson, Onwuegbuzie, & Turner 2007; Hesse-Biber, Rodriguez, & Frost, 2015). Therefore, although mixed methods target to combine qualitative and quantitative methods, this chapter concentrates on contributing to the need for skills in qualitative methods within mixed methods. Hence, discussions of quantitative methods or theoretical underpinnings are out of scope. The chapter will provide various examples and recommendations of applying mixed methods in network research, but cannot account for an extensive literature review of the field.

First, the chapter gives an overview on why network approaches matter in entrepreneurship and which research gaps exist. Then, it presents qualitative approaches of network research and their contribution for studying entrepreneurship. Next, the article guides researchers in evaluating and choosing from the different study designs for mixed methods research in entrepreneurship with several examples. The chapter ends with recommendations and a discussion of the application of mixed methods for network studies in entrepreneurship research.

2 Relevance and Gaps of Network Approaches in Entrepreneurship

In entrepreneurship we are experiencing a "dramatic increase" of literature about networks, making networks a key element of the research (Jack, 2010). With the predominant quantitative/numerical studies, a lot of research addresses the evolution, growth, alliances, and performance of enterprises as well as their financing and the social capital of the entrepreneur (see Jack, 2010 and Hoang & Yi, 2015 for an overview). But network research in entrepreneurship still shows promise to uncover untapped fields and neglected questions.

As mentioned above, research on contextualization and opportunities belongs to the most emergent topics in entrepreneurship (Busenitz et al., 2014). Based on the prevalent definition by Shane & Venkataraman (2000), the field of entrepreneurship is described as the discovery, evaluation, and exploitation of opportunities. A decade later, in a reflection about this seminal paper and the following research, Shane still notices a lack of studies on the sources of opportunities and their exploration to understand the different distributions of opportunities throughout space and time (Shane, 2012).

Studying social networks promises to contribute to findings on opportunities in entrepreneurship: Social networks have an effect on opportunity identification in terms of information access and

the valuation of opportunities (Shane, 2012). Networks also play an important role in providing access to the resources for opportunities (Jack, 2010), for example by the size of the network, its diversity (Hoang & Antoncic, 2003), or the kind of ties (weak, strong) a network consists of (Jack, 2010).

Shane (2012) and Shane & Venkataraman (2000) as well as several further scholars, acknowledge entrepreneurship as a process (Hoang & Antoncic, 2003; Hoang & Yi, 2015; Molina-Azorín et al., 2012; Sarason, Dean, & Dillard, 2006; Slotte-Kock & Coviello, 2010). However, research on processes remains a gap in entrepreneurship (van Burg & Romme, 2013; Jack, 2010; Zahra, 2007), especially when it comes to the identification of opportunities and the outcomes of such processes (Shane, 2012).

A central claim of Shane & Venkataraman (2000) was to bring together the view of individuals and the view of opportunities and see them as nexus in entrepreneurship. In this regard, following Alvarez & Barney (2007), as well as Klein (2008), Shane (2012) recognize that entrepreneurs also create opportunities. These opportunities are not objective and not independent of the individual.

In a recent review of the field of network-based research in entrepreneurship, Hoang & Yi (2015) especially encourage future research to examine the interrelatedness between the structural and the relational constructs of networks, for which the latter includes a network's content and governance.

What Hoang & Yi (2015) notice and what Shane describes with the nexus of opportunities and the individual points to a classic discussion within sociology – that of structure and agency, respectively culture. Opportunities belong to the structure of entrepreneurship and the individual, that is the acting entrepreneur, stands for the agent (Sarason et al., 2006).

In sociology, scholars emphasize either structure (macro level) or agency (micro level), thus seeing either structure or the agent as the dominant force in society. However, a growing group of scholars calls for an integrating view, acknowledging that both levels, that of structure and that of agency, are interdependent. We have to look at both levels and how these are interrelated to grasp the complexity of social reality. Social structure concurrently enables and constrains an agent.

Giddens (1984) stands as a prominent scholar of this thinking with his structuration theory. Sarason et al. (2006) and Jack (2010) apply structuration theory to entrepreneurship and claim that research would benefit from overcoming one-sided views of either structure or agency.

Similar to structuration, a group of sociologists introduced the relational approach to overcome the dualism of structure and agency/culture (Emirbayer & Goodwin, 1994; Fuhse, 2015;[2] Mützel, 2009). Relational sociology is based on social network research and introduced the notion of culture into social network analysis. Mützel (2009) recognizes economics as a very fruitful area for deploying relational sociology. Tatli et al. (2014) promote applying relational sociology in

2 Relational sociology captures different theoretical streams and is no homogeneous concept. Empirical applications are still emerging and developing (for an overview see Fuhse, 2015).

entrepreneurship with the agenda to bridge distant research streams of agency and structure, resp. qualitative and quantitative research. Following this, entrepreneurial phenomena are "produced by irreducibly intersubjective meanings, relational properties, and interdependent patterns and processes" (Tatli et al., 2014, p. 616).

Researchers, who call for structuration and relational sociology, emphasize that these lead to a bigger picture and better understanding due to the integration of different multilayered facets (Jack, 2010; Sarason et al., 2006; Tatli et al., 2014). These approaches take into account the complex dynamics between the levels of structure and agency/culture as well as between relationships and multiple actions of a network. As a result, structuration and relational sociology enable researchers to better tackle complexity in entrepreneurship. These approaches help to shed light on the nexus of opportunities and the individual (entrepreneur); and they help to tap into the different contexts regarding the exploration of sources for opportunities. Network research shows promise for methodological applications of a structuration/relational sociology approach because it is able to bridge the micro perspective of agency with the macro perspective of structure (Crossley, 2010a). This bridging calls for applying mixed method approaches in network research. Qualitative methods are rather associated with inquiries about the micro level and agency (inside-view) while quantitative methods rather address the macro level and structure of a network (outside-view). An integrative mixed methods approach empowers researchers to overcome a one-dimensional view on networks.

However, mono-method quantitative studies have dominated research on networks and entrepreneurship. Accordingly, a growing number of scholars are calling to integrate qualitative methods in network-based research in entrepreneurship and point to mixed methods study designs to account for different and/or complementing views (Gartner & Birley, 2002; Hoang & Antoncic, 2003; Hoang & Yi, 2015; Jack, 2010; Jennings et al., 2013; Molina-Azorín et al., 2012; Slotte-Kock & Coviello, 2010).

Therefore, I will first introduce qualitative approaches to network research and show how they contribute to entrepreneurship research, especially how they address the previously discussed gaps of context, process, and resources/opportunities.

3 Qualitative Approaches to Network Studies in Entrepreneurship Research

In this chapter, I describe the overall contribution of qualitative approaches in network studies tied to their methodological and epistemological backgrounds. Then, I show the relevance of qualitative approaches for research on networks in entrepreneurship and finally present fields of application with examples.

3.1 Contribution of Qualitative Approaches in Network Studies

Quantitative network analysis tells us a lot about the "how much" and "how many" of a network and yield to a better comprehension of a network through its structure. But drawing on the same methods like in physics or biology, such numerical analysis neglects socio-cultural factors. Qualitative approaches towards studying networks contribute especially to the comprehension of "why and how" (e. g. McKeever et al., 2014). This entails the qualitative parts of a network, its contexts and how people make sense of what is going on in a network (Crossley, 2010a; Hollstein, 2006). Quantitative, formal methods simplify relationships, e. g. as existing or not existing, resp. directed or un-directed, to fit them into an adjacency matrix for mathematical calculation. On the other hand, qualitative methods allow for detail and complexity. Like for ties, they convey their inherent meaning or content, such as a story, which sometimes is important to know "if we are to comprehend, explain or predict their effect," (Crossley 2010a, p. 10). Otherwise, even the same structural figuration of ties, e. g. the strength of a relationship measured by frequency of interaction, might lead to different effects. The underlying quality of a relationship, based on trust, affinity, shared content, etc. probably explains more than strength measured by frequency of interaction. In this regard, the dominant quantitative network analysis risks a narrowed, atomistic view on networks and individuals; whereas open qualitative methods help to explore and understand the network and its actors in depth and breadth.

If we lack prior knowledge of a network and its context, the standard procedures of formal network analysis risk validity errors: A priori definition and limitation may exclude explanatory and contextual factors, thus misguiding measuring of the right data. For example, the researcher's definition of the content of a relation differs from the respondent due to another understanding of what to regard as friendship tie or important flow of information (Wald, 2014). Another problem can arise from implicit assumptions, which are often made about the motivation for or positive impacts of networking (Jack, 2010; Wald, 2014).

As stated, if we want to grasp a fuller and complex picture of a network, we need to consider its environment and contextual conditions, especially its social and cultural context. This accounts for entrepreneurial practices and processes embedded in socio-cultural contexts and social networks imprinted with culture (Jack, 2010; McKeever et al., 2014; Slotte-Kock & Coviello, 2010). As relational sociology notes, "network structure is always intertwined with cultural forms," (Fuhse, 2015, p. 22). For example, political or cultural developments in the environment of entrepreneurs and organizations influence decisions. Embedded norms and practices or international differences impact entrepreneurial action. For example, to include the social-cultural context would go beyond an equation

of nation with culture (e. g. the USA and "individualism") and explore the meaning and operation of culture in the country context (Jennings et al., 2013). These cultural factors entail practices, meanings, and discourses (Mützel, 2009). We better understand the content and what is going on in a network, if we understand how these cultural factors affect actions and relations in a network and vice versa. Meanings mediate what information flows through a network; they are attached to particular relationships and communities (Crossley, 2010a; Weishaar et al., 2015). For example, someone shares information about a new record label only with people who like the same music. The same taste of music, often supported by a corresponding fashion style, enfolds the meaning.

Furthermore, something like information flow is mediated by the history and quality of social relations. Dividing tie strength into weak and strong does not grasp the multiple dimensions of tie strength, e. g. time spent, the emotional intensity, or the degree of reciprocity between individuals (Kim & Aldrich, 2005). Therefore, we should collect in-depth information on relationships and interpret the role and position of actors (Weishaar et al., 2015).

3.2 Relevance of Qualitative Approaches to Networks Studies in Entrepreneurship

Interest in studying networks in entrepreneurship is driven by the crucial role of networks in providing access to the resources of opportunities. The networks of an entrepreneur offer various, important resources throughout all phases of a firm's evolution. For example, they might help in recruiting personnel or reaching out to investors. Furthermore, they provide knowledge and information and thus prove highly relevant for the discovery and creation of opportunities. A central field of inquiry about entrepreneurial processes is start-up formation, covering opportunity discovery and the exploration and exploitation of opportunities. Edwards (2010), while referring to MØnsted (1995), notes that quantitative methods of network research are not appropriate for describing and analyzing in depth such dynamic processes. This applies particularly to the emergence of new structures because very weak or emerging ties often play a crucial role in provoking change, but quantitative methods struggle to record these ties and the change (Edwards, 2010; MØnsted, 1995). Qualitative methods and longitudinal research help us to close the gap on how networks develop over time and what this process consists of (Jack, 2010).

While notable research exists on the discovery, exploitation, and consequences of opportunities, the field of entrepreneurship still lacks insights on the source and nature of opportunities (McMullen, Plummer, & Acs, 2007; Shane, 2012). By going beyond reducing networks to resources (as in structural analysis), we encompass the qualities of certain resources and their opportunities.

These insights could answer how the sources find their way into the market or why there are more opportunities in some place and time (McMullen, Plummer, & Acs, 2007; Shane, 2012). Accordingly, we improve our understanding about what types of networks bring a competitive advantage to entrepreneurs (Bhagavatula et al. 2010).

As demonstrated, qualitative network approaches offer an inside-view of networks, provide depth and context. They contribute remarkably in bridging gaps in entrepreneurship research, e. g. the sources of opportunities or processes. Following the summaries of Stegbauer and Häussling (2010) and Hollstein (2006; 2011), qualitative approaches are of particular relevance in the following six areas of application in network research:

- The exploration of networks, which also helps in knowledge generation of a field prior to a quantitative study;
- Network practices, which entails the concrete interaction and communication patterns in context;
- Network orientation and assessments, which includes the interpretation and orientation of action by actors;
- Network effects, which tell us about why networks matter;
- Network dynamics, which covers process and change in networks;
- Validation of network data (from standardized research), field access.

4 Fields of Application and Examples of Qualitative Network Approaches

The following section introduces qualitative approaches to networks research. What becomes immediately apparent: "The definitive" qualitative network analysis does not exist and one can even doubt to term it a research field on its own because there are no established stand-alone methods with the exception of network maps (Diaz-Bone, 2008; Straus, 2006). In line with Hollstein (2011), I link qualitative approaches in network research with the common ground of an interpretivist research paradigm (resp. a narrative or constructivist paradigm). Different to the dominant positivist paradigm, an interpretivist methodology focuses on understanding the meaning of a social reality that is constructed by the actors. This leads to special attention towards contextuality to understand the subjective meaning of actors and their dynamic social reality. Thus, research follows an inductive and iterative path.

Corresponding with the broad range of methods applicable to retrieve data and different theoretical/conceptual approaches towards networks, the potential sources of qualitative data are diverse. If the goal of the study is related to network practices and effects, the study design will require data

on actually existing relations. If the study deals with e. g. network orientations and assessments, the researcher needs to collect data on the perception of relations by the actors (Hollstein, 2011).

Interviews represent the prevalent method to obtain qualitative data in network research, frequently integrated in ethnographic study designs or case studies. The widespread case studies on firms in entrepreneurship research often combine different data sources (data triangulation). Besides interviews with actors, secondary data like documents or data from observations provide a fuller picture beyond individual statements. How explorative a study design is and how much the researcher already knows about the inquiry guides how open and how standardized the chosen methods will be.

For example, McGrath & O'Toole (2013) integrated 19 semi-structured interviews and secondary data "to illustrate the complexity of network capability development" (ibid., p. 1141), using the example of all Irish micro-brewing companies. They detected moderating and context variables, which inhibit or engage network capability development. Their data collection and analysis was guided by previously developed themes, so was partly standardized.

In a study by Jack & Anderson (2002), seven established entrepreneurs were selected from a rural remote area for analyzing "the effects of embeddedness on the entrepreneurial process". The data collection lasted over three years to observe a process. The chosen entrepreneurs were interviewed in an open, ethnographic way and rich, secondary data was collected on the background and history of the entrepreneur and his firm. The authors drew on Giddens' theory of structuration and used grounded theory oriented data analysis to come up with a grounded model on the embeddedness of entrepreneurs.

Both examples are rather concerned with the conditions, premises, and antecedents of network development and structure. To analyze networks per se in a qualitative matter, the use of network maps and circles provide promising opportunities and gain momentum (Schönhuth et al., 2014). Usually, they represent egocentric networks in a visual way, but may picture a whole network as well. The actor (ego) is positioned in the center of concentric circles (Kahn & Antonucci, 1980) and describes his or her relations. This data collection process can be performed on a totally open basis (free cards with drawing and open interview) or with a high degree of standardization. For the latter, researchers use so called "name generators". This instrument has been established in formal network analysis for a long time (Heath, Fuller, & Johnston, 2009) and consists of questions on e. g. people important to a central actor. Additionally, "name interpreters" (ibid.) about the nature of relations, pre-defined categories (e. g. "family"), or non-human nodes (e. g. objects, events, places) can depict the network of an ego in further dimensions. Pies of the network circles, different colors, etc. mark these categories, making a complex network easier to grasp.

Network maps thus give a more holistic and detailed view of networks (Tubaro, Casilli, & Mounier, 2014). They enable the tracking of the contexts of origin of a network and its underlying indi-

rect and implicit influences (Heath et al., 2009; Schönhuth et al., 2014). Likewise, participants can more easily reflect on their network while it is mapped in front of them. They can change the structure of the network throughout this process, thus helping to improve validation (Schönhuth et al., 2014). Network maps also trigger narratives by participants, which often yield rich contextual data. Participants stay longer motivated or even experience excitement (e. g. Coviello, 2005), compared to an open or semi-standardized interview as well as solely filling out or answering surveys. Furthermore, developments in software (e. g. VennMaker or EgoNet) and hardware (e. g. touch screens) facilitate the elicitation of networks compared to the classic "paper and pencil" method (Hollstein, Pfeffer, & Behrmann, 2014). Tubaro et al. (2014) describes a web-based application of network maps. Although this may miss insights from face-to-face interviews, it can reach more people and demonstrates the future potential and field of application of visual methods in network research.

Coviello (2005) used qualitative data collection by network map to analyze the development of a family-owned business network over time. Within inductive, iterative in-depth interviews with the three founders/owners, she traced back the overall network evolution of this small enterprise over a four-year period in retrospect. The data collection and analysis was based on case research procedures and previous models of network development. The author did not just analyze the data in a qualitative way, but also in a quantitative way, which I will go into in the next chapter. The study revealed various results on different levels, e. g. that the network of the enterprise changed from an identity-based network to a more calculative network.

Qualitative approaches to network research offer a broad range of ways to collect and analyze data, combined in various ways. The nature of qualitative research also allows for a flexible adaptation of data collection. However, it is important that the researcher knows her general methodological background and is clear about the goal of the study (e. g. exploration vs. explanation). Furthermore, it is important that the researcher reflects on possible guiding models and theories to decide about the degree of standardization of the applied methods.

Of course, qualitative approaches in network research are subject to the same disadvantages as qualitative approaches in general: Small sample size, flexibility, and the reconstruction of subjective meaning miss the representativity and generalizability of findings in a statistical sense. Qualitative network studies risk replicating the "messiness of the social world" (Weishaar et al., 2015) and thus fall short of a clearer picture.

As stated previously, qualitative approaches recognize in particular the micro, respectively the inside or agency view of networks. To allow for an integrated view of the micro and macro level of a network and make its complexity graspable, I will discuss the application of mixed methods in the next chapter.

5 Mixed Methods for Network Studies in Entrepreneurship Research

This chapter explains the advantages of mixed methods in entrepreneurship research when studying networks. It will focus on how to apply mixed methods and guide through the various ways of conducting mixed methods, ending with advice for research designs.

Following the previously introduced structuration and a relational sociology approach towards networks, the micro and macro level, that is agency and structure, are interdependent. To understand the processes and complexity of entrepreneurial action within a network, we cannot think one level without the other.

Mixed methods promise to take account of the inside (micro) and outside (macro) view on networks, thus shed light on the nexus of both entrepreneur and opportunities. The next chapter will introduce mixed methods in network research, provide an overview of different mixed methods research designs and guide researchers in entrepreneurship in conducting their own.

5.1 Mixed Methods and their Contribution to Network Studies

Mixed methods in network studies address the integration of multiple views and research approaches by spreading beyond the levels of agency and structure. Although some state a whole "movement" has emerged around mixed methods in social science (Bernard, 2014), entrepreneurship research in general counted only about 11 % of papers using mixed methods between 2000 and 2009 (Molina-Azorín et al., 2012).

Mixed methods research can be defined as a "synthesis based on qualitative and quantitative research" (Johnson et al., 2007, p. 129). While combining methods is nothing new, the growing interest in mixed methods spurred a lot of discussion and fostered an institutionalization of the field with the development of its own research paradigm. Although some scholars reject the compatibility of qualitative methodologies like interpretivism with quantitative methodologies like positivism, most call to overcome these boundaries. The majority refers to pragmatism as the leading paradigm of mixed methods. Pragmatism puts the research questions into the center to guide the choice of methods. Researchers see methods as tools and combine them according to what best fits the needs and goals of the research (Johnson & Onwuegbuzie, 2004; Hesse-Biber et al. 2015; Onwuegbuzie & Leech, 2005). Meanwhile, scholars have criticized a delinking of pragmatism in mixed methods from its original philosophical origins, turning it into a "practical pragmatism" of "what works" (Greene & Hall, 2010; Hesse-Biber et al. 2015).

As an alternative, but equal framework to pragmatism, the dialectic approach (Greene & Hall, 2010; Hesse-Biber et al. 2015) links mixed methods more strongly to philosophical paradigms. The dialectic approach aims to traverse between different paradigms in a constant, spiraling conversation (Hesse-Biber et al., 2015). It does not aim to overcome different methodologies or to focus on convergence, but rather to seek new insights, surprises, and also dissonances (Greene & Hall, 2010). The overall goal of a dialectic approach in mixed methods studies calls for a strong reflection by the researcher on the links to theories, methodologies, values, etc., as well as her own standpoint within the research.

The core idea of mixed methods is that the strength of a single method or approach outweighs the weakness of another and thus leads to better validation. However, mixed methods do not target a simple, quick mix of "both worlds" of qualitative and quantitative methods (Giddings, 2006 Mixed methods study designs ask for a purposeful choice of methods to increase knowledge with a constant reflection of the researcher's questions and methodology. Therefore, a highly integrated or equal mix of qualitative and quantitative methods does not have to be the only or best way to conduct mixed methods research. Mixed methods designs can also be driven from a stronger qualitative methodology (qualitative dominant mixed methods) or quantitative methodology (quantitative dominant) (Hesse-Biber et al., 2015; Johnson et al., 2007).

In network analysis, the formal-structural analysis (e. g. density, centrality) will provide a picture of the networks' structure in a glimpse, while qualitative methods add detail and depth to the structural analysis. Qualitative parts of a study can problematize or even correct biases from structural network analysis (Crossley, 2010b), e. g. by questioning a priori definitions or limitations through explorative interviews, which yield into the development of a survey. Results from a quantitative study may point to outliers in data, leading to promising cases for in-depth research. The interplay of different research strategies allows for increasing validity of measurement and inferences or the corroboration of findings (Johnson et al., 2007; Miles & Huberman, 1994; Molina-Azorín et al., 2012; Wald, 2014).

Applying different research strategies can initiate theory development and lead to the discovery of new research questions through more breadth and range of inquiry (Molina-Azorín et al., 2012). If a researcher discusses the quantitative results of her study, qualitative insights, for instance from in-depth interviews, contribute to the discussion of results, e. g. through a better understanding of underlying motivations of actors. By combining qualitative and quantitative approaches, researchers even have the chance to generate and verify theory in the same study (Molina-Azorín et al., 2012; Wald, 2014). If the results from different methods do not lead to corroboration or verification, this challenges the researchers to come up with new, more complex explanations and might spur completely new thinking and theory (Miles & Huberman, 1994).

Hollstein (2014, p. 11) describes three conditions that define mixed methods network research:

- Studies contain qualitative (textual) and quantitative (numerical) data;
- Analysis used both strategies of qualitative/interpretivist (meanings, contexts, etc.) and quantitative/mathematical (network structure) approaches;
- Integration of data or strategies of analysis at least at one stage of the research process.

Wald (2014, p. 84) works out when it is best to use mixed methods in network research when confronted with the following study design issues:

- Research question: highly complex, partly clear-cut and partly open;
- Objectives: Confirmatory and exploratory;
- Research field/phenomenon:
  - › Well structured elements and unstructured elements;
  - › Existing, but incomplete prior knowledge of field;
  - › Subjective meanings and frameworks of relevance of the actors differ significantly and/or are unstable.
- Networks: No clear delineation of the system.

Wald (2014) adds that complexity not only refers to the first point on the list, the research questions. Complexity also manifests through the different questions a researcher wants to answer, or through analyzing a complex set of possible relations. Furthermore, complexity refers to the purpose of the study as a complex study tries to answer confirmatory and exploratory objectives.

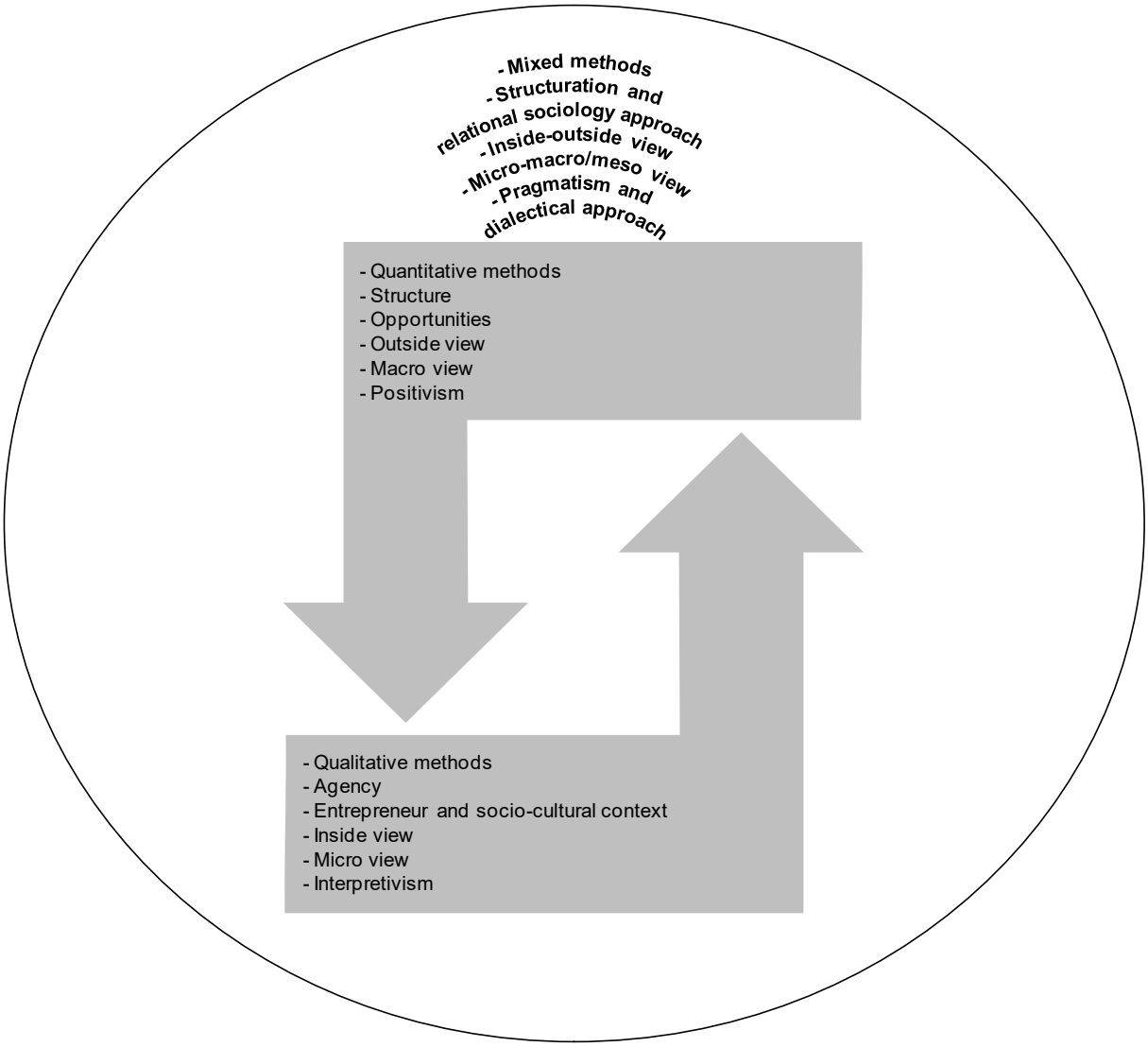
Before the chapter moves on towards the application of mixed methods research, Fig. 1 condenses the various concepts and categories introduced here. It shows how mixed methods "overarch" qualitative and quantitative approaches to tackle the complex interplay of structure and agency.

5.2 Application and Examples of Mixed Methods Research in Network Studies

Many ways exist to combine different research approaches for a better understanding of networks, thus to grasp their complexity. The field is evolving rapidly, has already produced an astonishing variety of implementations, and still leaves a lot of creative space for future research (Creswell, 2015; Straus 2006).

Edwards (2010) distinguishes between three generally different ways of conducting mixed approaches in network studies. This is based on the data at the start – qualitative or quantitative –

Figure 1: Integrated Approaches to Address the Complex Interplay of Structure and Agency in Entrepreneurship Research



and to what extent both data types are combined at the phases of data collection and analysis. She comes up with a type of study, in which qualitative approaches inform quantitative social network analysis or vice versa. A second type of study integrates qualitative and quantitative approaches at both data collection and analysis phases. And a third type of study mixes qualitative data collection with mixed-methods data analysis.

Hollstein (2014) depicts similar differentiations, but proposes five different ways of mixing methods in network studies, which will be described below and in Table 1. Her taxonomy is based on the classifications of Teddlie & Tashakkori (2006), Tashakkori & Teddlie (2009), Creswell & Plano Clark (2003; 2007), and Greene, Caracelli, & Graham (1989).

Following this summary of Hollstein (2014), criteria for the description and classification of mixed methods consist of:

- What the study combines – be it the number of strands or phases included
- Differences in implementation
- The use of an identical or non-identical sample
- The chosen stage of mixing methods within a study
- The overall goal of mixing methods (e. g. corroboration or focus on exploring a field)

The author then introduces the following five research designs: Sequential design, embedded, parallel, conversion, and fully integrated design (see Table 1). The research design types have no clear-cut boundary and different designs may partly be combined. Even the distinction between qualitative and quantitative data can be blurred (Wald, 2014). This relates to the big advantage of qualitative data over quantitative data: Qualitative data, such as interviews, relatively easy convert into quantitative data ("quantitizing") while the other way round ("qualitizing") makes sense only rarely.

Table 1: Mixed Methods Designs in Network Research
(based on Hollstein, 2014; Miles & Huberman, 1994)

Type of Research Design	Advantages	Disadvantages
Sequential Design a) QUAL → QUANT b) QUANT → QUAL	Easier to implement	Limits ability to make adjustments at later stages, takes longer
Embedded Design a) QUAL — (QUANT) → Mainly QUAL b) QUANT — (QUAL) → Mainly QUANT	Less demanding and costly	Mostly limited to narrowly focused research questions and well-defined boundaries
Parallel Design QUAL → QUAL → QUAL QUANT → QUANT → QUANT	Useful for triangulating data and checking for complementarity, usually takes less time	Considerable expertise needed for applying different approaches simultaneously
Fully Integrated Design QUAL → QUAL & QUANT → QUAL & QUANT	Most integration of qual and quant depicts complexity for the best, good for studying processes	Demanding for researcher in terms of complexity and coordination
Conversion Design a) QUAL, QUANT → QUANT b) QUAL, QUANT → QUAL & QUANT	Suited for various secondary data, saves time in data collection	a): quasi-mixed method that lacks true combination, narrowed results b): using one sample data for qual and quant analysis enhances validity

Sequential Design

The sequential design (Hollstein, 2014) corresponds with Edwards' (2010) description of studies where one approach informs the other. When starting with a qualitative, exploratory approach (version a in Table 1), e. g. open interviews or a qualitative analysis of documents help to explore and understand the research field. In network studies, researchers enhance the reliability of their quantitative evaluation of networks through qualitative pre-studies, where interviews inform the design of questionnaires.

When starting research with a quantitative, explanatory approach (version b in Table 1), that is, formal network analysis, the results give an overview of the research field and point to critical issues. In this way, the results guide the researchers in choosing participants for in-depth interviews, e. g. the central actors of a network (e. g. Kolleck & Bormann, 2014).

The sequential design is easy to implement, but limits the possibilities of changes to the study. Following a sequential design also takes longer because the second part of the study (and respectively the third, etc.) cannot start before the first has ended.

For example, Human & Provan (1997) conducted a case-based study using explorative, qualitative research logic on small-firm networks from the wood products industry. However, they used questionnaire data and descriptive statistics to validate data patterns from the previous qualitative research phase with open interviews. In this way, they discovered four types of network exchange in the qualitative first round. Sociometric data around these four types as well as further descriptive data was then obtained through the questionnaires in the quantitative research phase two. By using the network analysis program UCINET, the authors plotted a network graph and analyzed the sociometric data. In the end, they came up with a proposed model of SME network structure and outcomes with testable propositions.

To study an ambiguous network of cross-community youth leaders in Belfast, Smith (2015) used a three-step design of first qualitative, then quantitative, and finally again qualitative data collection, respectively analysis (qual → QUANT → qual). First, she had to specify the boundary and parameters of the network because the network itself was quite ambiguous and difficult to access. Therefore, she collected field notes and developed a network instrument in an ethnographic way within 8 months. She conducted over 90 informal and exploratory conversations and obtained external information sources on boundary specifications related to, e. g. time period, place, or actor attributes. In the second phase, she ran a survey with 59 participants, which was developed along the reoccurring themes from phase one. The analysis with the program UCINET incorporated more than 25 network measures. From this analysis composite indexes identified 9 interview partners with different network positions for the third, qualitative phase.

This last phase focused on variables that were previously identified for their explanatory contribution from the survey results and extended the network findings. An integrated analysis was achieved through exploration and comparisons of both interview and network data within the same matrices.

Embedded Design

In embedded (or nested) research design, one research approach dominates the whole study. A quantitative part enriches a qualitative study (version a), but the results remain mostly qualitative or vice versa with a qualitative part enhancing a quantitative study (version b). Embedded designs usually are less demanding, but often limited to narrow research questions and a well-defined research field.

Chell & Baines (2000) integrated open questions in interviews with multiple-choice questionnaires about the networking behavior of microbusinesses. The results were merely analyzed and discussed in a quantitative matter, establishing typologies and simple statistical connections.

Parallel Design

In a parallel design, qualitative and quantitative research strands take place independently from each other, often at the same time. Interim results can inform the other strand, but usually the analysis of the strands happens separately. The design of the study is not built on a continuous exchange between both strands. Nevertheless, the researcher compares the results of both strands. Therefore, parallel designs in particular check the complementary of results and provide a comprehensive understanding rather than to a convergence of findings. They allow exploratory and confirmatory research questions to be addressed. However, such research designs ask for substantial knowledge in applying qualitative and quantitative approaches at the same time.

Bernardi, Keim, & Klärner (2014) implemented a parallel study design when investigating network effects on fertility decisions and intentions, by analyzing egocentric networks of men and women. They used one sample of interview partners and conducted semi-structured interviews together with a socio-demographic questionnaire, network grids (for collection of an ego's alteri – that are his or her connections), and the evaluation of concentric circles (network maps). This mixed data collection provided direct qualitative and quantitative data. Additionally, qualitative data was quantified for the overall analysis of structural data. Additionally, the authors interviewed a subsample of relevant members of an ego's social network (his or her alteri), which partly was difficult to access, but yielded further information from another perspective.

Fully Integrated Design

A fully integrated research design, as the name indicates, exhibits a high degree of integration between qualitative and quantitative approaches. Qualitative and quantitative approaches relate to each other at several points. Their analyses are interwoven and inform the next phase of research. The design takes full account of both parallel and sequential research designs, but has to manage this accordingly. Thus, this design is quite challenging for the researcher. However, with the constant and interactive integration of different approaches, it depicts complexity in a superior way, compared to the previously introduced designs. The integration of the sequential design makes it perfect for longitudinal studies, such as network processes.

Avenarius & Johnson (2014) deployed this approach in a study on "adaptation to new legal procedures in rural China", which took place over three years. This multi-step and multi-stage research design was not planned straight ahead, but modified dynamically, in accordance with the findings. It included five data-collection instruments from ethnographic observation to semi-structured and structured interviews. Some instruments were used continuously over two or three of the three years. Quantitative and qualitative analyses were conducted on data from every data-collection and informed the next stages as well as the different approaches at several times. Furthermore, the integration of different methods and crossover analyses yielded comprehensive inferences. It allowed an understanding of social structures and social cognition – "the meaning of social relationships in the context of rural Chinese culture" (Avenarius & Johnson, 2014, p. 198).

Conversion Design

This research design incorporates the quantitizing strategy (respectively the qualitizing strategy) by converting qualitative data into quantitative data for analysis. A simple conversion design only takes account of one style of analysis: Qualitative data that have been transferred into quantitative data are only analyzed in a quantitative way. Thus, Hollstein (2014) regards simple conversion designs (version a in Table 1) not as "typical" mixed methods design. The qualitative information is lost for the results, but may have been helpful during data collection, e. g. to avoid misunderstanding through a misguiding survey, which allows for no check backs by research participants. "True" mixed conversion designs (version b in Table 1) analyze in a qualitative and quantitative way. They often involve a few, alternating rounds of data collection and analysis.

Both versions save time and are able to encompass a range of secondary data such as emails or other documents. This opens space to use a variety of already existing qualitative data for a structural analysis, which is promoted by the relational sociology approach of network studies (see

above). The data in such studies often rather describe cultural or conceptual networks or models than actual networks of interaction (Edwards, 2010).

Weishaar et al. (2015) used secondary data such as drafts and websites to convert these textual into relational data in a study on European policy networks. A plagiarism detection software tool helped to detect relationships/collaborations between actors based on similar documents. From these data, the researchers plotted a network, which informed the sample for in-depth interviews. These led to validation as well as contradiction of previous interpretations, revealing what was not stated in the publicly available documents.

A promising application of network studies with conversion design lies in QCA (Qualitative Comparative Analysis), which entails a mixed method in its own (Hollstein & Wagemann, 2014). QCA performs "alternate rounds of qualitative analyses involving the reconstruction of individual cases, on the one hand, and quantitative analyses on the other" (Hollstein, 2014, p. 17). QCA supports especially studies of medium-sized samples to understand network effects and to develop typologies.

Hollstein & Wagemann (2014) made use of QCA in a network study on the conditions of successful labor market transitions of young adults with low or no educational qualifications. Qualitative and quantitative approaches towards the analysis of secondary data were merged to systematically compare cases and explain individual behavior.

Coviello (2005), as described in the previous chapter, used qualitative data and network maps in studying the process of network building of a small business. The qualitative data was converted into quantitative measures, such as betweenness centrality or frequencies. This informed the generation of "frames for the analysis of the origins and outcomes of network processes" (Coviello, 2005, p. 51), for which the author drew on a theory-based concept from literature. Furthermore, the data provided a reconstruction of the evolution of individual egocentric networks and the resulting changing power structure in the firm.

5.3 Applying Mixed Methods in Network Studies: Advice and Disadvantages

Mixed methods in network research open a huge, fruitful space for analyzing the role of networks in various fields of entrepreneurship research. They are capable of integrating questions that address the structure as well as the content, context, and agency of networks.

Compared to a single research approach, mixed methods have the potential to increase the overall validity of a study. Fully integrated research designs in particular show promise in taking full account of this and allowing for the complexity of a given phenomenon to be grasped most

fully. Using the same sample throughout the study in general can enhance validity and positively affects generalizability (Wald, 2014).

Even when starting with quantitative data collection, it might make sense to collect some qualitative data (documents, interviews) to gain knowledge of the research field. This can lead to an increased reliability via an optimized survey questionnaire.

Reliability will also be enhanced if researchers check network maps with participants a second time or even multiple times (Edwards, 2010, see Coviello, 2005). In this way, participants can point to missing, inaccurate, or forgotten data.

Egocentric networks provide rich understanding of a network, especially with the various possibilities of integrating visual material such as network maps and applying more or less standardized data collection to a study's need. Nevertheless, it takes a lot of time to conduct the research and the generalizability of the results is limited. Complete egocentric network analysis needs to gather all alter-alter relations (not just the friends but "friends of friends") to make advanced statistical inferences on the structure of an overall network (Diaz-Bone, 2008). In bigger networks, it is unfeasible to collect all alter-alter relations as these usually grow exponentially. This points to a basic problem of network research – that of boundary setting (Laumann, Marsden, & Prensky, 1992). When approaching a very ambiguous network, the problem of setting the limit of the studied network can be decreased by intensive exploratory research in advance (see Smith, 2015). A lot of studies seem to address the issue of network boundary setting by deliberately choosing small networks and readily comprehensible settings like SMEs (Coviello, 2005), or rural areas (Avenarius & Johnson, 2014; Jack, 2010).

A similar strategy might apply when dealing with the difficulties of longitudinal studies. Studying processes and the evolution of networks is an important, but often neglected perspective due to the time constraints of data collection. Focusing on small networks might enhance retrospective interviews on events. However, recall bias of participants is an issue not to be ignored. Using network maps within multiple, iterative network maps will help research participants to remember information regarding processes. Furthermore, implementing multiple name-generators can enhance the risk of incomplete data collection (Elfring & Hulsink, 2007).

Turning to affiliate membership data (e. g. event-based), or documents like emails, resolves the problem of relying on collecting network data by interviews and egocentric network evaluation. This saves a lot of time and bypasses further issues. Nevertheless, this kind of data is not suitable for all research questions and may miss the depth of interactive, dynamic interviews.

Bernardi et al. (2014), whose parallel study design was introduced previously, point to four explicit challenges of mixed methods research they encountered in their study: Research philosophies, sampling, data management, and under-exploitation of data.

Highly integrated mixed methods studies ask for skills of both qualitative and quantitative research. Thus, and for enhancing triangulation through researchers, teams with several members often conduct mixed methods studies. Following Bernardi et al. (2014) the different paradigm backgrounds of the team members (either positivist or interpretivist views) can lead to different interests for which enough time for negotiations should be accounted.

For the sampling, the team agreed upon a feasible compromise combining a qualitative sampling strategy with a quantitative strategy by setting a limited amount of respondents with certain representative characteristics.

The different data types require refined data management because textual and numerical data are stored in different formats and programs. This can lead to the same information being stored in both data sets, but in different software and formats. The editing of the data while keeping track of them becomes especially difficult.

Finally, the huge amount of data, notably the quantity of text derived from what may be a relatively high number of interviews, risks an under-exploration of data. Due to time constraints etc., data analysis needs to focus and may miss further, interesting results.

To decide for or against conducting mixed methods research and facing the challenges, Wald (2014) suggests the following: The researcher should evaluate the availability of the resources, such as the time, costs, skills, and willingness of researchers. The optimal proportion and integration of qualitative and quantitative instruments depends on the individual case, guided by the research questions and goals. Similar to Bernardi et al. (2014) on paradigms, Wald (2014, p. 73) suggests that all team members take care to specify and "reveal their (implicit) interpretation schemes and their pre-structuring of the research object and problem".

The integration of qualitative and quantitative approaches usually requires much work and time. But, mixed methods can overcome the weaknesses of a single approach. Nevertheless, reducing the weaknesses of single approaches comes with the new price of the challenges discussed earlier.

6 Conclusion

Understanding entrepreneurship embedded within its environment and exploring opportunities of entrepreneurship are the most dynamic areas for research in the field currently. Network research contributes to this development in various ways, e. g. by shedding light on the access to information. The research on networks has mostly been driven by mathematical, quantitative structural analysis, coming from an outside and macro view on networks. With qualitative approaches to studying net-

works, researchers rather address an inside and micro view on networks with a focus on the interactions of individuals. But both levels of networks, micro and macro, resp. inside and outside, or agency and structure, are interrelated. Acknowledging this interdependence accounts for the complexity of entrepreneurial action. Relational sociology and the concept of structuration guide us in combining both levels. They help us to address the research of networks methodologically: Pragmatism and a dialectical stance call for the integration of qualitative methods and quantitative methods.

Mixed methods of integrated qualitative and quantitative approaches address the interplay between agency and structure at its best. In this way, mixed methods enable us to grasp the complexity of entrepreneurial action better than single approaches. They integrate the overall picture of a network's structure with a detailed in-depth view on what is going on in a network. This provides both an inside- and outside-view of networks, yet acknowledging that the outside and inside view are basically versions of the same (Edwards, 2010).

Various instruments and ways to conduct mixed methods enable tailored research designs such as a sequential, embedded, parallel, fully integrated, or conversion design. Qualitative approaches have been neglected and can provide a valuable contribution to future research, especially in studying processes in networks or the sources of opportunities. Researchers can contribute to a greater understanding of entrepreneurial phenomena and current research gaps if they integrate qualitative approaches in mixed methods to a greater extent. Network maps or QCA as well as conversion designs sound promising to open space for a further development of methods.

However, conducting mixed methods is still demanding and not an all-purpose tool (Wald, 2014). Studies should be planned deliberately and thoroughly within a conceptual framework determining the range and functions of methods (Häussling, 2014), but stay open for unplanned learning or even discrepant results. The latter tends to happen with mixed methods design rather than with a mono method design. Nevertheless, if we want to grasp the complexity of the social world, embracing contradictions can help us to discover new perspectives and understanding of a phenomenon. For example, a contradictory finding may dissolve into the acknowledging of both "x" as well as "y" and yield new conceptual models or theory.

Acknowledging this "both/and" perspective, accepting converging and diverging findings (Johnson, 2015) entails the greatest opportunities as well as challenges in mixed methods. What is holding us back in making full use of these opportunities is not the incommensurability of methods or methodologies, but the constraints of researchers – be it a lack of time, skills, or open-mindedness. Researchers will become more aware of the possibilities and limitations of different methods and methodologies through supporting the teaching and spread of mixed methods skills. Thus, mono method studies can benefit from mixed methods training, too.

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Paper Two

Local Communities as Knowledge Resource – Exploring the Meetup Network of Berlin

Abstract

In today's world, knowledge creation has become a crucial part in innovation management and entrepreneurship as it lays the foundations for innovation and acting upon opportunities. A growing research stream has acknowledged the role of the socio-cultural environment and external sources for firms and entrepreneurs. Communities have been reported as beneficial external sources to tap valuable tacit knowledge. However, local communities have been underexplored as sources. This research reveals the potential of local communities as resources with the case of the growing Meetup network. Meetup is an online platform that helps people to organize local groups and meetings. For the evolving start up city of Berlin, this study detects its tech and starts up communities and maps their change with via the Infomap algorithm and alluvial diagrams for affiliation networks. It also provides insights into the content of the communities and their emerging topics. The paper sketches out ways to unlock potentials for organizations from such Meetup communities.

Keywords: Networks; Regions; Knowledge; Community detection; Communities of practice

1 Introduction

The creation of knowledge to act upon entrepreneurial opportunities has been a focal point in innovation management and entrepreneurship because knowledge is a crucial factor for competitive advantage (Barney, 1991; Drucker, 1993; Grant, 1996; Leonard-Barton, 1995; Nag & Gioia, 2012; Nonaka, 1994). Although firms and entrepreneurs are embedded in a local, socio-cultural environment, their local context as a knowledge source has been acknowledged by only few authors (McKeever, Jack & Anderson, 2015; Saxenian, 1996; Simard & West, 2006; Weiner, 2016). Unlocking more local knowledge of external sources is important for innovation and success (Laursen & Salter, 2006; Vanhaverbeke, 2006). While local tech and start up communities hold promise as invaluable sources of knowledge that entrepreneurs and firms are part of, we lack understanding of these sources for innovation and entrepreneurial opportunities.

Information is like a stream of messages, however knowledge is created in practice and social interaction (Nonaka, 1994). Literature has paid much attention to the organization and its creation of knowledge, especially hard-to-copy tacit knowledge (Grant, 1996; Howells, 1996; Nag & Gioia, 2012; Nonaka, 1994; Nonaka & von Krogh, 2009). In addition, communities of practice have been discussed as a promising way to foster the generation and distribution of such knowledge (Wenger, 2009). Because a broad and wide exploration of knowledge proves beneficial (Laursen & Salter, 2006), organizations have turned to external sources of knowledge, such as suppliers, customers, or universities (von Hippel, 1988; Leonard-Barton, 1995). For the open innovation literature such external sources are key for innovation development. They also go beyond accessing knowledge by targeting ideas, e. g. through promoting co-creation in online user communities or making use of open source communities (Bogers et al., 2016; West & Lakhani, 2008).

Whereas research on knowledge in innovation management has mostly focused on an organizational view (Nag & Gioia, 2012) entrepreneurship research has focused on the individual (Dodd & Anderson, 2007; Hoang & Yi, 2015). Authors often locate external sources of knowledge within the personal networks of entrepreneurs and discuss their role for entrepreneurial opportunities (Hoang & Yi, 2015; Jack & Anderson, 2002; Jack, 2010). A growing research stream acknowledges the socio-cultural context of entrepreneurs and sees networks and communities as central foci of entrepreneurs being embedded in their environment (Dodd & Anderson, 2007; Granovetter, 1985; Jack & Anderson, 2002; Leyden, Link & Siegel, 2014; McKeever, Anderson & Jack, 2014; Uzzi, 1997). As communities hold great promise as sources for knowledge and opportunities, it is time for more research on communities, including spatial and temporal aspects (McKeever, Jack & Anderson, 2015; Shane, 2012). Also given that studies about external communities have increased in the open innovation literature, a need exists for more research on communities and their structures to unlock specialized and tacit topic knowledge (Bogers et al., 2016; Lyons et al., 2012).

Meetup is an international platform to help people organize local communities and events via the web. It has been growing dramatically the past few years[1], now hosting more than 260,000 groups in about 180 countries.[2] Interest-based groups of various categories exist, but start up and tech topics have been prevalent. Be it a start up pitching event, talks by professionals on their business cases, or a coding school, Meetup groups engage local communities with their self-organized and informal character and by fostering learning, networking, the creation and exchange of knowledge. They reflect the local tech and start up scene of a city as actors from the field organize them

1 https://www.fastcompany.com/3064063/behind-the-brand/how-meetup-ceo-scott-heiferman-used-a-staff-uprising-to-create-a-better-pro (10/17/2016, retrieved on 10/31/2016); http://www.forbes.com/sites/alexkantrowitz/2013/04/23/meetup-ceo-points-to-booming-growth-as-his-company-hits-100-million-rsvps/#1c8a4409321 (04/23/2013, retrieved on 10/31/2016).

2 https://www.meetup.com/about (October 2016, retrieved on 10/31/2016).

and take part. Furthermore, they are a local resource for firms and entrepreneurs that promote entrepreneurial action, especially for people entering the field or new in town.

For these reasons, studying the Meetup communities of a city provides us with an overview of a city's start up and tech scene and helps to tap valuable knowledge sources and opportunities. The goal of this research is to explore and describe local start up and tech communities to foster better understanding of these communities so entrepreneurs and firms can act upon them. Meetup data, including group and event information, is publicly available, so we have access to the content of such communities and can depict their structure. I chose Berlin as a case, because it has become one of Europe's most important start up cities within the last years and hosts a notable, but still relatively young Meetup network. This study draws a map and uncovers the structure and content of the Berlin Meetup scene via network analysis and community detection. It answers questions about which sub-communities exist and how they have evolved in the last few years. Which groups are driving the network? And which topics generally and recently animate the most within these groups?

This study sheds light on the potential of knowledge sources within the local environment of firms and entrepreneurs. It offers an overview of Meetup networks as an example of communities of practice that are easily accessible and already host several players from the tech and start up scene. For this reason, Meetup helps firms and entrepreneurs to define their role within their regional context and interact in a meaningful and successful way. This study may benefit people working in regional development and potential entrepreneurs, as well as people who are trying to get an overview and/or entry into the tech and start up world. It will also provide insight into using Meetup data as a source for the development of trending topics.

While the study is restricted to Berlin, it demonstrates how to use a relatively new method to detect communities and map their changes over time. Meetup's publicly available data can also be scaled to larger amounts of data and other questions.

After the literature review, I will describe how I derived the data from Meetup and created a meaningful sample. I will then map the Berlin Meetup network, first clustered by their top topics and then by groups, based on members' event co-attendance. In the following, I will trace the dynamics of communities within the last years and close the analysis by reporting on recent emerging topics.

2 Literature Review

This section will provide an overview of knowledge sources and external communities as a promising source for firms and entrepreneurs. After that, I introduce the science of community detection.

2.1 The Role of Knowledge Sources

Knowledge has become one of the most important assets of a firm in today's world, especially in growing dynamic markets. In our "knowledge society", knowledge is the source for productivity and innovation (Drucker, 1993). In this sense, knowledge is the antecedent of innovation and usually has to be applied, e. g. in a process of recombination, to generate innovation (West & Bogers, 2014). Knowledge is also crucial for strategic positioning (Porter, 1980) and foresight, such as scanning for weak signals (Ansoff, 1980). In innovation management literature, external knowledge often relates to technological or market knowledge (Chesbrough, 2003; West & Bogers, 2014). In entrepreneurship, knowledge is discussed within the context of entrepreneurial opportunities because (prior) knowledge is needed to act upon them (Eckhardt & Shane, 2010).

The competitive advantage of knowledge is closely linked with the imitability of knowledge. A broad scope and diffusion of knowledge is harder to imitate (Grant, 1996; Nonaka, 1994). While explicit knowledge can easily be communicated and codified, tacit knowledge cannot directly be transferred to explicit knowledge, thus is hard to imitate. It is subjective, embedded, contextual, and learned in practice; a change of new meanings and contexts generates new knowledge (Leonard & Sensiper, 1998; Nonaka, 1994; Nonaka & Toyama, 2003; Polanyi, 1966). Following Nonaka & Toyama (2003, p. 2), knowledge has to be created in a process of "dynamic interactions among individuals, the organization, and the environment".

While entrepreneurship research has focused on an individual view towards knowledge and opportunities (Dodd & Anderson, 2007; Hoang & Yi, 2015), innovation management particularly studied the role of the organization in knowledge generation (Nag & Gioia, 2012). In entrepreneurship literature, calls have been arisen to pay more attention to the dynamic social-cultural context of entrepreneurship (Bruton, Ahlstrom & Li, 2010; Jennings et al., 2013; Johannisson, 2011; McKeever et al., 2014; Steyaert & Katz, 2004) and the nature and sources of opportunities (McMullen, Plummer & Acs, 2007; Shane, 2012). The acknowledgement of this environment has been reflected most often by studies about entrepreneurial networks – here, the entrepreneur is embedded in networks (Dodd & Anderson, 2007; Granovetter, 1985; Leyden, Link & Siegel, 2014; Jack & Anderson, 2002; McKeever et al., 2014; Uzzi, 1997). In innovation management, the environment has been more in focus as important source for knowledge. The market with its customers, technology experts, universities, other companies, vendors, etc. have been acquired as a resource for knowledge and information (von Hippel, 1988; Leonard-Barton, 1995). The last decade saw a movement towards opening the organization to the environment within the open innovation research stream (Chesbrough, 2003). Firms started to embrace external sources of knowledge;

furthermore they reached beyond searching for knowledge and actively engaged in knowledge and innovation co-creation with external actors such as (potential) customers (West & Bogers, 2014). Both entrepreneurship and innovation management have pointed to networks and communities as important unit of analysis for interacting with external sources of knowledge. In the following, I will describe these loci for knowledge and will again pick up Nonaka & Toyama's (2003; 2005) dynamic view of knowledge creation.

2.2 Networks and Communities

Networks represent the relationship of more or less connected actors, but can also be transferred to non-social entities. Networks provide us with an overview of social interactions by revealing the structure and thus the social environment of the actors. The network approach underlies the notion of interdependent actors whose structural environment might hinder or advance them in their actions (Wasserman & Faust, 1994). Generally, communities have been described as entities of networks, whose nodes are more densely connected with each other than with nodes outside their community. Networks inhabit many communities and, according to their density, can be described as weak or strong. However, there are no clear definitions and the study interests guide a researcher's definition (Barabási, 2015; West & Lakhani, 2008).

Entrepreneurship research has spurred a lot of research into networks and the role of networks for entrepreneurial resources (Hayter, 2013; Hoang & Yi, 2015; Jack, 2010; Schildt, Zahra & Sillanpää, 2006). A special focus has been put on the social capital of entrepreneurs allowing them to access resources of weak ties within their network. Here, and beyond entrepreneurship, a lot of research has dealt with an actor's network position, especially the notion of "structural holes" to bridge a hole in network structures for importing and detecting opportunities and innovation (Burt, 1995; 2005). Vedres & Stark (2010) have challenged this notion and instead introduced the concept of "structural folds" as a fruitful network position for innovation: It is rather a folding of network structures than a bridging that generates innovation through the recombination of knowledge practices from and within different groups.

Innovation management turned to networks and communities as sources for knowledge, mostly with an active approach by setting them up. Networks as external resources have been notably discussed as inter-firm networks, e. g. to acquire technological information. The open innovation literature has moved to external communities, leaving the organizational-centric view towards networks and communities (O'Mahony & Lakhani, 2011; Vanhaverbeke, 2006; West & Lakhani,

2008). However, there is still a lot of potential to study communities in the future (Bogers et al., 2016; Lyons et al., 2012). Bogers et al. (ibid.) call for more research about communities, their structure, and interfaces with the organization, and point to studying the benefits of communities of practice for specialized and tacit topic knowledge.

Expanding the previous formal description of communities from a network analysis approach, I want to move toward better understanding of communities in the context of knowledge creation in entrepreneurship and innovation management. While a community in the general, "technical" sense of network analysis merely means dense relationships between nodes (actors), the classic sociological definition of a community is narrow. Gläser (2001) notices a continuous opening of this traditional definition of communities, in which people are bonded by shared values, mutuality and emotions, as well as frequent interactions. Following Gläser (ibid.), these features have been continuously undermined, like in the study of science (e. g. citation studies), which speaks of "scientific communities". Breaking different concepts of community down, he (Gläser, 2001, p.6) comes to the following parsimonious definition:

> *"A community is an actor constellation that consists of individuals who perceive to have something in common with others, and whose actions and interactions are at least partially influenced by this perception."*

Although it is difficult to draw borders, Gläser describes four subtypes of community: "Traditional" communities, social movements, communities of practice, and producing communities. The latter includes scientific communities and open source communities and their members relate to each other by a common subject matter of work (i. e. common body of knowledge) and are coordinated by this subject matter. Communities of practice relate to each other through common activity and are partially coordinated by institutions.

The concept of communities of practice (Brown & Duguid, 1991; Wenger, 1998) has been referred to in innovation management several times as a place for knowledge learning as well as innovation (O'Mahony & Lakhani, 2011; Vanhaverbeke, 2006; West & Lakhani, 2008). Communities of practice are mostly discussed from a firm-centric perspective, describing the organization as a "community of communities" (Brown & Duguid, 1991). However, these communities exist not just within organizations (e. g. also in an informal leisure context), integrate people from outside the firm, and are important boundary spanners between the organization and its environment (Brown & Duguid, 1991; Wenger, 1998).

Also Nonaka & Toyama (2003) refer to communities of practice, but weakening the learning aspect of communities of practice and introduce their own concept of "ba" to describe a physical

place of knowledge creation. Ba is "a shared context in motion, in which knowledge is shared, created, and utilized" (Nonaka & Toyama, 2003, p. 6). Here, knowledge in practice takes place through interactions between individuals, the organization, and the environment. Ba is described from the view of the organization, but not limited to it as it has fluid boundaries with its environment. Following this, the firm and its managers can interact with, e. g. suppliers, customers, universities, and local communities. In this regard, direct experience and physical interactions are important to share the context (ibid., p. 7).

If we want to make use of the local context of firms and entrepreneurs in knowledge creation, local communities held great promise and provide physical interactions. Some evidence exists, that such local communities can make the difference in entrepreneurial success (Saxenian, 1996; Weiner, 2016), but innovation management and entrepreneurship needs more research focusing on the regional, respectively city-level (Acs & Audretsch, 2010; Autio et al., 2014; McKeever et al., 2014; Steyaert & Katz, 2004; Vanhaverbeke, 2006).

2.3 Community Detection in Networks

If organizations want to engage with local communities as external sources for knowledge creation, we first have to find these communities and understand them. Network analysis provides ways to reveal the underlying community structure of a network, it "ground truth" (Barabási, 2015).

Community detection (or clustering) for networks has spurred a lot of research among different scientific fields with a huge variety of approaches within the last years, but lacks clear definitions or theoretical framing. In general, the goal of community detection lies in finding subsets of nodes of a network, called communities, respectively clusters or modules, based on similarities of nodes (e. g. homophily), especially being densely intra-connected than compared to the rest of the nodes. Scientific networks have been a prominent example for analyzing research groups and fields. For example, analyzing co-authorships can discover groups of scientists. But networks of papers or journals can also tell us more about the structure of science: Rosvall & Bergstrom (2008) analyzed more than 6 million citations between more than 6,000 journals. Based on these journal-by-journal relationships, they were able to draw a network of research fields detached from previously given taxonomies of science. In their "map" of research fields, the links and sizes of modules (based on the journal relationships) are depicted according to the traffic of citations and their flow – that is the time a random surfer or reader would spend in this module (similar to the idea of PageRank by Brin & Page [1998]). In Rosvall & Bergstrom's analysis, most flow is generated by the fields of medicine,

physics, and molecular and cell biology. While molecular and cell biology includes 723 journals about genetics, cell biology, biochemistry, immunology, and developmental biology and a random surfer would stay 26 % of the time in this field, the field of tribology consists of only 7 journals and a surfer would spend only about 0.064 % of the time in this field (Rosvall & Bergstrom, 2008, p. 5). Analyzing a subset of the social science fields, the authors receive a more detailed picture about the modules. For example, while psychiatry and psychology are linked via sociology, sociology breaks into the fields of behavioral and institutional sociology (ibid., p.7). In this way, community detection can discover important fields and their relationship and provide an overview of a network that would otherwise be difficult to grasp.

3 Data Collection, Sample and Methodology

To explore entrepreneurial activities and resources, I collected data from the event-based community platform Meetup about Berlin. Affiliation data of members and groups, respectively events, as well as topics were analyzed using methods from network research. In the following, I introduce Meetup and how the data from Meetup was collected and analyzed. I will then describe the Berlin Meetup scene and the chosen sample of categories and groups.

3.1 Meetup

Meetup.com was founded in 2001 in New York and has expanded to about 180 countries with more than 27 million members and currently more than 260,000 groups with about 620,000 monthly meetups (see footnote 2). Tech meetups make the biggest group of events organized via meetup.com and several Meetup groups have established local chapters, like the “Hackers and Founders Meetup”.

Everyone can sign up to Meetup, find groups and interesting events within the local area or open a group and start organizing so called meetups on his or her own. Groups and their events are arranged into one of 33 categories. In this way, Meetup is a social network for both offline (the events) and online interactions – what Liu et al. (2012) termed “event-based social network”. In an analysis based on more than 5 million Meetup events in the US happening at the end of 2011, the authors notice that online and offline social interactions are both extremely local, positively related and mostly located in urban areas. The network analysis revealed that the offline network is denser

than the online network and that the users connected online via groups are more cohesive than users connected via the events, meaning users tend to share more similar interests if they belong to the same online groups than if they attend the same events (Liu et al., 2012, p. 6). Furthermore, the authors observed a heavy-tail distribution of Meetup groups and events, which means that a lot of events and groups have only a small number of participants and a few attract a lot of participants.

Except from general socializing groups, meetups are interest-driven and mostly run by people passionate about a topic in their leisure time. Most meetups are free. For meetups in business-related fields, companies often act as sponsors in providing space and drinks. Some firms started organizing their own events to connect with the local community and become visible for possible employees. Especially if we think about the high number of tech and developer meetups, those communities attract a high number of in-demand work forces within the digital tech and start up field. As such, Meetup can be seen as an indicator of the digital tech and start up scene and can help us better understand and picture local communities[3] or point us to the human capital traction of a city.[4]

3.2 Data Collection and Sample

I constructed two network data sets: The group networks data is based on event attendance (positive RSVPs) of group members between 2012 and 2015. The other dataset describes the topic network of 2015, based on mutual chosen topics of groups. Furthermore, I used separate group data from September 2015 to the end of August 2016 for an analysis of emerging group topics within the Berlin Meetup scene.

Meetup organizers can choose from numerous topics to describe their group, which then will be allocated into one of 33 categories with the "tech" category probably being the most popular worldwide. According to an analysis of the company RJmetrics on Meetup data from 2014 on the tech category (see footnote 4) meetups ascended steeply with a 89 % growth in 2013 alone. Most members of tech meetups, that is 67 % of the worldwide members, state the United States as their residency. Based on the same analysis, Berlin scored number nine in Meetup memberships outside of the US back in 2014. If we take this data from total group members of the tech category, which was 32,652, and compare it with my data from two years later (July 2016), group membership in Berlin increased by more than six times up to 203,397. However, these numbers are the sum of members of each group, not distinct group memberships so each person counts multiple times when signing up for multiple groups.

3 http://www.nesta.org.uk/blog/using-meetup-data-explore-uk-digital-tech-landscape (05/13/2015, retrieved on 10/31/2016).
4 https://blog.rjmetrics.com/2014/04/23/whos-meeting-up-a-ranking-of-top-startup-cities (04/23/2014, retrieved on 10/31/2016).

For the analysis of the Berlin Meetup scene, my scope was beyond the tech meetups and I took account for 11 of the 33 Meetup categories. This includes more than half (828) of the overall 1,413 groups. Table 1 lists all categories with its total numbers of groups and the number of filtered groups considered in the analysis to reflect active ("offline") membership. Besides the dominant tech category, I included the second largest category of career and business. Both categories make up most of the relevant Meetup groups related to the start up scene in Berlin. The other chosen categories contain all "cultural/creative/arty" topics and are relatively: arts and culture, music, dancing, games, movies and film, photography, writing, hobbies and crafts, fashion.

First, the integration of these categories ensured tech-related groups that were categorized differently will not be excluded. For example, the "Berlin Wearable Technology and Fashiontech Meetup" belongs to the fashion category but, as the name reveals, is about mixing fashion design and technology. Then, besides such groups that intermingle tech and cultural/creative topics, there might be interesting connections between the groups of the tech and business category and the cultural categories. A clustering algorithm for community detection could reveal, for example, a community that consists of tech as well as some cultural groups as ground truth. As Berlin is known for its creative scene, from which is also said that it attracts the start up workforce, I decided to include all groups of the cultural categories to uncover possible overarching topics of such communities and their intermingling groups.

To make sure my data reflects actual "offline" group activity and possible face-to-face interactions between Meetup members, I carried out a thorough cleaning and filtering of the data leading to two different data sets for each of my two network analyses, which will be described in the next chapter in more detail.

Meetup.com provides an easily accessible API, from which I scraped group data from 828 groups of the 11 chosen categories. The group data included the number of (online) members, the date the group was created, and their chosen topics to describe the group. I collected all positive RSVP data from a group's past events, that is each member's positive answer to event invitations by the group from 2009–2015 (Meetup's first group in Berlin, which still exists, started in 2008).

As a first step, I discarded small groups with less than 20 (online) members. I also ignored groups that did not match the category, e. g. a general party/bar meetup in the music category and groups only created around one single event or online events (webinars). Furthermore, 2.7 % of the groups and members altogether had limited the public access of their data so I could not gather information on these groups and members (with the biggest limited group in place 70 with 920 members: "Singing in the city – Berlin", followed by "Acting in Berlin" and the "Developer Group" with about 570 members).

Table 1: Categories of Berlin Meetup Groups, Ranked by Number of Groups (grey: categories of interest)

Rank	Category	Number of groups	Active groups – Topics network	Active groups – Groups network (after splitting of 3 multi-themed groups)
1.	Tech	434	174	188
2.	Career & Business	203	61	68
3.	Health & Wellbeing	125		
4.	Language & Ethnic Identity	78		
5.	Food & Drink	56		
6.	Education & Learning	50		
7.	Socializing	45		
8.	New Age & Spirituality	42		
9.	Arts & Culture	40	13	13
10.	Music	35	8	8
11.	Outdoors & Adventures	33		
12.	Community & Environment	28		
13.	Dancing	25	8	8
13.	Fitness	25		
15.	Sports & Recreation	23		
16.	Parents & Family	20		
16.	Games	20	11	11
18.	Movies & Film	18	4	4
19.	Photography	17	6	6
20.	Writing	14	7	7
21.	Hobbies & Crafts	13	3	3
21.	Movements & Politics	13		
23.	Singles	11		
24.	LGBT	10		
25.	Fashion & Beauty	9	1	1
26.	Support	7		
27.	Book Clubs	5		
28.	Lifestyle	4		
29.	Religion & Beliefs	3		
29	Sci-Fi & Fantasy	3		
31.	Cars & Motorcycles	2		
31.	Pets & Animals	2		
33	Paranormal	0		
Total		**1413 (828*)**	**296**	**317**

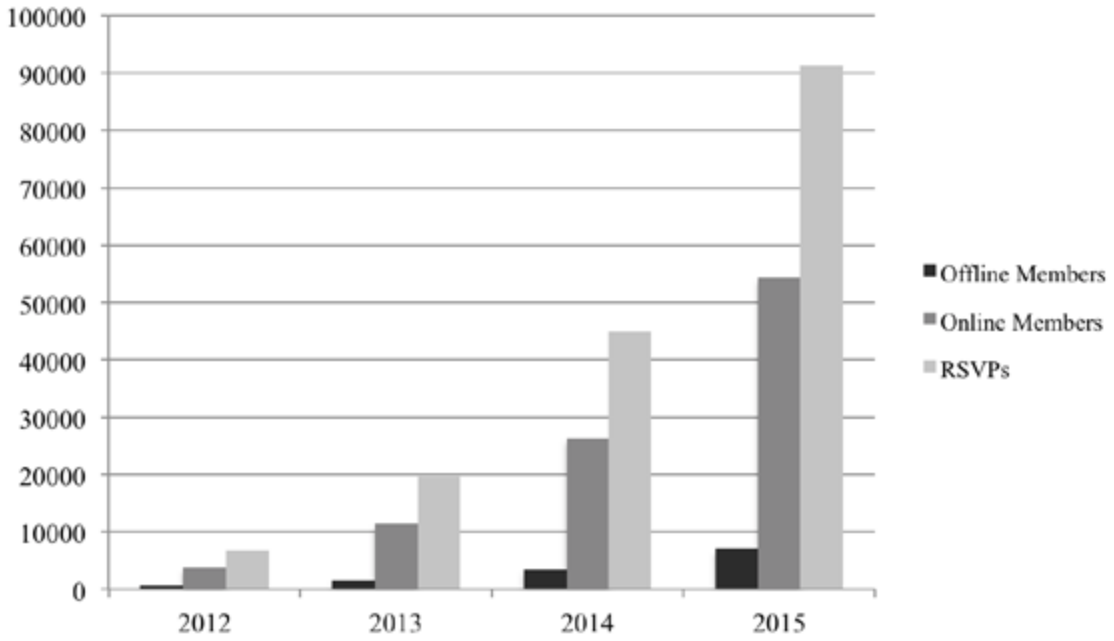
*in categories of interest

As a next step, I reduced the groups based on their regular members to a great amount. Therefore, I only covered members of a group who had positively RSVP'd to at least three events of a group in a year (including group organizers) and only groups with at least three of those regular members. This is because a lot of positive RSVPs on Meetup are made, although these members may not show up at an event. While the reverse may happen as well, we cannot track unregistered event visitors. So this represents best guess to retrieve network data reflecting valid event attendance. Compared to post-hoc surveys on past event attendance, Meetup's event data provides a valuable source to track the dynamic development of network data. Furthermore, the data reduction helps to reduce noise in the network data and focuses on active Meetup groups.

The Berlin Meetup Network

Figure 1 depicts the development of RSVPs and group memberships – the "online" memberships and the filtered, "offline" memberships based on regular event attendance (the regular visitors). With only 114 RSVPs and 3 groups in 2010 and 1,019 RSVPs in the following year, the platform did not take off in Berlin before 2012. Therefore, the network data is based on the years 2012–2015. RSVP and membership data reveal that activity on the platform has more than doubled by each year. The regular "offline" group members grew from 606 in 2012 to 6,944 in 2015. As mentioned before, these numbers reflect total group memberships with members counting multiple times if attending more than one group.

Figure 1: Development of RSVPs and Memberships



Not surprisingly, like Liu et al. (2012), I find a heavy-tail distribution with few large groups and many of smaller size. Three groups have above 5,000 (online members), respectively 200 members (offline members) while most groups have below 558 or 43 members, respectively.

Among these big groups were ones that consisted of subgroups, upon closer inspection. I was able to divide three dominant groups into subgroups by the event descriptions to balance their weight. This affected the "OpenTechSchool" (a group organizing repeating free programming meetups about different programming languages etc.), "Berlin Startups" and "GDG Berlin" – the Berlin chapter of the Google Developer Groups. When creating the network data on Meetup groups, I created these subgroups and integrated them instead of the original groups, increasing the total amount of groups from 296 to 317. However, when I analyzed the groups' topics, I had to rely on the original groups and their topics, as there is no topic data for single events. Therefore, the data resulted in two networks: a groups network including the split groups and a topics network. The groups network exists of four networks – one for each year (2012–2015).

With an increasing number of Meetup groups created every week, the number of dissolved groups has increased, too. Without longitudinal research, we cannot track these dynamics. If a group dissolves, all of its data is deleted. By the time of the data retrieval, "The Berlin Semantic Web Meetup Group" was the oldest Meetup group still existing today, created in 2008. The second oldest represents "Start Up Berlin" from 2009, but it hasn't organized an event for a year now. Coming in third is the "Datenjournalismus" (data journalism) group from 2010.

If we take into account both online ("followers" of the group's Meetup site) as well as "offline" membership (regular members attending at least three events of a group in a year), "Berlin Startups" is the biggest group (not to mix up with "Start Up Berlin"). This Meetup group represents a professional organization – the Berlin Chapter of German Start Ups Association, "a non-profit […] dedicated to promoting a vibrant entrepreneurial culture, shared learning, and professional business image".[5] It has different sub-groups such as regular meetups of founders, about PR, or financial tech. Besides "Berlin Startups" and "Open Tech School Berlin", the biggest online and offline groups differ a lot. The online group memberships reflect bigger, more professional and more general groups. All are backed up by sponsors and continuously attract new members. The regular offline memberships also tell us about the biggest stable groups, most likely reflecting communities of practice. The biggest offline group, "Microservices Meetup Berlin" stands for a more specialized tech group and deals with a software architecture pattern. The group's goal is "to understand the approach, its benefits and its implications by sharing experience from novice to expert".[6] "The Ul-

5 https://www.meetup.com/de-DE/BerlinStartups (retrieved on 10/31/2016).
6 https://www.meetup.com/de-DE/Microservices-Meetup-Berlin (retrieved on 10/31/2016).

timate Berlin Intercultural Boardgame", number two among the offline group memberships, is the only top group not from the tech or business category with the most past events and an increasing number of active members, often holding parallel meetups (in this case board games at one event).

Table 2: Ranking of Groups by Number of Members (after splitting of 3 big groups)

Rank by off-line members (by online members)	Groups	Number of offline (active) group members
1. (30.)	Microservices Meetup Berlin	226
2. (40.)	The Ultimate Berlin Intercultural Board Game Experience	148
3. (1.)	Berlin Startups – subgroup "Miscellaneous events" *(created during group splitting)*	147
4. (10.)	Berlin Machine Learning	126
4. (38.)	NodeJs Meetup Berlin	126

As Meetup serves as a place to go for new people in town, it is popular among expats. Most meetups are conducted in English and there are a lot of groups targeting international people new in town, such as one of the oldest groups "Internationals in Berlin" (not in the sample of chosen categories). When signing up for Meetup.com, people provide their city, which then gets linked with the corresponding country. Additionally, members can give information about their hometown. In a random drawing of 200 group members from the sample, only 23 % of these provided their hometown. But including the information on members' city and country when signing up, more than 20 % of the randomly drawn members give a non-German hometown or country. This is about 5 % above Berlin's official proportion of foreigners.[7] We can assume that there are even more foreigners within the sample among those who do not state their hometown and initially signed up for the service in Berlin.

When studying the groups from the chosen Meetup categories, they are all interest-driven as they define themselves through a certain topic, which can be more or less specific. In this way, the groups reflect what Gläser (2001) termed "practicing communities" (see literature review above), similar to a community of scientists. Otherwise, a lot of these groups also inhabit stricter community definitions and that of communities of practice. In general, the Berlin Meetup groups match both definitions, communities of practice and producing communities, as the "character" of the groups can be quite different. Most groups have rather less members who meet regular and have a higher quality of exchange. Other groups have a lot of members and a lower quality of exchange

7 https://www.statistik-berlin-brandenburg.de/Statistiken/inhalt-statistiken.asp (retrieved on 10/31/2016).

overall. Some groups are about learning, e. g. a programming language something and a lot of other groups usually have events with two or more expert talks with Q&A sessions and concluding "networking". Still, most of the groups are non-commercial, open, and have an informal character.

When talking about the Meetups groups in the following, I will stick to the term "group" to differentiate them from the results of the community detection, which are clusters/modules of groups, merged into a community. As the definition of producing communities and communities of practice makes no distinct notions about size (Gläser, 2001), these communities – the group clusters – fall into the same definition of communities like their smaller entities of groups.

3.3 Network Data and Methodology

As described above, the network data for my analyses was derived from event attendance (RSVP) data of members of groups and group data and as such, makes for an affiliation network. The 828 groups of 11 categories were reduced to 296 active groups, 317 (including the split groups) respectively, with at least three regular members who RSVP'd to not less than three events per year. To understand the development of the network, I created separate networks of each year from 2012–2015. I first created a network of the Berlin Meetup groups, including the additional split groups, and then I derived a network from these groups based on their topics, excluding the split groups. A description of the network data and method of network analysis can be seen below.

First, I created a weighted two-mode network with connections between groups and members. The weight of a tie between a member and a group reflect the number of RSVPs a member made for that group. Two-mode networks are complex and not optimized or eligible for several network analysis methods. Therefore, two-mode networks can be projected into one-mode networks by skipping one mode completely, which comes with some loss of information (Borgatti, Everett & Johnson, 2013; Everett & Borgatti, 2013; Opsahl, 2013)

The goal of this study was to understand the Berlin Meetup network as a source for knowledge on a larger level. As I understood the groups and their underlying community structure as a main source, I focused on the network between the groups, not between the usual network perspective of connections between members. This means that I projected a bipartite graph of groups and members onto the groups. Here, a regular member of two groups creates a tie between those groups, but the information on the connections between members as well as single memberships gets lost. As my network data consists of many more members than groups, the projection also helped reduce data overload.

Because we can assume that the underlying connections between members of small groups are denser, and thus more easily lead to exchange between members and group resources, I took into account a weighting in favor of small and less connected groups. During the projection, ties were weighted similarly to the method Newman proposed for co-authorship networks and the weighting followed the application of Opsahl (2013) for weighted two-mode networks. This means that the ties of groups sharing many members are weaker than if there were few groups sharing members. The main processing, including the projection and weighting, was performed by the R-package tnet (Opsahl, 2009). This weighting approach keeps information of network flow that would otherwise be lost during projection from two-mode networks to unweighted one-mode-networks. After the projection, some groups fell out of the sample as they did not have enough mutual members.

Community Detection with Infomap Algorithm

To understand the structure of Berlin's Meetup network as a proxy for the city's start up scene, I maintained community detection (clustering) of its topics and groups. As a result, I obtained different modules/clusters partitioning the Berlin Meetup scene based on members' event attendance with the groups network data and content interests based on their topics in the topics network.

I decided to apply the Infomap community detection by Rosvall & Bergstrom (2008) because it performed best in an extensive evaluation of different community detection algorithms by Fortunato (2010) and can handle weighted networks. Unlike the popular hierarchical approach to community detection, which divides clusters into sub-clusters by cutting weak connections, Infomap is also able to handle overlapping so nodes can belong to different clusters.

Viewing networks as flows of information is the starting point of the Infomap algorithm. It follows an information-theoretic approach that handles information flow as something that can be reduced by a code reflecting regularities in the data stream (Rosvall & Bergstrom, 2008; Rosvall, Axelsson & Bergstrom, 2010; Rosvall & Bergstrom, 2010). Detecting communities in a network then is similar to solving a coding problem.

Let us visualize this idea of data streams by a random walker who visits one node after another accordingly to the links between nodes and their weights, respectively to their direction. This is similar to a researcher who follows references in articles or a member visiting different Meetup groups. The denser the connections between nodes, the longer the walker would stay in that part of the network, thus indicating a community. To find the best clustering, our random walker would have to pass all possible walks, which is not feasible, except from small networks. Therefore, we have to find a balance between a good fit and a feasible effort of simulated walks. If we track the path of

the random walker, we can use codes to describe the different nodes with which the walker interacted. To optimize the simulation of multiple walks, the Infomap algorithm uses Huffmann codes, which decrease the computational time. Nodes the walker visited more frequently (nodes with more flow) receive codes with shorter bits. By introducing modules in the network, the computational time can be further decreased, as codes are reused within the modules. This is similar to reused street names in different cities.

The shorter the description length of a random walk, the better the according modules reflect the underlying structure of network communities. Using the so-called map equation, the result of a simulated description length is compared to an expected outcome. Similar to the Louvain method (Blondel et al., 2008), in a repeating process nodes are ascribed to different modules in a new simulation and moved to another module if this decreases the map equation (the description length).

The Infomap algorithm also works with directed networks. Here, the outcome of a random walk is not independent of the walker's starting point. Therefore, in directed networks the algorithm uses teleportation to send the walker to another node by a small probability, similar to the random surfer model in Google's page rank algorithm (Brin & Page, 1998). The Infomap algorithm can also be applied with computed significance of a nodes' assignment to a module and that of a module's significance. For the significance of nodes, the weighted links of the initial network are resampled several times (so called "bootstrap networks"). The computed clusters of these bootstrap networks are then compared with the original network. A module is significant if it consists of a significant subset which does not cluster with another significant subset within the confidence level (Rosvall & Bergstrom, 2008).

The Infomap algorithm can handle large networks and is very flexible. Besides directed and weighted networks, it also manages overlapping nodes and multiplex networks (nodes with different layers of link structure). The code is under continuous development and supported by a web application, including various means of further visualization. For a detailed description of the Infomap algorithm and its developments and further applications, see Rosvall & Bergstrom (2008) and the corresponding webpage[8] for more information and an animation of the algorithm.

For the analysis of my networks, I used raw code of Infomap as it allows to make use of the overlapping function and the significance function – albeit both functions cannot run together. So the groups networks run with the code for significance clustering with a confidence interval of 90 % and 200 bootstrap networks. For the topic network, I performed the code with the node overlapping function because it was more feasible to handle the overlapping nodes in the rather

8 www.mapequation.org (retrieved on 10/31/2016)

small network, compared to the group network of 2015. And for the groups networks, the significance function is recommended when comparing the change of networks between years to observe real trends.

The topic network was also analyzed through the language R, following an analysis and code provided by NESTA (see footnote 3). As the topic network was unweighted, I was able to compare the clustering results of other algorithms with the Infomap algorithm. For all networks (groups and topics networks), detailed network visualization was conducted with the software program Gephi. I also made use of the Infomap web application and its visualization to draw the networks and take the analysis to the next level by mapping change in the group networks between 2012 and 2015 via so-called "alluvial diagrams".

Alluvial Diagrams

Alluvial diagrams (Rosvall & Bergstrom, 2010) visualize modules of a network at different timestamps in horizontal bars. Each bar represents a module and streams between the modules of the networks depict the change of modules' compound. In this way, we can follow the structural changes of a network and see which modules stay rather stable, which modules split or merge over time. Alluvial diagrams help us explaining what is going on in a network by underlining and summarizing the general trends and changes of a network. Nevertheless, we have to be careful with drawing causal inferences as structural changes might have started before they become visible in the chosen snapshots of a network (Bech et al., 2015).

For my analysis of the groups networks, I was interested in how the Berlin Meetup network evolved from 2012–2015. With my yearly network snapshots and significant clustering through the Infomap algorithm, I was able to build an alluvial diagram and to detect the most important changes such as merging and splitting of groups into clusters. As the network from 2012 only exists of 25 nodes and grows up to 259 in 2015, the differences between the sizes of the networks make the networks less comparable, thus interpretation must be made carefully.

Emerging Topics

The results of the clustering of the topic and groups network as well as the insights from the alluvial diagram tell us about the structure of interest-based sub-communities in the Berlin Meetup scene, based on RSVP data for groups' meetups. We learn a lot about the different topics people were engaged with. With the filtered groups and topic networks, we capture actual interactions, but we inhabit a time lag due to restricting active membership to three RSVPs per year and annual comparisons.

Meetup activities can also inform us about recent trends in the start up and tech scene of a city. Be it an upcoming programming language, a growing interest in agile methods, or first experiences with new Virtual Reality devices – enthusiasts and some companies like to be a first mover and push new topics by establishing groups and organizing meetups. Therefore, I make use of analyzing the most frequent recent topics used by groups of the Berlin Meetup scene to detect recent trends and new activity in Berlin's tech and start up scene. To conduct this analysis, I first detected and counted the use of new topics within the last year in the tech, respectively the business & career category. I analyzed the top emerging topics through new groups creation using these topics for the first time. To do this, I checked the group creation in the tech and business & career category of Meetup.com within the last year, from September 2015 till the end of August 2016. For the tech category, I summed up the top ten new topics ranked by their cumulative number of positive event RSVPs across the groups (including multiple users). For the business & career category, I report only the top five topics due to the smaller size of this category. Events with less than three attendees were dismissed. This analysis was guided by another study from NESTA[9] and performed in R and Excel.

4 Results

This section portrays the results of the explorative network analysis of the Berlin Meetup network and its emerging topics as described above. In it, I introduce the Berlin Meetup scene via the topics network and its clusters based on the top 100 topics of the network's groups. I then analyze the groups networks with an overview and then detailed visualization of the biggest and latest group network of 2015. Finally, I depict the change of the group networks from 2012–2015 via alluvial diagrams. The chapter ends with a summary of emerging topics of Berlin's tech and business meetups.

4.1 Topics Network

Based on the top 100 topics of all active, filtered groups from 2012 until 2015 from the categories of interest, I built a network of topic-topic relationships between groups and applied the Infomap algorithm for community detection. Figure 2 gives an overview of the detected eight

9 http://www.nesta.org.uk/blog/find-emerging-tech-topics-with-meetup-data (retrieved on 10/31/2016)

modules as network visualization showing the links between the modules and the percentage of flow by size of the nodes. These modules were the results of the Infomap algorithm where every module exists of topics as nodes. The composition of the modules was solely up to the algorithm while only the names for the modules had to be assigned by me. For example, the module "makers" consists of the following topics: 3d-printing, DIY (do it yourself), electronics, makers, and maker spaces.

When we take a look into the most popular topic among groups counted by total mentions and flow, entrepreneurship and software development share the first place. As table 3 illustrates, other general topics like web and technology are among the most popular topics. The first rather specific topics are lean start up, mobile development, and JavaScript.

Table 3: Top Mentioned Topics by Groups in Topic Network

Rank by counts (by flow)	Topic	Total counts (mentions)	Total flow (in%)
1. (2.)	Entrepreneurship	62	3.97
2. (5.)	Start up/Business	61	3.87
3. (1.)	Software Development	56	4.21
4. (3.)	Computer Programming	54	3.93
4. (4.)	New Tech	54	3.9
5. (7.)	Open Source	51	3.66
6. (10.)	Technology Start ups	44	2.08
7. (8.)	Web	43	3.36
7. (9.)	Web Development	43	3.25
8. (6.)	Technology	32	3.8

Half of the overall flow between groups' topics is almost evenly distributed among the modules "Programming & Tech & Web" and "Entrepreneurship & Business". This reflects the two general, big Meetup categories "Tech" and "Business & Careers", which are actually based on groups' topics. However, we can observe distinct topic modules independent from these general fields although related to them: "Data, Cloud & Systems", "UX (User Experience) & Design", and "Makers". The non-tech and non-business topics adhere to one big "Gaming & Creative Arts/Culture" module with topics like game, painting, writing, or music. Only dance topics stand out as an independent module. This module is also the least connected with other modules, but it also consists of only two topics.

Figure 3 shows the full topic network with colored layers for the modules and the size of the nodes representing a group's flow (which translates to the probability of a random walker passing this node). In this network visualization I also included the results of the Infomap algorithm with overlapping nodes. The color of the overlapping nodes indicates the "primary" module of the node from the clustering computation without the overlapping feature.

As displayed in the full network visualization, the big "Programming & Tech & Web" cluster can be seen as the center of the whole network. It includes the most important, but general topics like software development, computer programming, open source, new tech, technology, web and web development. As touched before, mobile development and JavaScript make up the first less general topics. JavaScript languages and other languages like HTML5 or Python are also broadly distributed among this cluster.

While the topics of the big Tech category (the predefined overall category of Meetup) split into sub-categories, the "Entrepreneurship & Business" cluster reflects Meetup's Business & Career category as one cohesive module. The general topics entrepreneurship and start up businesses lead the topic ranking. Subsequent topics describe areas like marketing, lean, small business or leadership. A general focus on topics about learning business skills becomes apparent with tags like professional development, self-improvement or communication skills.

Figure 2: Overview of Topics Network (all categories of interest)

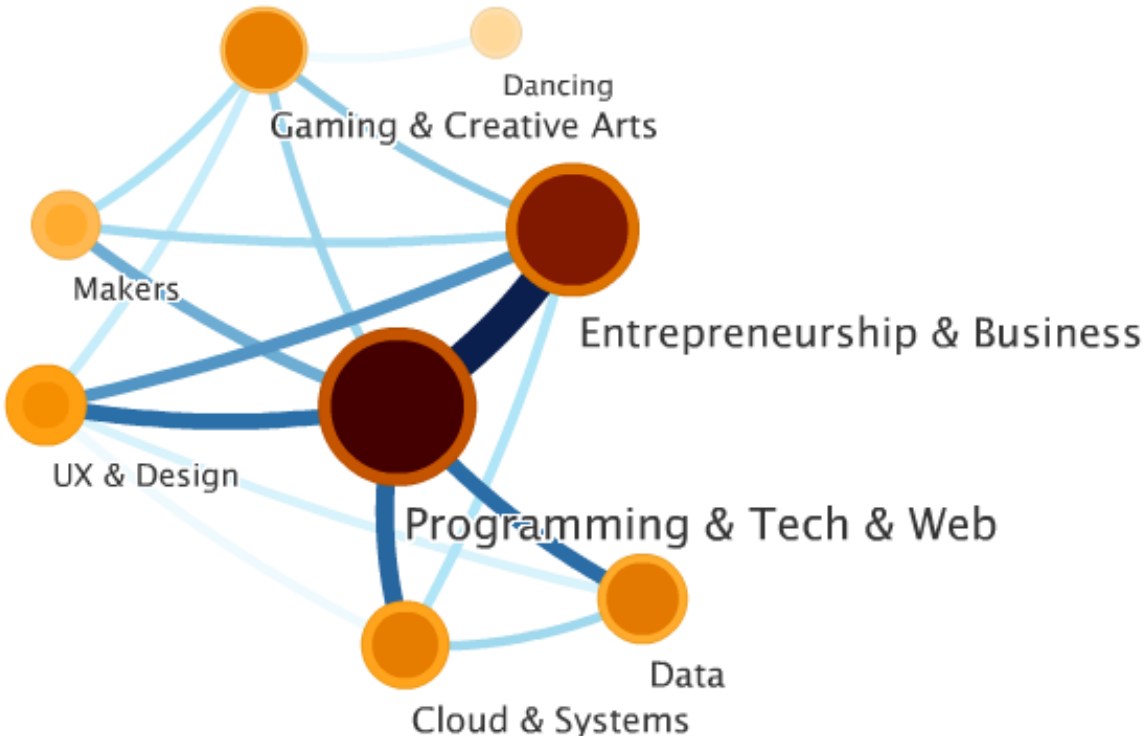
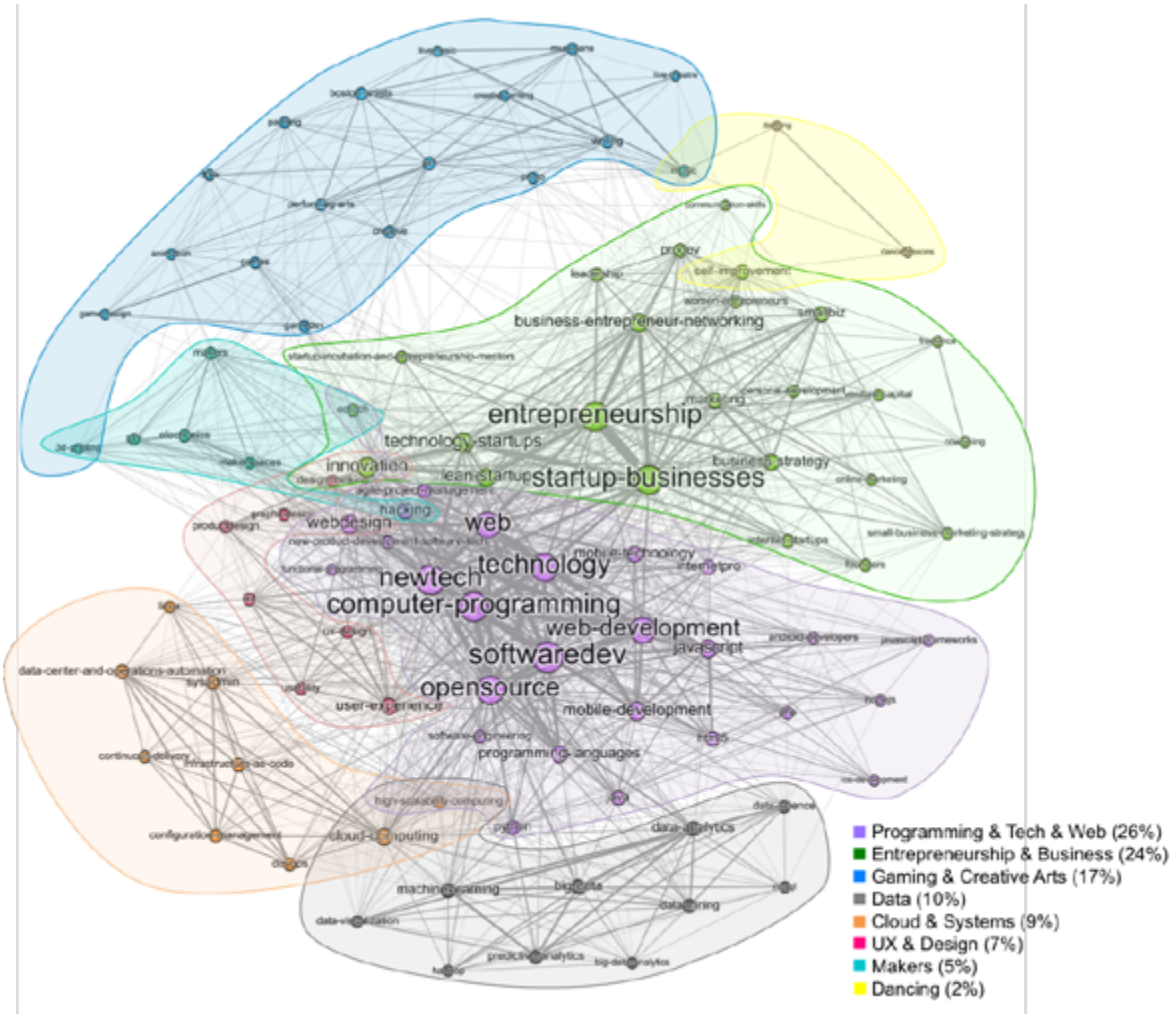


Figure 3: Topics Network with all top 100 Topics and Module Overlapping Nodes



The cluster analysis detected two distinct tech fields: "Data" and "Cloud & Systems". In the "Data" cluster the topics machine learning, big data, and data analytics describe the cluster that is most prominent, the programming languages Hadoop and NoSQL, which stand for working with large amounts of data. The topic cloud computing represents the "Cloud & Systems" cluster. This cluster revolves around abstract, general computing and infrastructure topics like configuration management, infrastructure as code, data center and operations automation or system administration. A rather small cluster is built upon "UX & Design" topics with user experience being the most important topic for this cluster. From UX design and usability it spans to product design and graphic design as well as the more general topic of design thinking. Topics like makers, electronics, Ed Tech (education technology) or 3d printing shape the second smallest cluster, the Makers cluster, which is well connected with the bigger "Gaming & Creative Arts" cluster. In this general culture cluster, we find various topics around (applied) arts, such as writing or painting with small

sub-networks on gaming, art and music. The small "Dance" cluster is quite isolated (dancing and dance lessons), but connects via music and self-improvement with overlapping nodes of the "Gaming & Creative Arts" as well as "Entrepreneurship & Business" cluster.

Eight topics overlap with a second module and two topics overlap with a second and third module. The topic "Ed Tech" is primarily ascribed to the "Entrepreneurship & Business" module, but also associated with the "Makers" module as well as the big "Programming & Tech & Web" cluster. High-scalability computing makes up another topic that goes well with three modules: First its primary module "Cloud & Systems", then "Data", and the "Programming & Tech & Web" module. Other overlapping topics include such as innovation, hacking, web design, or design thinking. Except from web design and innovation, these overlapping topics are small, according to their flow.

4.2 Groups Networks

For the groups networks, I created weighted, undirected networks for the years 2012–2015, ran the Infomap algorithm with significance to detect group clusters, and compared the change between the networks with the help of alluvial diagrams. As described in detail in the previous chapter, the groups networks are built on positive RSVPs (attendance) of group members. This means, the

Figure 4: Overview of 2015 Groups Network

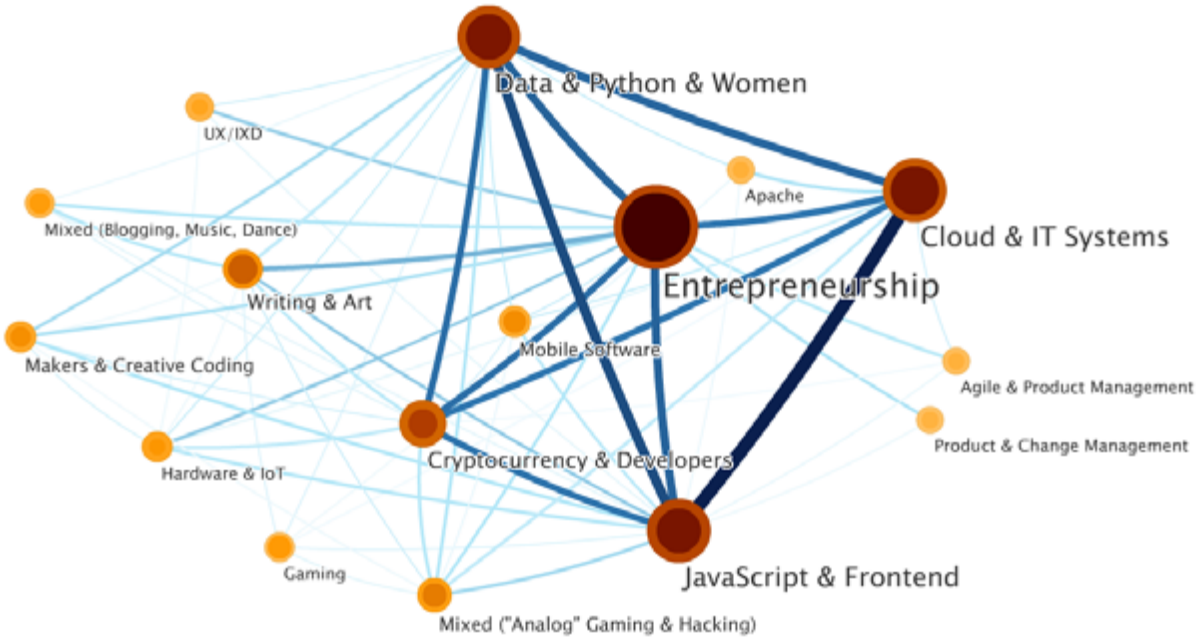
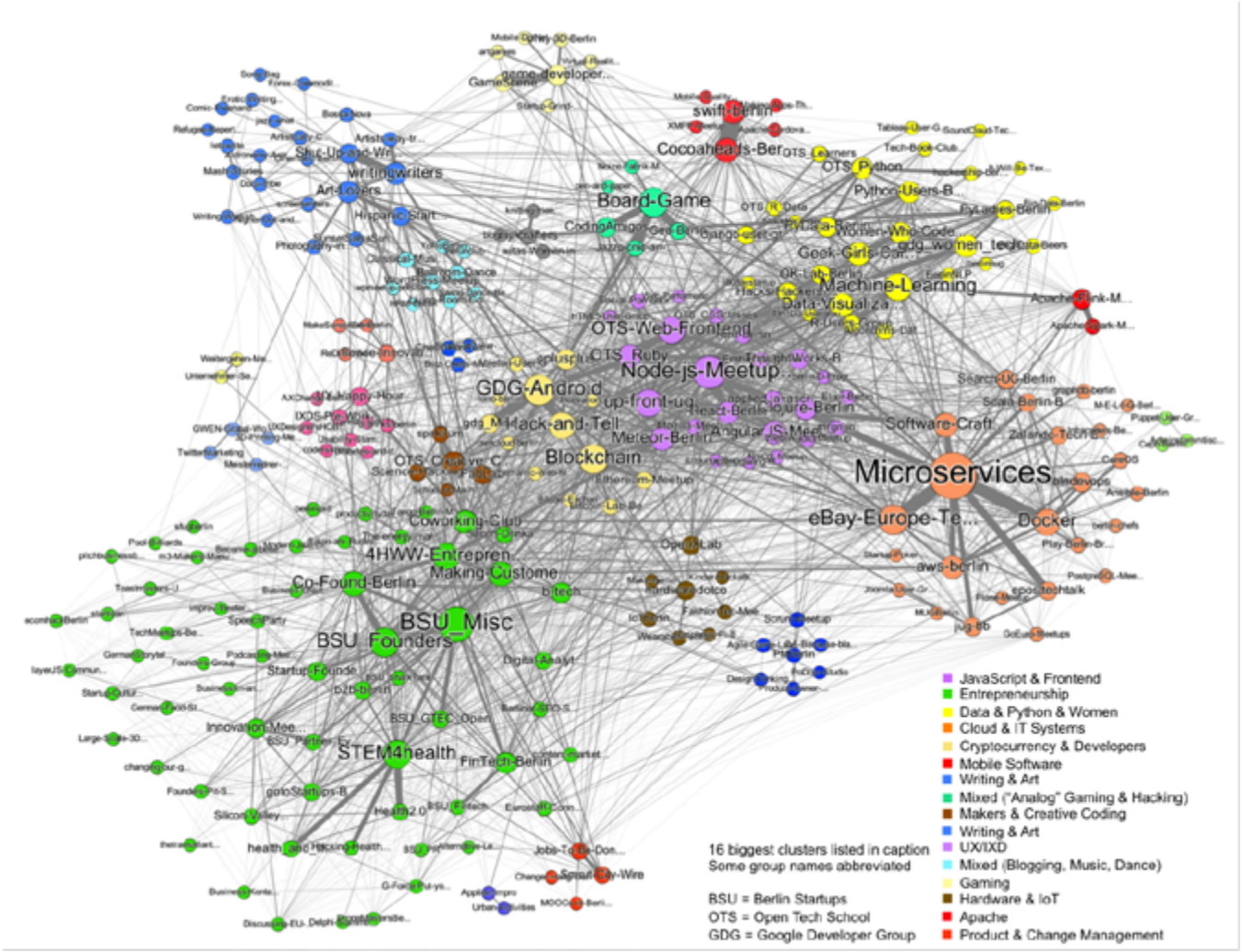


Figure 5: Full 2015 Groups Network



networks tell us about the connection between groups based on their active members. While the topics of a group are heavily influenced by unofficial categories group organizers relate their groups to, members' attendance can be quite arbitrary in regard to content-related similarities of groups. The groups networks show us if groups clusters exist based on members attending meetups which are independent from the "official" topics and content of a group. I focus on the biggest and most recent network from 2015, and describe its clusters and peculiarities before comparing it with the other networks and describing the change over time.

The group network of 2015 consists of 259 nodes and therefore the Infomap algorithm finds more clusters than with the topic network of 100 nodes. In total, the group network counts 23 clusters with some big and many small clusters. Figure 4 shows 16 of these 23 clusters (with almost half of all links between the clusters) as an overview of the network, nevertheless representing more than 97 % of all network flow.

The biggest clusters with the most flow (represented by size) are "Entrepreneurship" with 22% of all flow volume and 62 groups, "JavaScript & Frontend" with 14% of all flow and 24 groups being even with "Cloud & IT Systems" (likewise 14 % flow and 24 groups), followed by "Data & Python & Women" with also 14 % of all flow, but distributed among 28 groups. However, the "Cloud & IT Systems" module is not significant and also clusters with "JavaScript & Frontend". This is supported by the highest link flow between those two clusters compared to the other clusters. The fifth "biggest" cluster consists of groups about "Cryptocurrency & Developers" with an overall flow of 8 %. If we take these four big clusters, they inhabit more than 50 % of the network's flow and are all strongly interconnected.

As in the topic network, the clusters are the result of the community detection method and only their names have been ascribed. In general, I found similar content-wise clusters when comparing the topic with the groups networks. Different than the topics network, the group clusters are less homogenous and obvious so that they do not completely represent a field like “Cloud & IT Systems”. For example, in the latter, we find the group “Berlin Start up Poker” where people from “the start up and tech community” meet to play poker.[10] Mid-sized and a few very small clusters (with about four groups) are especially hard to categorize and thus some are tagged as “Mixed”. This does not necessarily mean the Infomap algorithm performed inadequately as it only reflects the chance of groups being connected by people attending different groups and their events. To come up with meaningful names for clusters, I studied the groups’ pages, including their description and topics, and took into account the different flows of the groups within a cluster. That is, I weighted a group with bigger flow as more important when deciding about the cluster’s name.

Figure 5 depicts the whole network with all groups as nodes and clusters represented by different colors. The nodes’ sizes reflect their flow and the width of the links represents weights of these links, telling us how strongly two groups are connected. Here, we can also see the strong interconnection between the four biggest clusters plus their dominant groups. Figure 5 is like a zoom from the cluster overview into the whole network (however restricted by the dimensions of the page). Combining both views of the network helps us “reading” the network in an easier way.

If we zoom into the node-level of the network, we depict the biggest groups by flow: “Microservices Meetup-Berlin” with 3.7 % of all flow, “Berlin Startups – miscellaneous events (BSU_Misc)” counting 2.4 % flow, “Node.js Meetup Berlin” with 2.1 % flow, “GDG Berlin Android (Google Developers Group)” with 1.9 % total flow and “eBay Europe Technology” adding up to 1.8 % flow. Not surprisingly, these nodes are distributed broadly among the top five clusters (by flow).

10 www.meetup.com/de-DE/Start up-Poker-Berlin (retrieved on 10/31/2016)

Similar to the topics network, the groups network consists of one big "Entrepreneurship" cluster. This includes some highly connected groups with a lot of flow and a lot of less connected groups. The split group "Berlin Startups (BSU)" dominates this cluster and its "miscellaneous events" and "founders meetups" lead the cluster. Next comes a founder meetup about health, sponsored by the pharma company Bayer. General founder/entrepreneur and networking meetup groups like the "4HWW-Entrepreneurs-and-Self-Funded-Founders" (4 Hour Working Week) make up high flows in this cluster. A lot of groups in this cluster address getting support and learning how to found a start up, like practicing pitches (among the most popular), marketing, HR, leadership or discussing EU funding. Other groups revolve around a specific sector with health and financial tech as the most popular ones. As discussed before, in general the clusters are still quite homogenous content-wise although built upon content-independent event attendance, not topics. However, there are several groups that fall outside of the overall theme of a cluster. For example, within the "Entrepreneurship" cluster, "Drone Masters Berlin", a rather "techy" group is clustered as significant. While the topics network analysis detected a small dance cluster, the dance groups are distributed among different clusters. The "Entrepreneurship" cluster inhabits the "Tango-Berlin-Meetup" and "Modern-Jive-in-Berlin" group, although they are both not significantly clustered with the Entrepreneurship module.

Two clusters with minimal overall flow complement the overall Business and Entrepreneurship field: "Agile/Product Management" and the "Social Entrepreneurship & Innovation" cluster. The first cluster is mostly connected with the "Entrepreneurship" cluster, but also with "Cloud & IT Systems" and is lead by the "Berlin Scrum" and the "Project Management Meetup". The "Social Entrepreneurship & Innovation" cluster is spearheaded by the "Peace Innovation Lab", but is not significant and clusters with "UX & IXD" (User Experience and Interaction Design). The Berlin chapter of the "UX Happy Hour" spearheads the latter cluster. However, it is insignificant and associated with the big "Entrepreneurship" cluster.

The tech groups tell a more complex story than the business groups and the previously introduced tech topics. However, the groups networks is twice as big as the topics network. As mentioned above, three bigger tech clusters exist: "Cloud & IT Systems", "Data & Python & Women", and "JavaScript & Frontend".

The "Cloud & IT Systems" cluster comprises two of the biggest groups (according to their flow): "Microservices Meetup Berlin" and "eBay Europe Technology". "Microservices Meetup Berlin" was already discussed as the biggest offline group and discusses a web/platform software architecture pattern used by many services and applications like SoundCloud or Netflix, and as such touches different programming languages (see footnote 6) The group partners with a microservices

conference and several sponsors who also built upon this architecture pattern approach. The "eBay Europe Technology Meetup" is organized by eBay and features talks of eBay employees on how they solve software issues, etc. Further groups of the "Cloud & IT Systems" deal with platforms like Docker or software like Scala and Java and other aspects of cloud computing and managing software systems and frameworks. Many groups have several sponsors. The above-mentioned "Start up Poker Berlin" group is the misfit of the cluster. The "Cloud & IT Systems" cluster is no significant cluster and is mostly clustered with "JavaScript & Frontend", which points to similarities between these clusters.

"JavaScript & Frontend's" group with most flow is the "Node.js Meetup Berlin", dealing with the server side of JavaScript.[11] Right in the beginning, the group's organizers' are address potential recruiters and point them to a jobs platform, as they want their meetups to be free from hiring offers. The "Node.js group" is followed by "Up.front" – a group about web design, that aims to bring together designers and developers. Other languages from the JavaScript framework, like Meteor, React or AngularJs make up the biggest proportion of the group. "Open Tech School's" "Web Frontend" and "CSS classes" meetups, the "Berlin Web-Audio-Meetup" or the "Berlin HTML5 User Group" address frontend topics from this cluster.

As the name already suggests, the "Data & Python & Women" cluster is less homogenous content-wise. The significant clustering does not break into a sub-group of women meetups, such as the "GDG Women Techmakers" meetings (a split group of the "Google Developer Group (GDG)"), "Geek Girls Carrots Berlin" or "Women Who Code". The group "PyLadies Berlin" depicts a connection to the Data & Python groups as best as it combines a meetup targeting women and Python users. And the "PyData Berlin" meetup encompasses the link between Python and Data, as Python is a famous programming language for analyzing data. Overall, the "Berlin Machine Learning" and "Data Visualization Berlin" groups top the list of the whole cluster, than followed by "GDG Women Techmakers" and the "Geek Girls Carrots Berlin". Besides Python, other programming languages around data analysis and data management, like Django and R, as well as rather general (Big) Data groups make up the cluster. Compared to the clusters discussed before, among the groups with less flow, there are more groups not fitting into the clusters main themes, like "Hackership Berlin", a "self-directed learning retreat for developers"[12] or the "Tech Club Book Berlin".

Besides the three big tech clusters, there are mid-sized ones such as "Cryptocurrency & Developers", "Mobile Software" and "Hardware & IoT". The "Cryptocurrency & Developers" group combines several Cryptocurrency-related groups, such as the "Blockchain Meetup Berlin", the

11 https://www.meetup.com/de-DE/Node-js-Meetup-Berlin (retrieved on 31/10/2016).
12 http://www.meetup.com/de-DE/hackership-berlin (retrieved on 31/10/2016).

"Berlin Ethereum Meetup" or the "Bitcoin Lab Berlin". But more than half of the cluster contains developer groups, such as the "GDG-Berlin-Android", "Hack and Tell" or "Berlin Cplusplus". The "Mobile Software" cluster is homogenous and deals with groups about programming for mobile apps etc., like the "Cocoaheads Berlin" or "Swift Berlin". The insignificant "Hardware & IoT" (Internet of Things) cluster is lead by "OpenXLab", which presents itself as an "educational incubator space for open technologies" for the Internet of Things,[13] and the second biggest group is "Hardware.co". The "Hardware & IoT" cluster includes several maker & hacker meetups, including two about wearable tech/fashion. Although it captures typical maker topics, the "Hardware & IoT" rather clusters with "Cryptocurrency & Developers" instead of the small "Makers & Creative Coding" cluster. The latter ranks the "Creative Code" sub-group of the "Open Tech School" in first place, a monthly meeting for "anyone interested in the use of code for artistic expression". Follow up is the "FabLab Berlin" group, one of Berlin's best-known maker spaces. Two groups form the tiny "Apache" cluster, which focuses on a framework for data analytics. However, this cluster is insignificant and clusters with "Cloud & IT Systems".

What about the creative and culture/art groups? To recapitulate: The topics network depicted one big cluster plus a tiny dance cluster (though inhabited only by two general dance topics). The groups network looks more differentiated in this regard. As already discussed, dance groups split among different clusters. Most creativity and culture/art groups converge in the "Writing & Art" cluster. Spearheaded by "Write Together Berlin", where writers sit together to write, and followed by the "Berlin Art Lovers" who "explore the Berlin art scene" together.[14] Writing groups dominate this cluster and the topics of the other groups range from photography to jazz and also include two dance groups and two "non-creative" meetups, the "Spanish Start ups" group and "Forex & Commodities Trading".

In the groups network of 2015, "Gaming" makes up its own cluster with the "Game Developers Berlin" on top and covers topics like 3D, virtual reality or art and games with other groups. Compared to other clusters, "Gaming" is relatively loosely connected to other clusters.

Compared with the business and tech field, art/culture groups are split between the different mid-sized and small mixed clusters, such as a cluster bringing primarily together blogging, music, and dance groups.

In the following, to complement the view of the biggest clusters of the 2015 groups network, I have analyzed where they came from via an alluvial diagram.

13 https://www.meetup.com/de-DE/OpenXLab (retrieved on 31/10/2016).
14 http://www.meetup.com/Berlin-Art-Lovers (retrieved on 31/10/2016)

4.3 Alluvial Diagrams – Observing Change in the Groups Networks

The four groups networks from 2012–2015 were clustered running the Infomap code with significance for undirected networks. This means that obtained results as described above for each year. The fast growing rate of the Meetup platform yielded networks of very different sizes – from 25 groups in 2012 to 259 groups in 2015 and these accordingly resulted in a growing number of clusters each year.

Figure 6: Overview of Alluvial Diagram (2012–2015)

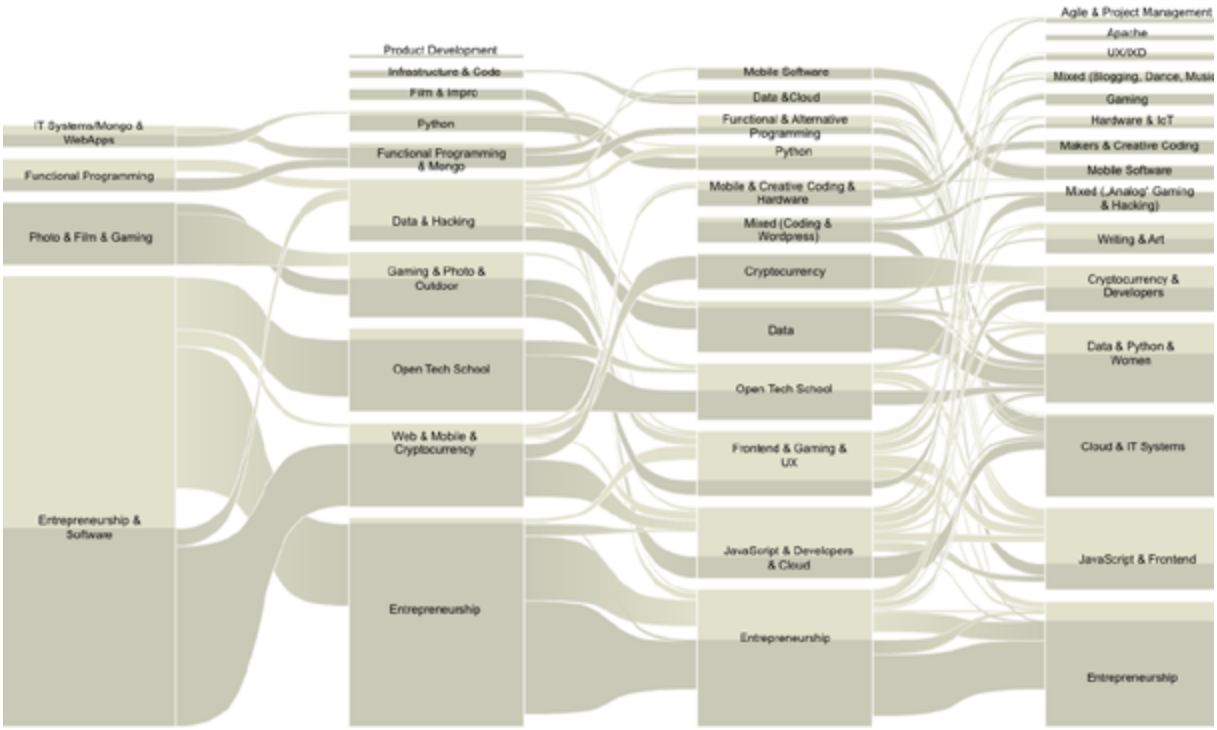


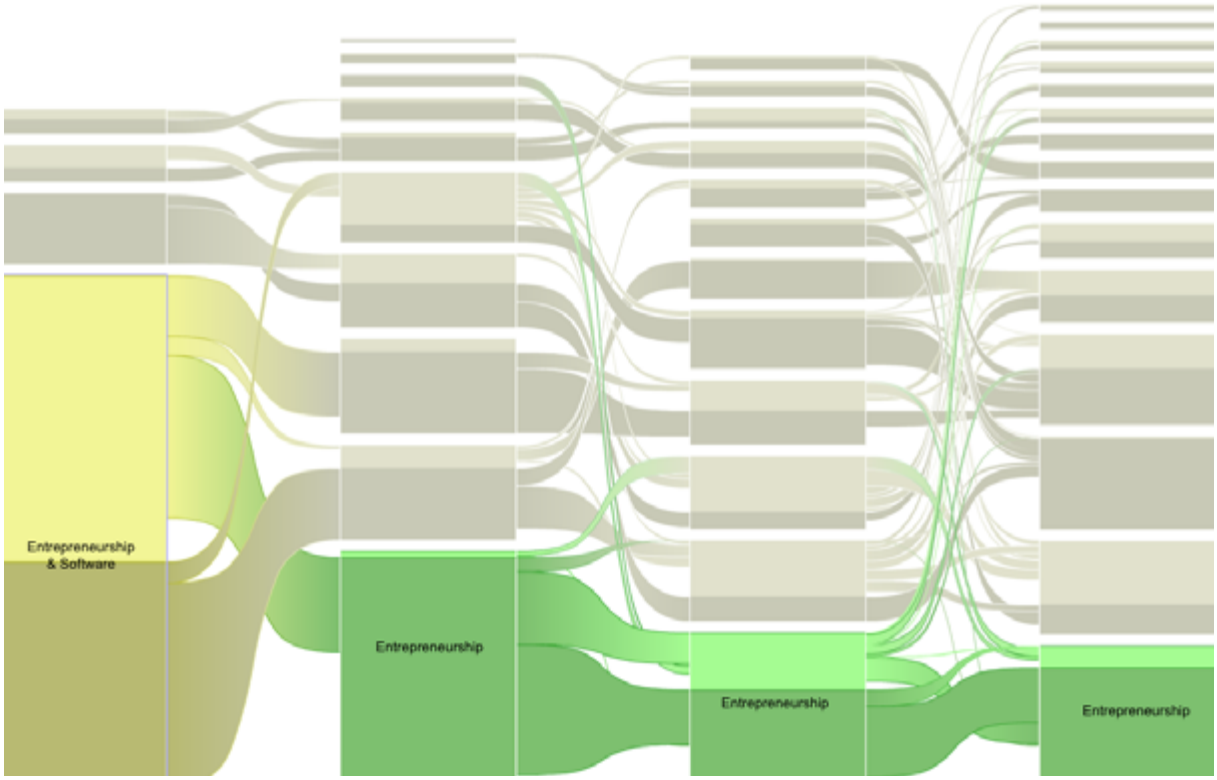
Figure 6 depicts the four networks with their clusters in the alluvial diagram. Some clusters with small flow are excluded from the diagram because they only make a small proportion of the overall network flow and spacing them out helps to avoid visual clutter. The network from 2012 results in four clusters (all shown), 2013 derives 10 clusters (all shown), and from the 2014 network, the alluvial diagram displays 12 of 19 clusters, but these 12 clusters make up almost 94 % of all network flow. The 2015 network consists of 23 clusters from which 15 are integrated into the diagram, representing more than 96 % of all flow. Because the 2012 network is that small and less comparable with the other clusters, I neglect its clusters and their streams and start my analysis from the view of the 2015 network. Also important to note, is that not every group that emerged remains until 2015. Some groups might emerge one year, go missing the next (due to lack of event attend-

ance) and come back a year later. Furthermore, a lot of the thinner streams often represent only one or two groups changing clusters and are usually insignificant, thus can be ignored.[15]

The alluvial diagram gives us a good overview of the different proportion (percentage of flow) of the clusters and the general differentiation that took place. Each cluster is represented by a block with a darker grey for the significant subset of nodes and a lighter grey for the insignificant ones. The streams indicate the change in the clusters between the years. We see a lot of movements across the clusters between the years and most clusters integrate two (or three) themes, as we already know about the 2015 network. Nonetheless, certain fields and clusters become apparent.

The "Entrepreneurship" cluster started in 2012 within a shared cluster of "Software" groups ("Entrepreneurship & Software"). It split into its own cluster in 2013, from which time it has remained as the biggest cluster. It is clearly the dominant standalone cluster in the Berlin Meetup network throughout the years – and it is less differentiated than tech groups.

Figure 7: Entrepreneurship Clusters

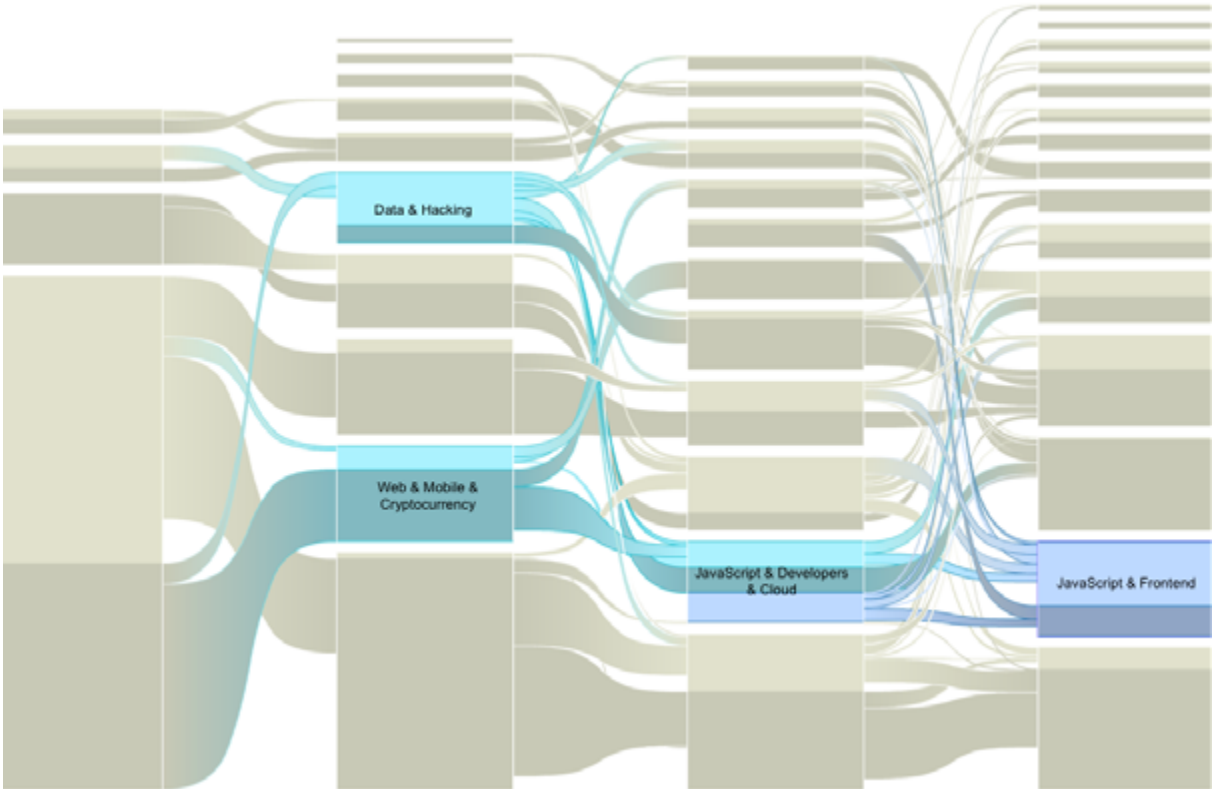


JavaScript groups and topics demonstrate high presence in the 2015 network, however no dedicated or stable cluster has emerged. We see a lot temporal dynamics with merging and splitting with

15 It is also known, that many social networks have a "fat tailed community size distribution" with many small communities and few big ones (Barabási, 2015)

other clusters. While in 2015 JavaScript groups mainly clustered with frontend groups, in 2014 they mostly clustered with developer and cloud groups. In 2013, JavaScript groups were not dominant in one cluster and instead split up in the more general "Data & Hacking" and "Web & Mobile & Currency" clusters. Figure 8 depicts these clusters and their streams from the last three years.

Figure 8: JavaScript Clusters

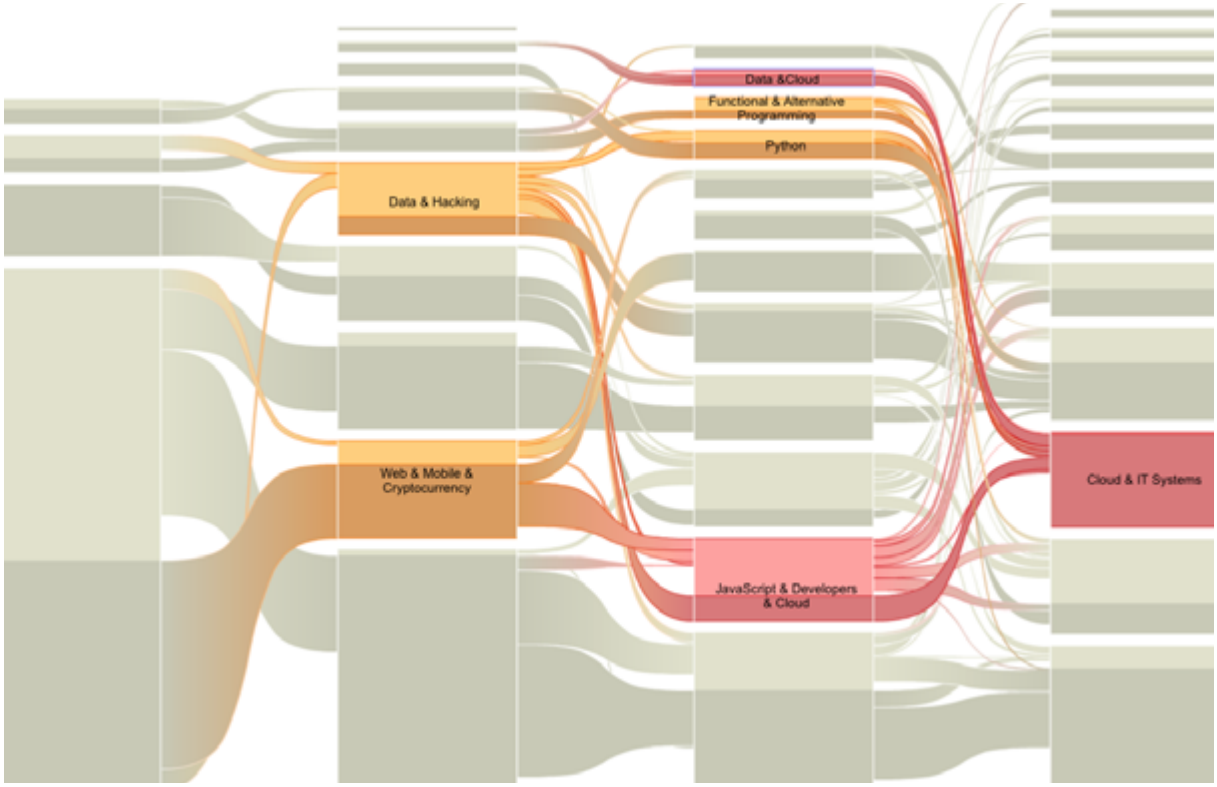


Next, let us assess in the clusters associated with groups about cloud computing. In 2015, the cluster "Cloud & IT Systems" is insignificant/not standalone as it also clusters with "JavaScript & Frontend". This is reflected by the change: Most previous groups of the Cloud & IT System 2015 came from the "JavaScript & Developer & Cloud" 2014 cluster and the small "Data & Cloud" 2014 cluster – also marked as red in the alluvial diagram (see figure 9). Minor streams came from more general programming clusters from 2014.

In 2014, a distinct "Data" cluster emerged which received more than half of its nodes from the "Data & Hacking" 2013 cluster (darker yellow in figure 10). Then, the closeness of this cluster ended and it gave almost all of its nodes (about 8 % of its overall 9 %) in 2015 to the cluster merging "Data & Python & Women" groups. The "Data" 2014 groups contributed more than 4 % of the cluster's overall flow of 14 % while less than 2 % originated from the "Open Tech School" 2014 cluster and 1.5 % from the "Python" 2014 cluster. Furthermore, the latter is insignificant and clus-

ters with the Open Tech School in 2014 as well as 2013. Thus, the "Data" groups, the "Python" cluster and the distinct "Open Tech School" cluster merge altogether in the "Data & Python & Women" 2015 groups. The women groups came from different clusters and two of them showed up in the network the first time in 2015.

Figure 9: Cloud Clusters



"Cryptocurrency" was established as its own cluster in 2014, and then totally merged with developer groups in 2015. Still, four of the 13 groups in the "Cryptocurrency & Developer" 2015 cluster were part of the "Web & Mobile & Cryptocurrency" cluster in 2013.

The previously discussed changes in the dynamic Meetup network mostly reflect merging into mixed clusters. These often started from a differentiation by splitting of previously mixed clusters into sub-clusters followed by a new merging into mixed clusters in 2015. On the other hand, according to the growing 2015 network, other groups started differentiation and established their distinct clusters: Gaming groups and UX/IXD groups split up from the "Frontend & Gaming & UX 2014" cluster. From the mixed "Mobile & Creative Coding & Hardware" cluster of 2014 a "Makers & Creative Coding" cluster emerged in 2015.

The "Mobile Software" cluster has stayed distinct and stable within the last two years after it emerged out of the Data & Hacking cluster from 2013.

Figure 10: Data Clusters

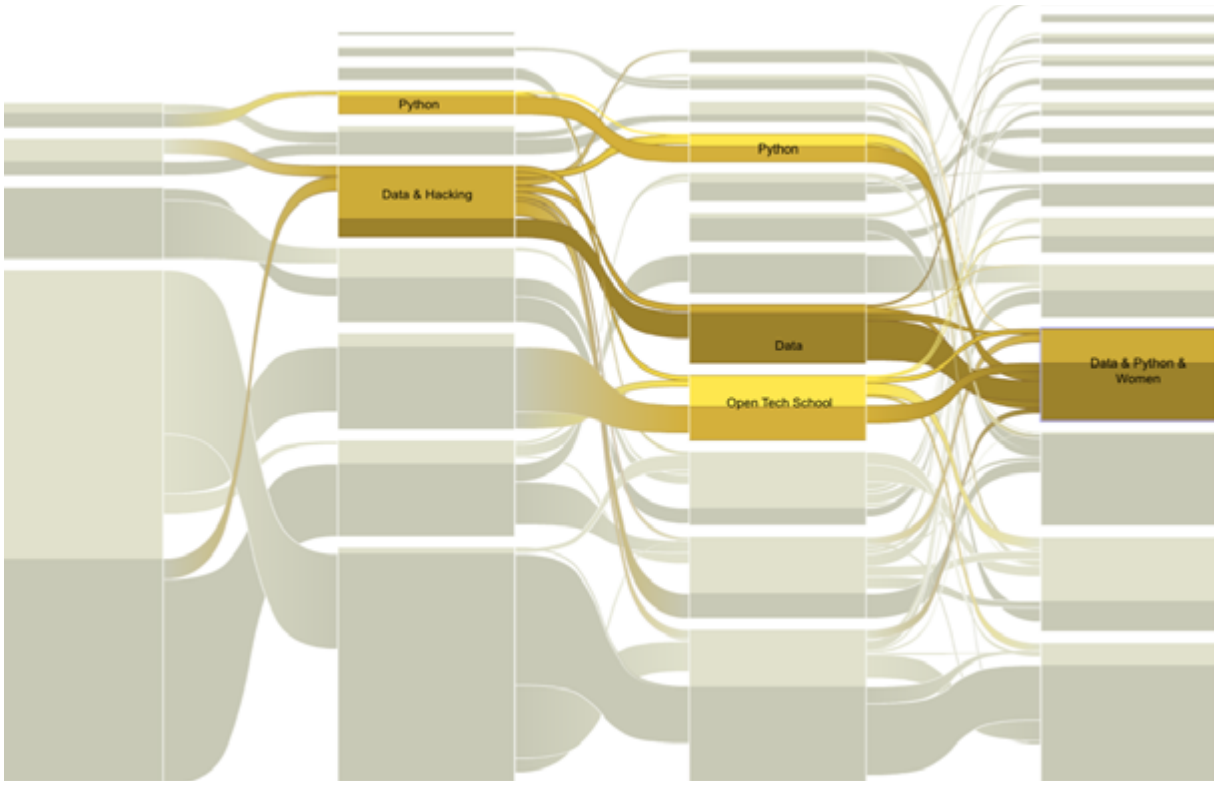


Figure 11: Cryptocurrency Clusters

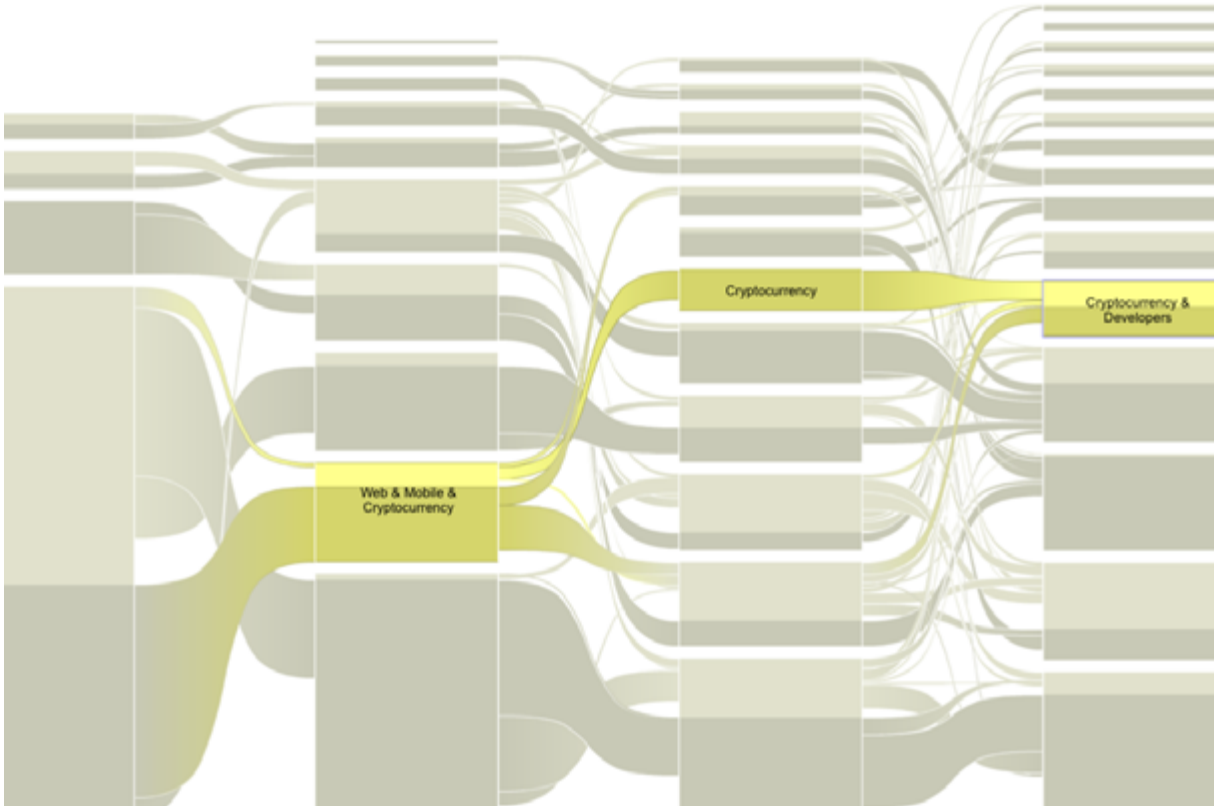
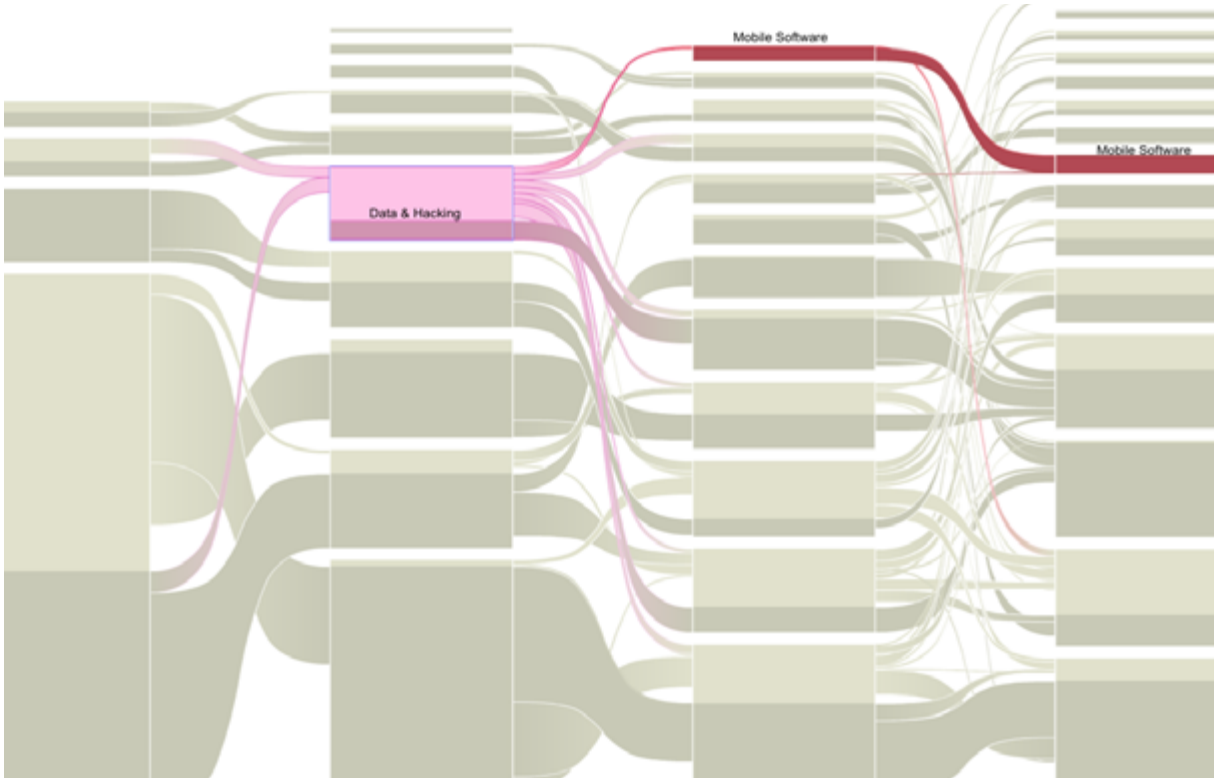


Figure 12: Mobile Software Clusters



The culture and art groups seem to be too small and non-stable to establish bigger clusters over time. Gaming groups are the most visible and make up their own cluster. Among the culture and art groups, writing groups dominate and start a tiny cluster in 2014 as well as making up a bigger portion of the "Writing & Art" cluster in 2015.

4.3 Emerging Topics

While alluvial diagrams illustrate change and stability in the Berlin Meetup network during the past few years, we can also leverage their potential to tell us about recent developments in the tech and start up scene.

Within the tech category, "refugees" was the most popular newest topic, according to event attendance between September 2015 and 2016. The more than 1000 RSVPs are above 90 % driven by the meetups of the popular ReDi School, a "non-profit digital school for tech-interested newcomers applying for asylum in Germany".[16] Two other refugees tech meetups were

16 http://www.redi-school.org (retrieved on 31/10/2016)

also founded during the same autumn of 2015. However, one of these two meetups only held one event.

Second ranks the topic "Oculus Rift", the name of famous Virtual Reality (VR) glasses, with 464 positive RSVPs. Virtual Reality is a dominant topic within the last year as other VR topics also rank high: The third-most popular topic is the general topic "VR Glasses", and in 7th place "HTC Vive" also describes VR glasses. Nevertheless, this statistic has to be mitigated because these topics were mostly created by the same groups so we should consider the VR topics altogether. The same goes with rank four and five: "AI Applications" (Artificial Intelligence) and "AI Programming". Together with the topic "Neural Networks", AI can be summed up as another very popular topic within the last year. "Decentralized Systems" (rank 6) touches the topics AI and "Neural Networks" (rank 9), but rather deals with cryptocurrency systems.

In eighth place, we find "UI/UX Design". From the previous network analysis we know this is not a new topic per se, but within the last year it seems to gain momentum in the groups from the tech category. Also "Girls in Tech" became popular last year while there had been tech groups targeting women before that did not use that topic or other tags describing a female focus of a group.

Table 4: Top Emerging Topics in Tech Category

Rank	Topic	RSVPs
1.	Refugees	1004
2.	Oculus Rift	464
3.	VR Glasses	424
4.	AI Intelligence Applications	413
5.	AI Programming	336
6.	Decentralized Systems	325
7.	HTC Vive	298
8.	UI/UX Design	288
9.	Neural Networks	286
10.	Girls in Tech	273

The most popular new topic within the Business & Career category has been "Accounting" with 346 RSVPs. Among the three groups touching this topic, two address freelancers and founders respectively. "Property Tech", on rank two, deals with the "digitalization of real estate" and is "the

talk of the town", as the "PropTech Now!"[17] group announces. This explains why "Digitalization" ranks fourth among the most popular topics as two of the three "Property Tech" groups also tagged their group with "Digitalization". The topic "Career Transitions" got the third-most RSVPs, respectively, with two of three groups targeting women. "Open Source" gained 137 RSVPs within the last year. This general topic has been primarily identified with tech topics and one of these "Open Source" groups is the "Tech for Good Meetup", connecting topics of social entrepreneurship with tech.

Table 5: Top Emerging Topics in Business & Career Category

Rank	Topic	RSVPs
1.	Accounting	346
2.	Property Tech (proptech)	215
3.	Career Transitions	205
4.	Digitalization	196
5.	Open Source	137

5 Discussion

The network analysis provided insights into the structure and content of the Berlin Meetup scene on different levels and thus gave a valuable view into Berlin's tech and start up community. The topics network reflected different clusters of connected interests that groups use to describe themselves. The groups networks revealed clusters of groups based on their members shared event attendance.

In general, the topics network and the groups networks had notable similarities in terms of clusters based on the groups' content. In both networks, we see a big, highly connected cluster about entrepreneurship and separate mid-sized to big clusters revolving around data and cloud/systems. We can conclude, that the entrepreneurship/business groups are more strongly connected than groups from Meetup's tech category. We find more clusters and specialization among the groups from the tech category. This makes sense as a lot of these groups deal with specific software and applications, thus have a higher entry barrier and tend to have more closed and homogenous

17 http://www.meetup.com/de-DE/PropTech-Now (retrieved on 31/10/2016).

groups. Furthermore, the higher number of tech groups supports the development of more clusters. From entrepreneurship and business groups only very small clusters emerged, besides "Agile & Product Management" and "UX & IXD". The latter seem to sit between general tech and entrepreneurship topics and groups, bridging these fields. Agile & product management and UX/IXD indeed embrace issues relevant to both developers/tech people and entrepreneurs/managers. The topic network with overlapping nodes points us to further potential intersections of fields, based on the shared topics of groups, like "Ed Tech" and "High Scalability Computing". These are promising for further investigation as these intersections of different backgrounds facilitate the creation of new knowledge. Vedres & Stark (2010) describe such intersections or intercohesion as "structural folds", which provide "familiar access to diverse resources" (ibid., p. 1150). Structural folds support the mixing or recombination of knowledge for learning, opportunities, and innovation (see also the literature review).

I did not detect such stronger intersections between groups from the culture/creative categories and the tech or business category, apart from the topic "3d printing" overlapping the "Makers" and "Art" cluster of the topic network. In the 2015 groups network, "Gaming" made up its own cluster and some dancing groups mixed with clusters from the tech and business category. However, several culture/creative groups are connected with tech and business groups, as the network graph depicts, and groups from different fields share common topics (although they are not topics overlapping clusters). Focusing on these connected groups could lead to potential structural folds as members with quite different backgrounds and knowledge meet. For example, the topic "communication skill" from the "Entrepreneurship & Business" cluster connects with the topic "live theatre" from the "Creative Arts" cluster of the topic network and points to learning acting to enhance communication skills.

Like many other social networks (Barabási, 2015) the groups networks consists of a few hubs and a long tail of smaller groups. Considering the overall flow of the 2015 network and the member count (regular "offline" members), the "Microservices Meetup Berlin" is the most important group, followed by "Berlin Startups – Miscellaneous Events" and then the "NodeJS Meetup Berlin". Without the split of big groups to balance their weight, "Berlin Startups" clearly would have been on top. From the groups (like "NodeJS Meetup Berlin") and their associated topics, it became clear that JavaScript is one of the most prevalent interests among the Berlin Meetup scene. This corresponds with data from Github[18] and Stack Overflow,[19] two important online platforms for developers. According to their projects and a survey, JavaScript has become the most popular

18 http://githut.info (retrieved on 31/10/2016)
19 http://stackoverflow.com/research/developer-survey-2016 (retrieved on 31/10/2016)

software language with wide spread applications. Programming languages and other developer interests have dominated the Berlin Meetup scene from the beginning. This is generally known for Meetup and is also reflected in the Berlin network by the stronger professionalization of corresponding groups. These groups often have sponsors who use the events to present themselves and might promote their products, but also share their knowledge, e. g. by showcasing how they approached a problem and which tools and techniques they used to solve it. In some communities, it seems highly recommended for companies to participate in meetups to demonstrate their relevance. Some companies, like eBay, even organize their own groups. Nevertheless, it is a fine line for companies as some groups explicitly state a focus on knowledge exchange and disapprove of promotional talks or recruiting activities.

The analysis of alluvial diagrams and emerging topics offers further understanding of the Berlin Meetup scene by adding a dynamic perspective and telling us about recent trends. We saw rather stable communities like "Entrepreneurship" and "Mobile Software" and communities where a lot has been going on as members of different groups interact and several communities merge and split, like the "Cloud & IT Systems" cluster. Women seem to catch up in the tech scene and organize via Meetup as they cluster in a community with Data & Python. When running the Infomap code with node overlapping mode, the clustering of tech groups targeting women becomes even more apparent. Their grouping with data and Python groups in the 2015 networks coincides with the developer survey of Stack Overflow (see footnote 19) where women are more prone to programming with or for data. Moreover, Python is a popular language for data analysis and also popular among programming starters. And according to Stack Overflow, while there is a gap with mid-aged women, a growing number of younger women start learning programming. The Berlin Meetup data also had "girls in tech" among the top 10 emerging tech topics.

The trending topic "refugees" with three groups starting in autumn 2015 goes together with the events happening in Berlin at that time. Many refugees were coming to the Berlin and the city was struggling to care for them, which called a lot of people to action.

The trending topics regarding VR glasses are about concrete applications of this technology and point to further specialization and implementation. Accordingly, the popular technology radar Gartner Hype Cycle from summer 2016 tags VR within its "slope of enlightment" – a phase, where a technology is coming to maturity, not far from its productive phase.[20] The Gartner Hype Cycle also reflects the trend in AI topics within the Berlin's tech Meetup scene as AI topics in 2016 belong to the top phase of hype, the "peak of inflated expectations".

20 http://www.gartner.com/newsroom/id/3412017 (retrieved on 31/10/2016)

6 Conclusion

Access to sources of knowledge is a crucial asset to compete in today's world. Organizations have increasingly turned to external sources of knowledge for entrepreneurial opportunities and innovation. To make use of valuable, tacit knowledge, authors have pointed towards communities as a place for knowledge creation through direct social interactions (Bogers et al., 2016; Lyons et al., 2012; Nonaka & Toyama, 2003; O'Mahony & Lakhani, 2011; Vanhaverbeke, 2006; West & Lakhani, 2008). Although firms and entrepreneurs are already more or less actively and consciously part of their local networks and communities, the literature is missing research focusing on knowledge resources on the regional level (Acs & Audretsch, 2010; Autio et al., 2014; McKeever et al., 2014; Steyaert & Katz, 2004; Vanhaverbeke, 2006).

This study explored a growing and popular network of technology and start up communities of the platform Meetup on a city level. The results gave an overview of Berlin's tech and start up scene and mapped their clusters and their development. Furthermore, the research presented insights into the content of these communities by analyzing their topics and most influential groups.

The Berlin Meetup communities are indeed places for a broad range of knowledge exchange and creation about entrepreneurship, software development, and other tech topics. Groups about entrepreneurship are less homogenous and less differentiated than tech groups, albeit the latter more strongly present. Among the tech groups, JavaScript is the dominant discussed programming language and communities about data as well as cloud computing/IT systems make a bigger portion. More than 250 active groups (tech, entrepreneurship and few cultural interest groups) of the Berlin sample demonstrate a great potential for entrepreneurs and firms to dig deeper into their domains of interests and tap knowledge. The communities not only support learning about new tools and best practices, or exchange about the latest developments and trends; they also foster business relationships and new projects, potentially even the founding of start ups. Organizations can also use meetups for self-promotion and HR, but should be attentive to a group's internal code of conduct. If a group has not acquired a topic yet, firms and entrepreneurs can gain advantage by founding their own group and becoming a hub and leader for this topic in their region. For example, this could support start up incubators of corporates that want to participate in the local community of entrepreneurs. Newcomers, firms, and entrepreneurs can benefit from taking part in the Meetup communities as well as stakeholders from regional development, who need to know more about their local tech and start up networks.

This paper introduced a still new method for community detection and mapping the change of these communities, which can be applied to other contexts. With the introduced methods

and the Meetup API, further analyses could map the community structure of other regions. This touches on the exciting research area of city comparisons. Such comparisons could tell us about the peculiarities of cities and deliver real-time data about their development in terms of their tech and start up scene. For example, the role of the "Ed Tech" topic and UX in the Berlin Meetup network was found in a similar study by researchers of UK's institution NESTA (see footnote 3). It would also be interesting to conduct more research into hubs of meetups, such as Silicon Valley, to see how these communities and the usage of the Meetup platform are developing and what positive and negative professionalization processes are occurring. By looking beyond Meetup, a typology of local communities would be a valuable research outcome to guide organizations in engaging with such external sources. Also, this study was explorative and neither makes predictive conclusions nor shows causal relationships. A lot of areas could be scrutinized for deeper understanding and discovering relationships, like studying the use of local communities by entrepreneurs and firms or comparing them with other external sources. The analysis of emerging, new topics of the Berlin Meetup communities from the last 12 months provided no big surprises and reflected assumed adoption of trends, like Virtual Reality devices and AI. For the amount of Berlin groups, the data set was rather small and, if reduced to shorter timeframes, results could be arbitrary. So using such data to check and track how local communities act upon recent developments has its limits.

Finally, we must consider some inherent flaws with the topic data from Meetup: Topics are set up by the organizer of a group and the organizer might not choose the most relevant and extensive list of topics or might fail to update topics. However, Meetup suggests topics to organizers. Meetup also suggests topics and groups to the user of its platform based on their interests and group memberships. On the other hand, these recommendations risk a partial skewing of the data based on the recommendation algorithm. A bigger, general limitation of the data lies in the validity of the RSVP's. I encountered this problem with extensive filtering, but the data still cannot confirm interactions between group members. However, having access to such an amount of data with a higher validity would not be possible to obtain through common surveys. Future research might consider triangulating data, e. g. through mixed methods or further "big data" sources, like social media.

Tapping into local interest-based communities also bears risks, like an "over-embedding" with local structures and control mechanisms of the embedded actors (Welter, 2011). Furthermore, knowledge of an organization might "leak" into these communities with a negative impact (Duguid & Brown, 2001; O'Mahony & Lakhani, 2011). Also, to benefit from local communities, one has to actively interact with them, which is time-consuming.

Nevertheless, local communities of practice within the environment of organizations hold great promise for the creation of knowledge. When firms and entrepreneurs actively take part in chosen communities, they might present themselves to valuable sources of opportunities and innovation. A deeper analysis of local communities, such as the Meetup platform at city-level will also help us to better understand why there are more opportunities for entrepreneurs in some places than in others (Shane, 2012).

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Paper Three

Paving the Path to Culture-Driven Innovation: The Role of Intermediaries in Cultural Absorptive Capacity Building[1]

Abstract

This research is motivated by the neglected potential of culture as a resource for innovation. It connects the concept of culture as a toolkit with research on knowledge brokering and comes up with a framework of cultural absorptive capacity. Herein, the paper focuses on the active role of intermediaries in bridging distant, external cultural resources for an organization. This individual perspective acknowledges the social contingent factors of knowledge brokering and points to the relationships with an intermediary at the boundary of companies. After an extensive literature review and the development of the framework, a case study with two medium-sized manufacturers of interior products illustrates the framework. It demonstrates how cultural resources from collaborations with artists support firms in developing competitive advantage through such as unconventional strategies or the creation of products with symbolic meanings.

Keywords: Intermediaries; Absorptive capacity; Knowledge brokering; Cultural resources, Boundary spanning

1 Introduction

We are experiencing a shift towards culture: Users increasingly turn towards "lifestyle products" where technological functions are overlapped by intangible symbolic meanings arisen from culture (Dalpiaz, Rindova & Ravasi, 2010). Ravasi & Rindova (2008) argue that innovation activities turn from technology-based to culturally-informed and illustrate the concept of cultural innovation. Verganti (2009) claimed, that to gain competitive advantage and pursue radical innovation, firms rather need to come up with new meanings for products than with new technology.

But so far, culture as a resource has been widely neglected in management (Dalpiaz, Rindova & Ravasi, 2010; Giorgi, Lockwood & Glynn, 2015; Ravasi & Rindova, 2008; Rindova, 2007;

1 This paper is currently in review process at "Creativity and Innovation Management". An early version ("The Role of Intermediaries in Culture-Driven Innovation and Future Orientation") was presented at "The XXIV ISPIM Conference – Innovating in Global Markets: Challenges for Sustainable Growth in Helsinki", Finland on 16–19 June 2013.

Ravasi, Rindova & Dalpiaz, 2012). Sociological research describes culture as a resource or as a toolkit from which an individual picks his or her strategies for action. Broadly speaking, cultural resources include such as stories, world-views, habits, skills, or styles. Organization science transferred this concept from individuals to organizations to better understand strategy and change in companies (Giorgi et al., 2015; Maurer, Bansal & Crossan, 2010; Weber, 2005; Weber & Dacin, 2011). There is some empirical evidence that organizations can benefit tremendously from external cultural resources in innovation: Rindova, Dalpiaz & Ravasi (2011) for example, have shown how Alessi has used cultural resources from, e. g. the arts or anthropology, to envision unconventional, versatile strategic opportunities and innovative practices by cultural repertoire enrichment and organizational identity redefinition.

It is, however, difficult for companies to explore and integrate cultural resources (ibid.). This is especially true for cultural resources that are distant to an organization and its domain. But, for truly new external input and to come up with new symbolic meanings such distant resources hold a lot of promise (Rindova et al., 2011; Verganti, 2009; Verganti & Öberg, 2013).

Therefore, scholars and practitioners need to know more about how organizations integrate and successfully make use of cultural resources. The concept of absorptive capacity (Cohen & Levinthal, 1990; Zahra & George, 2002) provides us with a framework for the process of acquiring new knowledge from external resources. This paper adopts the recent model for absorptive capacity by Todorova & Durisin (2007) to elaborate on a framework for cultural absorptive capacity. It follows the notion from literature to account for social and individual factors in this model.

A broad stream of research from innovation management and knowledge management points to the crucial role of intermediaries in knowledge brokering between external sources and an organization (Howells, 2006; Stewart & Hyysalo, 2008). This paper evaluates different concepts of intermediaries and their various ascribed roles regarding the relevance of intermediaries in the use of cultural resources. Thus, I focus on the role of intermediaries and their relationships with the organization in the absorption of cultural knowledge by firms.

After the literature review on cultural resources, absorptive capacity, and intermediaries, I introduce my framework of cultural absorptive capacity with due regard to the role of intermediaries. To illustrate the framework, I conducted a case study with two manufacturers of interior products. Each case has made use of cultural resources in collaborations with artists by the help of intermediaries to obtain access to relevant "cutting-edged" cultural resources. The second part of the paper starts with the methodology of the case study, followed by results on the roles and functions of the intermediary as well as the relationship between intermediary and firm. Then, I discuss the added

value of intermediaries and compare the different approaches between the cases in integrating cultural resources, followed by a discussion and conclusion.

My research adds to a deeper understanding of the underlying process of absorbing knowledge on socio-cultural developments through intermediaries to uncover the potential of culture as a resource for innovation. I will demonstrate the impact of intermediaries through their broad roles and functions on fostering the cultural absorptive capacity of a firm.

Readers from innovation management, foresight, and strategy will gain a better understanding in applying these approaches. They will learn which added value the use of cultural resources provides. Intermediaries will profit from insights about their role and learn how to pursue their strategies in helping companies to absorb cultural resources.

This paper introduces the "culture as a toolkit" perspective in innovation management research and elaborates a model for cultural absorptive capacity. It connects the concept of the intermediary with the research on cultural resources by drawing on the process of knowledge acquisition described in the literature on absorptive capacity. It sheds light onto intermediaries and knowledge brokering in early phases of innovation from a micro-level perspective.

2 Literature Review

2.1 Cultural Resources and Cultural Capital of Individuals

Culture marks a vague term that is used in very different ways. Older concepts pictured culture as a rather stable, latent variable dominated by values with many constraints for individuals, tied to the social structure of a society. But newer concepts point to the strategic use of culture by individuals with more choice and variation (DiMaggio, 1997; Giorgi et al., 2015). These concepts qualify the role of culture on individuals as less bound to values and describe culture in a more flexible way as providing orientation or resources for social action (Giorgi et al., 2015; Kaufman, 2004). According to anthropologist Clifford Geertz culture is "an historically transmitted pattern of meanings embodied in symbols," (Geertz, 1973, p. 89). Geertz goes on to describe cultural patterns or symbols as extrinsic sources of information. In this regard, culture is a resource – like a toolkit, a repertoire, or "grab-bag" (DiMaggio, 1997; Giorgi et al., 2015) people choose from to construct their strategies of action (Swidler, 1986). Swidler (ibid.) understands strategies in general as organizing an action or one's life, for example selling skills in a market. Culture as a toolkit consists of habits, skills, and styles. Swidler differentiates between "symbolic vehicles of meaning, including beliefs, ritual prac-

tices, art forms, and ceremonies“ and “informal cultural practices such as language, gossip, stories, and rituals of daily life” (Swidler 1986, p. 273). These cultural resources provide a register (on a collective level), respectively a toolkit (on an individual level) for problem solving and navigating the environment (Swidler, 1986; Weber, 2005). Someone makes the best use of cultural resources, if his or her cultural resources encompass a high cultural variety and if he or she knows which cultural resource is relevant in which context (Erickson 1996). The cultural variety is connected to the network variety of a person, like contact to people from different locations (ibid.).

Culture serves as a resource as well within the concept of Bourdieu on cultural capital (Bourdieu, 2011). Cultural capital describes one type of asset, besides economic, social, and symbolic capital, from which accrues the position of an individual in society. Cultural capital inheres tastes, skills, knowledge, and practices and becomes apparent in the arts or fields of consumption like food, interior, pop culture, or sport (Bourdieu, 2011; Holt, 1998). It exists in three forms: Embodied cultural capital, which predominantly exists as long-lasting dispositions of the mind and body and is often acquired over time, then objectified cultural capital, as represented by physical objects like books, works of art or instruments, and last in institutionalized form, especially as educational qualifications (Bourdieu & Thompson, 1991; Bourdieu, 2011). Symbolic capital encompasses social, economic, and cultural capital – it is “the outcome of the conversion of other forms of capital” (Lawler, 2011, p. 1417) and most often exemplified as the prestige of a person or its distinction (Bourdieu & Thompson, 1991).

Accordingly, Bourdieu understands cultural objects as symbolic goods, which inhabit a cultural value besides their commercial value (Bourdieu, 1985). People use these objects for distinction, expressing their prestige and life style. Already in the 50s, Levy (1959) noted that people also buy a thing for its social and/or personal meaning in addition to its functions. Thus, a manufacturer of goods is also selling symbols.

Following a review of Beckert (2011), the value of a product consists of a physical and symbolic dimension. The physical dimension refers to the function of a product, basically what a product does. The symbolic value of a product reflects the symbolic meaning of an object. This symbolic meaning can be signified in two ways: The positional value, which is ascribed by third parties to an object and acts as social signifier, or the imaginative value, which is ascribed by an actor. The imaginative value represents ideals and values of the owner through the object, carrying needs and emotions of the owner as well as providing self-actualization.

Ravasi & Rindova (2008, p. 270) define the symbolic value of a product “by the social and cultural meanings associated with it that enable consumers to express individual and social identity through the product’s purchase and use”. They describe the source of these meanings lying in

culture or in a "cultural milieu", dominated by certain subcultures. These cultures demonstrate alternatives to common consumption, lifestyles, thinking, etc. Ravasi & Rindova (2008) call these subcultures "lead cultures", referring to the definition of "lead users" (von Hippel, 1986) as lead cultures are communities, in which social trends become relevant at an early stage. Similarly, Liebl & Schwarz (2010) describe subcultures as the hotbed for new meanings, which play a crucial role in the formation of socio-cultural innovation and trends.

One example is the subculture and community of "coffee geeks" around the "third wave coffee movement". The members of this community refuse mainstream coffee culture and build a connoisseurship around a way of making and admiring coffee, which differentiates from previous ones, like the one Starbucks stands for. The third wave coffee culture is a trend on its own, but incorporates previous trends and amplifies existing ones by broadening the register of symbols and meanings: For example authenticity and rawness, which is reflected by the design of coffee roasters and cafés through a neutral, modern style with pieces of authenticity or rawness, like used wood, as well as the notion for the "true flavor" of mildly roasted beans. Similarly, the selection of beans from micro coffee farmers accounts for the value of conscious consumption in food processing.

While the previous paragraph introduced concepts of culture and its role and usage by individuals, in the following I refer to the role of culture for firms.

2.2 Cultural Resources and Cultural Capital of a Firm

Predominantly, scholars of management studies have been talking about culture as the culture in an organization separated from culture around organizations, but recently discuss their overlap (Giorgi et al., 2015). Similarly to the changing view of the role of culture for individuals, organizational culture is increasingly seen as flexible and less stable and constraining. Firms open up to the cultural context, in which they are embedded, increasingly interacting with external audiences and the public sphere ("open-system model of cultures") (Giorgi et al., 2015; Weber, Heinze & Desoucey, 2008; Weber & Dacin, 2011). In the following, they use culture as a resource. Accordingly, some scholars applied the "culture as a toolkit" perspective to firms and show how organizations use cultural resources e. g. for strategy and identity management or creativity (Giorgi et al., 2015; Harrison & Corley, 2011; Maurer et al., 2010; Miettinen, 2006; Rindova et al. 2011; Weber, 2005; Weber et al., 2008; Weber & Dacin, 2011).

As Rindova et al. (2011) sum up, previous research has shown that the use of new cultural resources by organizations is often limited to their industry registers. Furthermore, the use of

cultural resources outside a company's industry register is seen as difficult and costly. With their own revelatory case study of Alessi, the authors demonstrated how the proactive search for cultural resources outside the industry register, allowed Alessi to break away from industry conventions, develop innovative practices, and strategic versatility. The company started integrating cultural resources from the register of the arts (e. g. collaboration with artists) during the 70s, then from the register of crafts (e. g. reintroducing of craft techniques) up to resources from anthropology and psychology during the end of the case study in the mid 2000s. The cultural resources enabled the household producer to create new demand through a changed understanding of users and their needs in the organization, which led to new (symbolic) value creation through products and the creation of a new market. As Rindova et al. (2011) were able to show, Alessi not just accumulated cultural resources and developed unconventional strategies, the organization also integrated more diverse cultural resources. This diversity fostered "strategic versatility", the "ability to execute strategies of action that serve multiple and diverse segments simultaneously through integrated practices of product development, production, and marketing" (ibid. p. 426). This was possible, because the firm went through redefinitions of its identity when incorporating new registers of cultural resources. The challenge was to integrate the new resources and strategies while still maintaining to the previous ones to a certain degree. Alessi used identity claims, which represented a combined version of the previous and the new cultural resources as a practice of sensemaking. Rindova et al. (2011) point to the difficulties of this practice, e. g. by product failures, or clashes between commercial and efficiency interests, represented by technicians and managers on the one side, and the other side the interests driven by the input from the art register, represented by artists. But, with an additional reference to a case by Weber et al. (2008), Rindova et al. (2011) claim that these experienced contradictions and uncertainties due to integrating diverse cultural resources are crucial in breaking away from industry conventions, provoking growth and thus gain true competitive advantage.

Verganti & Öberg (2013) emphasize the same, when calling for companies to interact with external networks from a different environment – the more outlandish these networks and their actors, the more different and radical innovations possibly can emerge. For them, innovation is the co-creation of product meaning with external actors from a firm's environment. To come up with new symbolic meanings and unconventional strategies, a company needs those outlandish resources and interpretations from alien industry registers to challenge their thinking and certainty.

While already Levy (1959) proposed that companies, which sell goods, also sell symbols, Hirschman (1986) introduced consumers as taking part in symbols and meaning contribution in a culture production system consisting of a creative, managerial, and communication subsystem.

Ravasi & Rindova (2008) built on this and Hatch's (1993) cultural production process in their model of symbolic value production. Here (Ravasi & Rindova, 2008, p. 275), producers stand in the middle of the production process, transferring meaning to products through product design and advertising. They absorb cultural expressions from lead cultures, and designers and advertisers as "symbol management experts" also influence the absorption of new cultural expressions. Besides these experts and the producers, institutional actors like media and critics are further involved in the transfer of meanings to products. Once the new products reach the "general consumer culture", they are collectively interpreted and included in cultural practices by the consumers. In this way, consumers, producers, and other actors jointly create the meaning of objects in interaction.

Summed up, cultural resources offer organizations a broad repertoire of possible actions for their innovation management in terms of creativity, strategy, organizational identity, and the creation of products with symbolic value (meaning).

Accumulating cultural resources distinguishes from the accumulation of other sources, like technological knowledge. While technological developments are rather linear and thus easier to predict, socio-cultural developments are constantly changing and make it difficult to spot which styles or subcultures will become relevant for a majority as well as allow for different interpretations (Dalpiaz et al., 2010; Ravasi et al., 2012). When talking about the accumulation of cultural resources, it makes sense to introduce the term "cultural capital" for organizations by referring to the previously introduced concept of Bourdieu. Such do Dalpiaz et al. (2010): They call cultural capital the organization's internalized set of cultural resources, which revolve in the external societal culture of a firm. A firm makes use of its cultural capital through its strategies of value-creation. This cultural capital includes knowledge and knowing capability of contemporary artistic and cultural movement, or about socio-cultural trends. This could include, for example, the knowledge of the socio-cultural trends of authenticity, rawness, or conscious consumption, which becomes apparent within an emerging "third wave" coffee culture (see above).

According to Dalpiaz et al. (2010, p. 189), besides hiring and collaborating with carriers of cultural knowledge, firms can establish cultural capital by:

- Employing individuals who are carriers of specific knowledge;
- External collaborations with artists, experts, and cultural actors;
- Creating new ad hoc structures to become involved in cultural activities (e. g. exhibitions);
- Changing the way in which they develop new products (deploying cultural and intellectual capital in products);
- Creating new boundary-spanning roles (for identification and development of knowledge of socio-cultural trends).

Furthermore, besides cultural capital Dalpiaz et al. (2010) define intellectual, social, reputational, and symbolic capital as different kind of intangible capital of a firm. The intellectual capital refers to the knowledge of a firm, e. g. on technology and processes. The social capital relates to the resources based in relationships and networks, and the reputational capital encompasses the perception of the firm by stakeholders, especially regarding the quality of products. The symbolic capital of a firm describes the "stakeholders perceptions that the socio-cultural meanings embodied and represented in a firm's products and activities are socially distinguishing and therefore, identity- and status-enhancing," (Dalpiaz et al., 2010, p. 182). It becomes visible for example through advertising and other communication practices in brands, logos, features of products, or activities of a firm and can result in a higher willingness to pay by customers (ibid.).

2.3 Absorptive Capacity

The potential of cultural resources leads us to the question how an organization acquires these resources? Before an organization is able to gain access to external networks of cultural resources, it has to open up for the exploration of those resources. Researchers describe the capability for the latter as absorptive capacity.

According to Cohen & Levinthal (1990), the absorptive capacity of a firm is crucial to innovative capabilities and defined as a set of organization routines and processes, through which the firm is able to value, assimilate, and apply new knowledge. Zahra & George (2002) differentiate between the potential and realized absorptive capacity. The potential capacity includes the acquisition and assimilation of new knowledge. An exposure to diverse and complementary external sources is beneficial for the potential capacity. The realized capacity describes the transformation and exploitation of new knowledge and allows the firm to sustain a competitive advantage. More recent evaluations of the research on absorptive capacity refocus on the seminal work of Cohen & Levinthal. Lane, Koka & Pathak (2006) describe absorptive capacity as a three sequential processes of recognizing and understanding, assimilating, and using new knowledge – while referring to different modes of learning as means in each process. (Organizational) learning concepts resonate in a lot of research on absorptive capacity (Lane et al., 2006; Todorova & Durisin, 2007). Todorova & Durisin (ibid.) criticize Zahra & George's division into potential and realized absorptive capacity as simplifying through neglecting the complex, dynamic, and evolutionary aspects of absorptive capacity. The two authors instead draw on theories from learning and innovation and add further contingent factors into their model of absorptive capacity as well as introduce more feedback links

to account for the dynamic nature of such a process. Todorova & Durisin introduce an alternative model, drawing back on the model of Cohen & Levinthal (1990) while also integrating concepts of Zahra & George's (2002) model. Absorptive capacity consists of recognizing the value, acquisition, transformation and/or assimilation, and finally exploitation of external knowledge.

Different to Zahra & George (ibid.) and in line with Cohen & Levinthal (1990), they put "recognizing the value" as a first dimension before the step of acquisition. Thus, the ability to value the new external knowledge is crucial for absorbing external knowledge and the ability of learning. Next in the process come assimilation and transformation. Todorova & Durisin (2007) see transformation not as a consequence but as an alternative process to assimilation, which occurs when new knowledge has to be altered because it cannot fit in existing knowledge structures of an organization. This information can move back and forth between assimilation and transformation processes. Todorova & Durisin pay special attention towards social contingent factors: Social integration mechanisms and power relationships. They expand the influence of social integration, which was introduced by Zahra and George, beyond the steps of assimilation and transformation. Social integration mechanisms thus play a role throughout the whole processes of absorptive capacity building and can have positive or negative influence on the absorptive capacity depending on the knowledge type and knowledge processes. For example, investment in broad social networks helps to identify new external knowledge, as weak ties are more efficient in providing access to new information. In addition, the authors introduce power relationships as a contingent factor that helps to understand why some organizations are better able to make use of external knowledge. Powerful actors within and outside of an organization can hinder or promote knowledge absorption. These actors use their power and other resources in relationships to reach their goal. Power relationships influence the exploitation of knowledge internally and externally they influence the relationships with stakeholders such as customers or suppliers.

Todorova & Durisin (2007) adopt from Cohen & Levinthal (1990) "knowledge sources" and "prior knowledge" as prerequisite of absorptive capacity and borrow the contingent factor "activation triggers" from Zahra & George (2002). These triggers can be events, like a crisis, or a new technology, calling the organization to react upon and influence where a company is searching for external sources of knowledge (ibid.). For the regimes of appropriability, which illustrate the ease of imitation (Teece, Pisano & Shuen, 1997), Todorova & Durisin follow both Cohen & Levinthal as well as Zahra & George, and take into account both effects of appropriability: A moderating role regarding the outcome of absorptive capacity on competitive advantage (Zahra & George, 2002) and a moderator of the antecedent of absorptive capacity regarding the motivation of investing in it (Cohen & Levinthal, 1990). For the outcomes of absorptive capacity on the competitive advan-

tage of a firm, Todorova & Durisin adopt Zahra & George's division in flexibility, innovation, and performance.

Similar to the stress on social contingent factors by Todorova & Durisin, Lane et al. (2006) call for a better understanding of relationships and interactions in future research as this individual perspective is missing in a lot of previous research, but could help to understand how firms develop and use absorptive capacity. On top of this, Lane et al. (ibid.) criticize the focus of previous research on R&D-related contexts because this narrows down to technology-intensive firms.

Corresponding with the concept of cultural capital and absorptive capacity, Dalpiaz et al. (2010), as well as Ravasi & Rindova (2004) recognize culture as a valuable knowledge resource and introduce "cultural absorptive capacity", relating it to the size of the cultural capital of a firm. In this regard, the cultural absorptive capacity of a firm describes a set of cultural resources and capabilities, the incorporation of knowledge on contemporary social trends and tastes, and the grasping and decoding of cultural meanings. Following this, cultural capital and cultural absorptive capacity play a crucial role in the symbolic value creation, that is innovation based on new meanings. However, Dalpiaz et al. (2010) and Ravasi & Rindova (2004) do not elaborate on their concept of "cultural absorptive capacity".

2.4 Knowledge Brokering at the Boundary

As mentioned above, besides a high absorptive capacity, an organization needs access to external networks of cultural resources. A lot of research in innovation management describes the important role and integration of external actors for the acquisition of external knowledge resources. Especially research build upon the open innovation stream (Chesbrough, Vanhaverbeke & West, 2006) has spurred studies on the external search for knowledge and innovation (West & Bogers, 2014). Similar to the research on absorptive capacity, most of these studies relate to the use of external sources for R&D and the search for technology, but lack research on individuals as sources of innovation (West & Bogers, 2014). Firms working together with users as external sources for innovation might tap into certain communities and subcultures, but focus on idea and solution generation (Lüthje, Herstatt & von Hippel, 2005; von Hippel, 2005; Bogers, Afuah & Bastian, 2010) instead of the creation of new meanings (Verganti & Öberg, 2013).

Closest to the search for cultural resources in innovation management comes Verganti's research (2009) and Verganti & Öberg's (2013) conceptual paper on the radical innovation on meanings. External networks play a crucial role in capturing new meanings in society through taking

part in debates between networks or networks and companies. The further these networks and external actors are from usual connections with the company, the better because in this way more novel and new perspectives can fuel a co-generation of meanings. I will turn to Verganti's concept of external actors below.

Still, even if a company opens up towards external sources, the question remains how to find and address theses sources. From the works on absorptive capacity we know that "boundary spanners" inside a company are crucial for successful acquisition and assimilation of external knowledge (Cohen & Levinthal, 1990). These actors inside an organization create a link between the environment and the company and support the dissemination of knowledge. Innovation management literature ascribes different qualities to the role of boundary spanners. According to Leonard-Barton (1995) they understand both worlds – of the source and the receiver – and translate and disseminate this so acquired knowledge. For Reid & de Brentani (2004) boundary spanners play an important role in the detection of emerging patterns for discontinuous innovation at the front end of the innovation process. Williams (2002) acknowledges no consolidated body of literature on boundary spanners and little attention in research on the important role of individual actors in boundary spanning interactions.

The concept of absorptive capacity helps to understand the underlying processes of recognizing and acquiring external resources. As mentioned above, a boundary spanner working inside a company is key for building up absorptive capacity. According to Dalpiaz et al. (2010) creating boundary-spanning activities and fostering external collaborations with artists, experts, and other cultural actors help firms to build up cultural capital. And, different to technological and other intellectual knowledge, it is not that easy to capture relevant cultural knowledge. This especially applies to firms that are distant to culture. Following Verganti & Öberg (2013) as well as Rindova et al. (2011), notably input from distant and different cultural resources enable firms to develop strategic versatility, unconventional strategies, and innovation based on new symbolic meanings. Therefore organizations also need external actors, who support internal boundary spanners in their activities directed to the organizational environment. Such external actors can reach out to a much broader scope of potential resources.

So, if we want to understand better how firms can successfully absorb cultural resources, we should pay attention to the actors at the boundary between the firm and its environment. In this way, we can also take account of a micro-level perspective and consider the interactions and power relations, which new models of absorptive capacity underscore. Various concepts of an "intermediary" as external actor of boundary-spanning activities exist and the following chapter will elaborate which concepts to what extent will help us in improving our understanding of obtaining cultural absorptive capacity.

2.5 Intermediary Roles

Including the early phases of innovation, innovation management research maintains the concept of the intermediary as an external actor who helps an organization to acquire external knowledge. Howells (2006) analyzed 23 concepts of intermediaries in innovation and defines them as "an organization or body that acts as agent or broker in any aspect of the innovation process between two or more parties," (ibid., p. 720). During early phases of innovation, he recognizes four functions of intermediation: foresight, scanning, knowledge processing/combination, and gatekeeping/brokering and six functions in the latter processes like testing or commercialization. He distinguishes in the stream of literature on intermediation between research on diffusion and technology transfer, innovation management, systems and networks (like "superstructure" or "boundary organizations"), and intermediaries as service organizations (especially Knowledge Intensive Business Services). Most of the research on intermediaries focuses on intermediation in technology and, as noted by Howells himself, is confined to an organizational view. This leaves out the micro-level of dynamic relationships of individuals. He also notices the rarity of descriptions of sophisticated and proactive intermediary roles. Although we find an ongoing interest of research on intermediaries in innovation (Gassmann, Daiber & Enkel, 2011; Lichtenthaler, 2013), research on the micro-level view and proactive intermediary roles are still sparse.

In a recent article, Agogué, Yström & Le Masson (2013) call for a proactive role for intermediaries, which has previously been neglected. Intermediaries deal simultaneously with various functions and act as architects in co-creation and enabling of collective knowledge creation in open innovation: They do not only fulfill the known roles of brokering and networking, but also exploring – that is structuring collective exploration activities like initiating collaboration or creating new knowledge and exploring new ideas. Brokering, networking, and exploring take place among the phases of initiation, outcome, process, and resources (see also table 1).

Colombo, Dell'Era & Frattini (2015), while drawing on web-based innovation intermediaries (such as Italian Aedo-to, who organize competitions online for design ideas), set up a typology of four intermediaries among the dimensions access and delivery and, respectively, divide the types in regard of their provided tacit knowledge between "know-how" or "know-who". Following this, the authors describe the role of the collector, broker, mediator, and connector. Collectors deliver solutions to their clients by encouraging their network to come up with solutions, brokers also provide solutions, but on their own deep access to knowledge sources (also see below the "knowledge broker"). Mediators are not looking for solutions, but for contacts for their client. They monitor promising innovation trajectories and establish a relationship between those sources and their client. Also

the connector offers contacts, but does not establish a relationship between the contacts and the client – the connector just delivers the contacts' proposals, which do not yet entail any solutions.

Stewart & Hyysalo (2008) open up the view on innovation intermediaries by defining them as "actors who create spaces and opportunities for appropriation and generation of emerging technical or cultural products by others who might be described as developers and users." (ibid., pp. 296–297). The authors emphasize the change of intent, meaning, and form of technology by intermediaries through their mediating interactions between different actors (ibid, p. 298). Stewart & Hyysalo take into account the social and demand side of technological innovation by introducing the framework of social learning in technological innovation and drawing on social sciences' view on intermediaries by referring to Latour (2005). The social learning perspective emphasizes understanding of the circular interchange between technological and social change in innovation by shaping technology, visions, and knowledge. In this regard, intermediaries mediate between supply and use, thus they do not only act in one way, like recognizing and acquiring external sources for a company, but also in the other direction.

While Stewart & Hyssalo (2008) still focus on technological innovation and the mediation between supply and demand, cultural studies and social sciences talk about the mediation between production and consumption through "cultural intermediaries" and focus on their influence on the demand and consumption side of products. In cultural studies, intermediaries work in the production and circulation of symbolic goods, such as media, advertising, design, marketing, branding, or sales (Bourdieu, 1984; Moor, 2008; Nixon & Gay, 2002). In the tradition of Bourdieu (1984), most of the research views those cultural intermediaries critical in having a too dominant and negative influence in shaping the taste of consumers.

Only a few concepts of intermediaries from the research stream of innovation management are of specific relevance for my focus on the absorption of cultural resources. The concept of cultural intermediaries from cultural studies is too broad to apply it to my research. Therefore, I draw on further concepts that describe intermediaries in practice who do not focus on intermediation in technology but culture, such as brokering of knowledge about socio-cultural developments or linking between artists and organizations:

- By referring on interventions with artists in organizations, research from Berthoin Antal (2014) shows us different visible and intangible roles of intermediaries: Visible functions include matching artists with the organization, monitoring, and communication. Intangible functions include building trust between the artist and the organization, interpreting, bridging, and translating.
- Verganti and fellows (Abecassis-Moedas et al., 2012; Dell'Era et al., 2011; Verganti, 2008, 2009; Verganti & Öberg, 2013), describe cultural actors like artists, anthropologists, and especially

designers as important "interpreters". They take part in a broad "design discourse", showing the firm how people give meaning to things and how sociocultural models evolve in certain areas. Interpreters undertake various bridging tasks – some act more as a mediator, others fulfill rather the role of a language broker, providing knowledge about meanings, that is the meanings from a pool of socio-cultural symbols that products stand for. Additionally, interpreters also act as influencers on people and their meaning creation – similar to the view of Stewart & Hyssalo (2008) and that of cultural studies on intermediaries.

- Hofmann (2011, 2015) introduces the concept of the trend receiver as a person with visionary competence and someone "who perceives and reflects changes and potentials of the new in a specific domain in a highly sensitive and differentiated way," (Hofmann, 2015, p. 10). Attributes of trend receivers are such as broadly connected and interested, having discerning views, being empathic, curious, open-minded, self-aware and being able to abstract from themselves. They also have the ability to combine previously detected patterns and transfer them to other areas.
- The knowledge broker (Hargadon & Sutton, 1997; Hargadon, 2003) goes through a process of access, acquisition, storage, and retrieval of information and innovation. They translate information and combine existing ideas and technologies to provide radical innovations. Like the interpreter, they are able to influence people and as networkers build new communities of practice around emerging ideas.

Table 1: Concepts of Intermediaries in Practice

Concept	Reference	Market & Application	Roles of Intermediary
Intermediary	Agogué, Yström & Le Masson, 2013	State funded open innovation research initiatives in traffic safety	Brokering, networking, exploring; active role of an architect, structuring collective exploration activities
Intermediary	Berthoin Antal, 2014	Artistic intervention residency programs in different industries	Visible: matching (artist and organization), monitoring, communication; intangible: building trust, interpreting, bridging, translating
Interpreter	Abecassis-Moedas et al.; Verganti & Öberg 2013; Dell'Era et al., 2011; Verganti 2008; 2009	Various, mainly large firms and consumer market	Brokering, mediating, translating, seducing; knowledge on how people give meaning to things (language broker)
Trend Receiver	Hofmann, 2011; 2015	Automotive	Monitoring trends, transferring knowledge, envisioning potentials of developments
Knowledge Broker	Hargadan & Sutton, 1997; Hargadon, 2003	Various clients of design and innovation agency IDEO	Access, acquisition, storage, and retrieval of information and innovation; translating, combining, networking, influencing

3 A Framework for Cultural Absorptive Capacity

Cultural resources offer a great potential to fuel innovation and strategy of an organization and gaining competitive advantage. They sound promising in the growing markets, in which the symbolic meaning of a product is of increasing importance for customers. Cultural resources feed these meanings and seem to have the biggest and most radical impact when they are diverse, originated in fields distant from the current industry of an organization and sparked controversial discussions. As Rindova et al. (2011) and Giorgi et al. (2015) claim, we need a better understanding of how organizations can assimilate new cultural resources, as they normally are not directly applicable. To address this, I introduced the concept of absorptive capacity and its newest work, which points to the importance of social contingent factors as well as the dynamic and complex process in absorbing new knowledge (Todorova & Durisin, 2007). This work on absorptive capacity also reveals the crucial role of individuals and their power relationships at the border of an organization and its environment to identify new knowledge. Especially firms, which lack easy access to cultural sources via employees belonging to lead cultures or subcultures, need internal boundary spanners and external contacts to detect new sources. Different to technological and other R&D knowledge, which most literature has been focusing on, culture as a knowledge resource is tacit and thus not easy to decode. External actors could make use of their weak ties to reach networks distant to the industry of the targeted firm and help to translate the resources for the firm. The more distant the knowledge is from known industry registers, the harder it is for a firm to detect and absorb this knowledge. Therefore, I am proposing an integrative framework of cultural absorptive capacity with a focus on intermediaries in the early part of the process and at the boundary of an organization. To better understand how firms acquire culture as a resource in innovation management, I extend the concept of cultural absorptive capacity (Dalpiaz et al., 2010; Ravasi & Rindova, 2004) by adopting Todorova & Durisin's (2007) model and integrating previous research on cultural resources and intermediaries. By integrating the roles of the intermediary and boundary spanner into my model, I account for the important role of individuals in absorptive capacity (Cohen & Levinthal, 1990; Todorova & Durisin, 2007). In this way, my framework adds to the theoretical understanding of the use of cultural resources by organizations, especially resources from distant industry registers, which proved to be promising for gaining competitive advantage. Overall, it adds to the neglected socio-cultural embeddedness of firms within management studies and accounts for an open-systems view of organizations (Giorgi et al., 2015). It also guides practitioners, notably by the systematic introduction of intermediaries, who help to broaden the search for cultural resources and to transform the inherent knowledge.

Figure 1 pictures the framework of cultural absorptive capacity. All parts of the framework that were modified or added to Todorova & Durisin's model for specifying the cultural absorptive capacity are highlighted in gray. It shows on the left side the cultural resources and cultural actors (e. g. artists or members of a subculture) as knowledge source. These cultural resources exist in the form of styles, social trends and tastes, art forms, practices, etc. Of special relevance are subcultures or other communities ("lead cultures"), which are ahead of their time or cutting-edge and excel in terms of their symbolic enrichment, like art and music cultures. As described in an example above, the third coffee movement contains the trend conscious consumption in a certain context of food processing, which is also reflected in the "raw style" of cafés, like wood or a certain form of lettering (e. g. chalk). Trends like conscious consumption or concrete symbols of "rawness", like wood, could be used as cultural resource. Another example is the case of Alessi (Rindova et al., 2011), which depicted how, e. g. from the register of crafts, old craft techniques were reintroduced and fostered by internal workshops.

The cultural intermediary becomes a central part of the framework of cultural absorptive capacity because this external actor bridges between cultural resources/cultural actors and the firm, represented by the boundary spanner. The intermediary understands the external and internal world of an organization. In literature, various concepts exist on how special actors help organizations to absorb knowledge. They help to illustrate different aspects of external knowledge acquisition, but altogether a consolidated picture for a crucial intermediary actor is missing who is brokering between a world of culture and a world of business along several activities. The latest research shows, that the active role of intermediaries has been neglected: Berthoin Antal (2014) calls for a more comprehensive mapping of intermediaries and their proceedings, and Agogué et al. (2013) propose to examine further the value of intermediaries after calling for their proactive role, especially in exploration activities of firms. From the previous concepts in the literature and my own case study (see below), I refer to the following possible roles and functions of cultural intermediaries in contributing to the absorption of cultural resources by an organization: Exploring and monitoring, curating and networking, knowledge brokering, linking and mediating, initiating and pushing, organizing and creating concepts.

A cultural intermediary needs a receiving partner from the organization, the boundary spanner. The boundary spanner should be open-minded to acknowledge and recognize the value of new information. Depending on how difficult it is for a firm to assimilate or transform the new knowledge, he or she more or less takes part in pursuing or translating the knowledge into the firm. If boundary-spanning activities are centralized to a high degree and the boundary spanner lacks strong networks, the firm risks the transformation or assimilation of new knowledge due to gatekeeping effects (Cohen & Levinthal, 1990; Reid & de Brentani, 2004).

The relationship between the cultural intermediary (in the following "intermediary") and the boundary spanner becomes a focal point for a successful integration of new cultural knowledge. It is especially influenced by power relationships, like powerful stakeholders, and activation triggers, such as a decision to act upon an event. In the context of cultural knowledge, this could be the realization that a firm has missed a recent socio-cultural trend and wants to prepare for the next.

The prior knowledge of an organization is an antecedent of absorptive capacity, which the organization needs to evaluate new information. It has influence on how well new knowledge can be recognized and integrated.

Furthermore, regimes of appropriability influence the interface of an organization and its environment at the beginning (as antecedent) as well as at the end (at the outcome) of the cultural absorption process. Comparing to technological and R&D knowledge, the exploitation of cultural knowledge is difficult to imitate due to the complexity of cultural capital accumulation (Dalpiaz et al., 2010; Ravasi & Rindova, 2008). Thus, working on enhancing the cultural absorptive capacity and building up cultural capital, can yield high competitive advantage.

Following the model of Todorova & Durisin (2007), the process of cultural absorptive capacity starts with the recognition of the value through an organization, which always is biased in some way. This precondition to value new external knowledge becomes especially true for cultural knowledge as this is a new form of knowledge for a lot of firms and the promising usefulness of knowledge distant to its own industry register can be difficult to value by an organization, too. Only if an organization recognizes the value of new knowledge, it is capable to acquire a broad range of new knowledge in the next step.

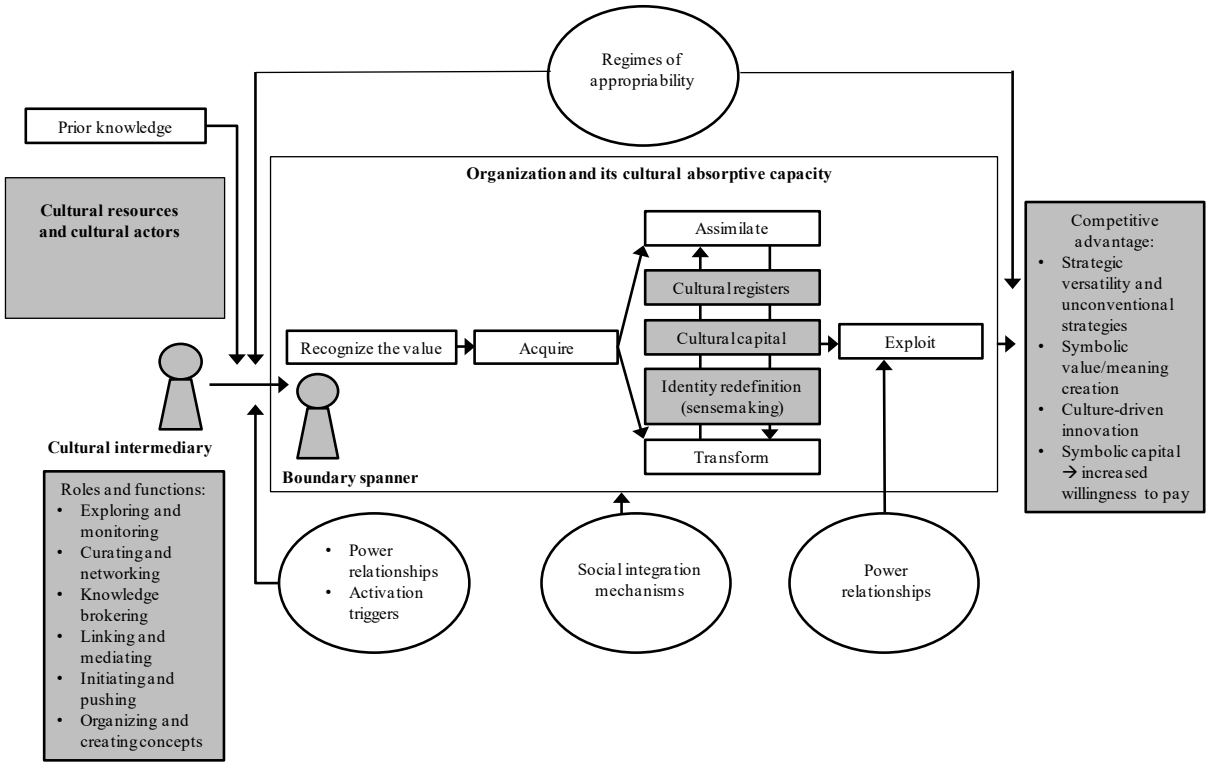
Then, the organization will assimilate or transform this knowledge. If the new cultural knowledge fits into existing structures, it can be directly assimilated into the cultural register of a company and contributes to its cultural capital. An ad hoc usage of cultural resources, not intended for strategic means, (Rindova et al., 2011) also undergoes this way. As culture is always in flux and cultural capital no fixed, but a flexible capability, already assimilated knowledge within the cultural register might somehow undergo a transformation through the overall learning process of knowledge absorption, too. For cultural knowledge, especially from distant resources and industries, transformation will be the predominant way to proceed. Existing knowledge within the organization has to be reframed and changed to make it compatible to new knowledge (Todorova & Durisin, 2007; Zahra & George, 2002). As Rindova et al. (2011) illustrated, the sensemaking practice of organizational redefinition reveals the transformation of cultural knowledge. This makes the absorption of cultural knowledge difficult, but also promising for exploiting its competitive advantage. Furthermore, through knowledge transformation, the cultural registers of a company will not just simply grow, but probably also become more versatile.

Social integration plays an important role for the successful assimilation and transformation of knowledge, but, according to Todorova & Durisin, social integration makes a contingent factor throughout the whole process of absorptive capacity, as each of its elements is a set of social interactions. Following this, especially social networks foster social integration through connectedness and shared meaning. But Todorova & Durisin also point to the possible negative side of social integration as, for example, strong ties may hinder the search for and the dissemination of new knowledge compared to weak ties. However, strong ties support the process of complex knowledge, which cultural knowledge is due to its symbol-loaded nature.

Finally, the exploitation of cultural resources marks the end of the process of cultural absorption. At this point, power relationships again become apparent and may enable or hinder the exploitation of knowledge, as Todorova & Durisin report. They might exist internally or externally, like commitments to current customers or suppliers.

From the literature (Dalpiaz et al., 2010; Rindova et al., 2011; Verganti & Öberg, 2013), I specified the following possible outcomes of cultural absorptive capacity in influencing the competitive advantage of a firm: Strategic versatility and unconventional strategies, symbolic value/meaning creation, culture-driven innovation, and building up symbolic capital, which has positive influence on the willingness to pay.

Figure 1: Cultural Absorptive Capacity (adopted from Todorova & Durisin, 2007)



4 Methodology, Data Collection and Analysis

To illustrate my framework of cultural absorptive capacity and explore the relationship between cultural intermediaries and boundary spanners, I carried out a case study, comparing two companies with data from in-depth, semi-structured interviews. Semi-structured interviews allow respondents to answer in a narrative way, which helps to reveal rich data, by simultaneously maintaining a structure for comparability (Miles & Huberman, 1994).

This qualitative research approach aims to identify the underlying processes and interactions between intermediary and boundary spanner, their perceived roles and their means of communication. I also reviewed archival data like articles, movies, books, brochures, and interviews from internal and external publications. These secondary data helped me to select the cases, prepare my interviews, and match information and facts, as well as illustrate and contextualize the cases.

I chose two German enterprises, Salzland and Wohlwerk[2] that each produce premium interior products, and are therefore intertwined with culture, aesthetics, and lifestyle. That is, this industry profits much from an early knowledge of changing cultures and lifestyles from cultural resources. Apart from that, the chosen cases do not belong to the creative industry or do not share another direct link to cultural resources as, e. g., a producer of surfboards might be connected to the surfer culture by its surfing founding partners. In this way, the selected cases show relevance for a broader range of industries. The medium size of each company facilitated an easier tracing of processes and impacts. I exclude cases in which the exchange (e. g. with artists) is solely used for representative and marketing purposes, which Rindova et al. (2011) call a rhetorical use of culture for self-presentation. But, cultural resources could additionally be used for rhetorical use, thus contribute to the symbolic capital of an organization.

Each case describes the use of cultural resources in terms of cooperation with artists from different registers. In each case, an agency for PR/communication and branding was driving the cooperation with artists. The actors from these agencies fulfill the role of intermediaries, standing between the cultural resources and the company. These agencies seem to be promising for the case study, because their professional background and connections to cultural actors enabled them to bridge between the art world and the world of the company. The counterparts of the intermediaries at the company represent the boundary spanners: Managers, who are responsible for the cooperation with the artists.[3]

2 To ensure confidentiality, names of each organization are pseudonymized.
3 When referring to a boundary spanner or intermediary by "he", I am including both genders.

I conducted four interviews of one to two hours with the most important actors: the intermediary and boundary spanner in each case (see table 2). Each interview was recorded and transcribed, resulting in 76 pages of transcripts. The interview guide covered questions on the roles of the actors and their relationships, the cultural resources/artists, processes and events, and the added value influenced by the absorption of cultural resources such as impact on innovations or strategic change.

Table 2: Overview on Interview Partners

Case	Role	
Salzland	Intermediary	Employee from communications agency, long-standing responsible for culture & communication for Salzland
	Boundary Spanner	Head of corporate communication
Wohlwerk	Intermediary	Managing partner of communications agency
	Boundary Spanner	Product manager in marketing, leader of project team at Wohlwerk

I analyzed and collected the data in parallel, combining methods from Yin (2008) and Miles & Huberman (1994) to conduct a cross-case analysis. Therefore, I coded the transcripts in a program for qualitative data analysis. The codes derived from the data as well as from theoretical concepts from literature and the framework. Parts of transcripts went through check-coding by up to three coders not involved in the research to enrich reliability. Different ordered matrices helped to uncover the differences and similarities between the cases and to gain a broader understanding and sensemaking of the cases (Miles & Huberman, 1994).

5 Results and Discussion

Each case, Salzland and Wohlwerk, is a German enterprise of premium bathroom and kitchen interior products. They have both worked with renowned designers and won various prizes in their category. Each company is at least mainly family-owned while Wohlwerk is much older and has about ten times more employees than Salzland. Thus, Wohlwerk is more traditional than Salzland and targets a bigger market.

5.1 Case Salzland

Salzland has had programs and types of cooperation with cultural actors (like artists) from diverse cultural resources like photography, design, installation art, architecture, fashion, sound, or philosophy since the mid-1990s, when cooperation between art and business was relatively new in Germany. Since then, the boundary spanner, who I spoke to, has been responsible for cultural projects, communication, and corporate social responsibility at Salzland. Since that time Salzland has been working with the agency in question, at first with the founder and then mainly with the intermediary I interviewed, who joined in the late 1990s. This intermediary is the "sparring partner" of the boundary, responsible for the conceptual design and consulting on communication for art and culture and PR. His work includes monitoring trends and artists, proposing and organizing cultural projects, and the development of the brand. The initial motivation (the "activation trigger") at Salzland to establish cultural projects was driven by a desire to buck an industry-wide trend towards overblown design and star designers. The company was afraid that good design would not be enough to differentiate:

> *"That's why we started to fiddle with different approaches on introducing the next steps in evolution and differentiation for the brand, but also for the company in terms of product development. … The first project and insight was that we're dealing with aesthetics and that our products play a role in interior design and architecture. We were thinking about the emergence of architectural patterns and how (habitat) infrastructures evolve over time in our culture.*
>
> Boundary spanner at Salzland

Insights from the involvement with cultural actors led to a better understanding of long-term sociocultural developments like the changing meaning of interior or the importance of rituals in the bathroom. With the help of these insights, the company came up with scenarios and ideas to ensure the cultural meaning dimension of their products. Together with the intermediary and with inspiration from these cultural resources, the company continuously has been opening up and reflecting on its identity and environment while staying on a "path of insight" in their future orientation and "evolutionary development":

> *"In such art series a path of insight is being built over the years that on the one hand leads you to a terrific openness, on the other hand fosters courage due to an enduring positive experience. This has helped to take a step ahead and that's why projects evolved that brought something home to [us and]*

the audience, which at first provoke a startle reaction by elevation, by exaggeration, but then turn into a process of reflection that took the audience and us on an insightful journey."

Boundary spanner at Salzland

Overall, the exchange with cultural actors has increased regarding its freedom, its topics, and forms of abstraction; stated topics for cultural projects have increasingly become detached from Salzland's products and industry. Art is used as initiating new ways of thinking, which results in changing claims for the strategy of the firm. Additionally, Salzland has begun to involve artists in public discussions of zeitgeist topics. Living up their own claim of being open, the company recently decided to dedicate a deliberate space (a lab) for more open-ended and experimental projects. These projects focus on research and exploring of topics and do not have to contribute to PR and brand communication. At the same time, cultural actors are kept at a distance, so that they do not intervene in actual product development or other internal processes. The latter would be seen as blunt and compromising Salzland's effort to give the artist plenty of rope.

5.2 Case Wohlwerk

Wohlwerk has been working together with the agency of the intermediary since the mid 2000s on branding and innovation projects. In 2009, a product manager from Wohlwerk asked one managing partner of the agency, the interviewed intermediary, to initiate and organize a project to acquire new input on collaboration with the arts. Meanwhile, Wohlwerk had already reflected its traditional brand heritage of connections to art and became drawn to interact with artists and perpetuate the company's heritage. The intermediary developed a concept with a topic and addressed two personal known artists with slightly different briefings to come up with their own interpretation. One version integrated an existing product of Wohlwerk to produce limited versions of art pieces bound to a decor, the other version dealt with creating completely new forms. Although not favored by the intermediary, Wohlwerk decided for the first version because it was closer to the company's brand perception and cheaper. Nevertheless, the goal of the intermediary still was to provoke Wohlwerk's self-image, trigger mind change inside the company, and explore new product segments:

"It was a means to an end to initiate this innovation process, this new way of thinking, leaving old ways of product development, and launching a product in a significant shorter time."

Intermediary for Wohlwerk

The interviewed boundary spanner at Wohlwerk managed a team of about six people to produce the art pieces. He had to report back to several stakeholders including the management board and especially the art director. In 2011 the cultural actor, a graphic artist, started his actual work. His main motivation was to learn about the used material and production process at Wohlwerk. He was partly working inside the intermediary's agency and partly working about two weeks inside Wohlwerk on the agreed art pieces. Then, the intermediary and the artist convinced the boundary spanner to exceed the original project idea, which was tied to a product from Wohlwerk, and to create further art pieces:

> *"But then came this tremendous change because [the artist] indeed weighed in and brought in his position. And then he said: 'Well, I've met your wishes to interpret Wohlwerk, but very, very much from the view of Wohlwerk. And now,' he said, 'after I've dived into your world, I want you to get a fine grasp for my world, for the world I'm representing. Now I want you to dive into my world.'"*
>
> Boundary spanner at Wohlwerk

So, the boundary spanner convinced the internal stakeholders and the project moved from a clear, concrete product management project to a flagship project beyond adding value for product development and branding but innovation and organizational learning: The artist challenged processes and employees from various departments of Wohlwerk to develop a new manufacturing technique to realize his work. Employees contributed their spare time and found ways to bypass the inflexible production process to reach the goals of the artist. Until now, the project and its art pieces are presented internationally. Besides the new manufacturing technique, the project created future possible applications and one of the additional art pieces (jewelry) was adopted and is currently tested for a product launch in a product segment new to Wohlwerk.

5.3 Roles and Functions of Intermediary

The described cases reveal an active and broad contribution of intermediaries in building up an organization's cultural absorptive capacity. Table 3 lists the roles and functions of the cultural intermediaries as shown in the cases: Exploring, curating, knowledge brokering, linking, initiating, and organizing. Both intermediaries act as a sensor; they explore and monitor developments and trends from the "outside world". Each intermediary is characterized by its curating role: They select cultural actors and match them with the organization. Hereby, an important function lies in the network intermediaries build upon for communicating as well as addressing relevant actors.

Because the intermediaries are familiar with the corporate world and the world of cultures, they know what to filter and how to communicate these insights into the corporate world. During this knowledge brokering, the intermediaries transfer and interpret information. While the intermediary at Salzland explores and transfers a broader range of information, the intermediary at Wohlwerk is challenged by the concrete translation of information. Therefore, he is using a lot of artifacts for communication such as an artwork or an invitation card to make a trend or idea tangible.

Furthermore, the intermediaries link the artists with the organization. At Salzland this bridging between people is already quite established while at Wohlwerk the intermediary puts a lot of work into mediation throughout the daily business between the artist and the company, especially the boundary spanner. He has to take the initiative by pushing the organization very much to reach the project's goals and his higher goals of organizational change at Wohlwerk. At Salzland, the intermediary takes the initiative, too. For example, he proposed to dedicate the new lab space for more open-ended projects.

Overall, the intermediaries play an important role in organizing the exchange between the artists and the organization: They create concepts, draw up contracts, or manage events – often in the context of their professional skills in brand communication.

5.4 Relationships between Intermediary and Boundary Spanner

The long-lasting and continuous collaboration in the case of Salzland fostered a trustful relationship in which the cultural intermediary is highly integrated within the company. Each intermediary has a sound knowledge of the organization that builds the foundations of cooperation. Although the intermediary at Wohlwerk looks back on some years of collaboration, this was the first project of its kind and the intermediary had to stress the relationship to pursue his goals. But over the three years that the project was lasting, he managed to intensify the collaboration up to pushing a massive change in the project and convincing stakeholders of his ideas. After he had persuaded the boundary spanner, they both tried getting the other stakeholders on board. Overall, the relationship still is a client – agency relationship where the agency fulfills a relatively demanding role, especially in requesting more resources for the project. While the intermediary keeps up following higher-order goals related to organizational learning and strategic change, the boundary spanner is still focused on the project's goals for brand communication.

At Salzland, the relationship between boundary spanner and intermediary is built on the wish for openness: Different to Wohlwerk, the boundary spanner and other stakeholders at the company welcome ideas that trigger change. The CEO of the family-owned business even claims this con-

Table 3: Roles and Functions of Cultural Intermediary and Intensity of Appearance in each Case

Roles	Description	Example
Exploring + *Wohlwerk* ++ *Salzland*	Exploring and monitoring trends, envisioning, sensing/need forecasting	"In general, it starts with a new product that is introduced by the product design team. But in the run-up, considerations from our side are taken into account: What are general developments, trends? How is society changing? How are needs changing? How are patterns changing? …" (Intermediary for Salzland)
Curating + *Wohlwerk* ++ *Salzland*	Networking, selecting, matching, influencing external sources	"We're always selecting those, who we think are artists or perspectives from which we think they are cutting edge. They aren't well known to everybody, but for a small circle of insiders they do play a role. They are setting the tone." (Intermediary for Salzland)
Knowledge brokering + *Wohlwerk* ++ *Salzland*	Transferring, interpreting, combining, translating knowledge	"One [the intermediary] is observing things, absorbing them, and throwing them into a big blender, mixing, throwing them on the table, sorting again and looking if this sorting is fitting. And if it's not fitting, one is again throwing them or pieces into the blender, rearranging and reordering them on and on, until one feels he or she has grasped it and is able to convey a picture of it." (Boundary spanner at Salzland)
Linking ++*Wohlwerk* +/- *Salzland*	Mediation, building trust, communicating, bridging between boundary spanner (the organization) and cultural actor (artist, the cultural resource)	"Indeed, interplay between [the intermediary] and Wohlwerk and the artist had been developing. […] [One] role was communicating between the company Wohlwerk and the artist. Because, in the beginning a mutual understanding had to be evolved due to established different angles and manner of reasoning of an artist and a product manager." (Boundary spanner at Wohlwerk)
Initiating ++*Wohlwerk* + *Salzland*	Pushing, activation, inspiring	"And we said: 'We have to get into rooms you wouldn't usually film…' It was a hell of a procedure to gain access, more than ever to film. 'But if we are not getting access now, we gonna leave. That's it. There's no other way.'" (Intermediary for Wohlwerk)
Organizing ++ *Wohlwerk* + *Salzland*	Managing, structuring, concept creation	"He [intermediary] has been taking care of the whole project from creating the concept until the roadshows. So, from start to finish, partly the communication, too." (Boundary spanner at Wohlwerk on intermediary)

cept of opening up towards culture and ideas. This top-down approach facilitates the teamwork of boundary spanner and intermediary. More than ten years of trustful collaboration and several projects had been establishing what Salzland's boundary spanner calls "sparring partner".

The exchange at Salzland between boundary spanner and intermediary is based on regular meetings and workshops beyond the daily business of concrete projects such as strategy and consumer behavior. At Wohlwerk, intermediary and boundary spanner participate in a rather loose, "remote working" cooperation. Due to the changing phases of the three-year lasting project, intensive stages of exchange replaced rather calm stages.

Table 4: Relationships between Intermediary and Boundary Spanner

	Salzland	Wohlwerk
Mutuality	"Sparring partner", trust and openness; early and highly integrated in each others work	Client – agency relationship with a demanding agency
Duration	Continuity since late 90s	Bond to project(s), about three years
Exchange	Regular exchange, workshops, and meetings about product development and communication, strategy, and consumer behavior	"Remote working", loose exchange overall with phases of dense exchange

5.5 Added Value of Cultural Resources and Summary

Each case shows how organizations use cultural resources in building up their absorptive capacity with the tremendous help of intermediaries from activities of exploring to organizing. Art pieces, discussions, exhibitions, and other forms of presentations and interactions with cultural actors (artists etc.) make socio-cultural developments and trends tangible. Thus, they convey knowledge about a firm's environment into the organization.

The data depicts especially how the intermediary at Salzland contributes during early phases of absorptive capacity building through monitoring and exploring of knowledge, knowledge brokering and curating and networking of cultural resources: Salzland maintains to stay open towards different insights, ideas, and information. The intermediary helps them to reflect continuously on socio-cultural developments on an increasing level of abstractness. The boundary spanner reports on the importance of abstract thinking about culture in the context of bathroom interior to reach new insights. They influence product development on a higher level:

> *"The technological development is one element, the cultural insight another, and if you're bringing both together in the development of such a product – actually, then something good is happening because then the idea is emerging."*
>
> Boundary Spanner at Salzland

It is rather the assemblage of cultural works processed in transformation practices than concrete art pieces or interactions that lead to these insights. They infuse strategy and continuous thinking about the future of the company. Through them the organization knows how to adapt early to changes in their environment and how to differentiate for competitive advantage.

At Wohlwerk, the intermediary is concerned with exploring, knowledge brokering, and curating, too. Yet, the case demonstrates the importance of his role in linking and mediating between boundary spanner and artist. Furthermore, his role in initiating and pushing the organization becomes apparent along with several tasks of organizing and concept creation. Cultural resources in the case of Wohlwerk are used specifically for the development of a new manufacturing technique and product innovation, even in the possible creation of a new product segment. Opening up towards the wishes of the artist lead to stimulation and activation, it challenged the organization's routines and its employees – what the intermediary calls "small, small mega revolutions". Also, it stretched the identity of the organization, its skills, and repertoire – e. g. the graphical approach of the artist was not part of the core competencies of Wohlwerk, but they found a way for its implementation.

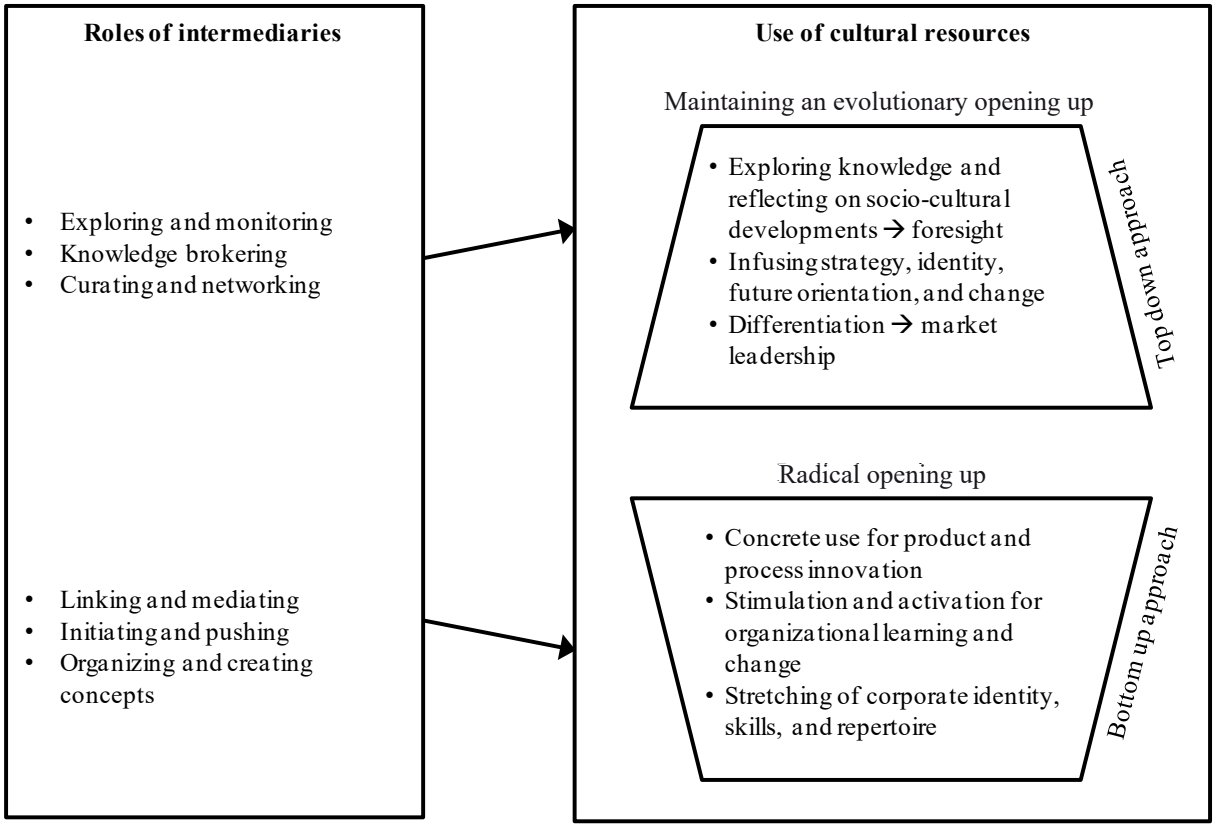
> *"We did not just create a new decoration technique, but also new colors, and new applications. Additionally, the jewelry topic [the additional art pieces] was exciting. That is, we haven't just dealt with the topic of material, the implementation part, but with the related opportunities for the company of Wohlwerk. (…) Then, the third point was on the "soft key learning": I think, the company has learned a lot to open up towards different kinds of projects. As well, it raised awareness about what Wohlwerk is standing for – inside the company, for the single employee on all the different levels."*
>
> Boundary Spanner at Wohlwerk

Although the project with the artist at Wohlwerk was first aiming at bringing concrete added value to the company in terms of product and process development and brand communication, in the end it moved some steps beyond these goals.

5.6 Discussion

The cases show two different approaches how to open up towards cultural resources and the role intermediaries play within this process: Wohlwerk is in an early stage of using cultural resources in which the project with the artist leads to a radical opening up of the company. Salzland is well experienced in using cultural resources and applies them to maintain an evolutionary opening up of its firm. A main reason for this lies in the top-down approach of integrating cultural resources, as the long-standing CEO of the family-owned enterprise had been committed to opening up towards art even as the first outcome did not please him very much because it was quite provocative. But the

Figure 2: The Role of Intermediaries in two Different Ways of an Organization's Opening up towards Cultural Resources



trustful relationship between the owner of the intermediary agency and the CEO convinced him to follow the advice from the "artsy" owner of the brand and communication agency. And soon, Salzland learned to embrace especially those provocative art collaborations as they challenged their thinking on socio-cultural developments in the context of their industry. Over the years, Salzland dealt with cultural resources on a growing abstract level. This helped them to reflect on and sense upcoming changes on a wide base and redefine their identity for differentiation. Similar to the case of Alessi (Rindova et al., 2011), they are using changing abstract identity claims to incorporate the growing diversity of cultural resources and make use of them for their strategy. Furthermore, Salzland is going to provide even more space in a "lab" surrounding for open-ended art collaborations that are not tied to an outcome or exploitation like brand communication (what would be a "rhetorical use" of cultural resources). In this way they have been increasing openness and versatility, hence their cultural absorptive capacity. The intermediary was in particular accountable in selecting the "cutting edge" cultural actors and translating the obtained knowledge into the company.

Following the case of Salzland, we can retrace their path to establishing a high cultural absorptive capacity by opening up towards cultural resources as a best practice example. Though

the case of Wohlwerk seems to lag behind in this regard, compared to Salzland, it shows us how to open up towards cultural resources in the challenging first time, thus a radical opening up. The intermediary had to follow a bottom-up approach because the stakeholders at Wohlwerk did not feel comfortable in opening too much because they were afraid of eroding the brand image. But then, after fulfilling the primary goals of the project from Wohlwerk's point of view and received appreciation, it was possible to convince the stakeholders to open up and to radically shift the project. Even more, it was possible to push organizational learning and trigger organizational change in this project because the artist was embedded in the daily business of different employees. In this way, the project was able to add concrete visible value to the organization. Contrary, Salzland neglects this possibility because interaction with artists is kept on distance to ensure their independent, open-ended interpretations of topics. Thus, the impact lies more on a strategic level.

Practitioners from foresight, innovation management, and strategy can learn from each approach in making use of cultural resources. A better understanding of the potential of cultural resources and the role intermediaries play, help in exploring trends, coming up with innovation and differentiation in an increasing competitive environment. Practitioners also benefit from a better comprehension how to trigger organizational learning and identity redefinition through cultural resources. The two cases demonstrated how cultural resources can be successfully integrated into companies with the help of intermediaries. It makes sense to build on Wohlwerk's approach and start with projects with a clear outcome, which is easy to communicate internally as well as externally, e. g. through artifacts that make insights tangible. Then, in the long run, cultural resources can be easier transferred for strategic purposes.

This study analyzed cases that are not solely used for rhetorical use – that is marketing and brand communication, which influences the symbolic capital of a company. Nevertheless, the rhetorical use plays an important role in each case. At Wohlwerk, the collaboration with the artist was claimed as brand project and measured in KPI's for PR. Still, these were quite soft, qualitative KPI's, compared to other projects the boundary spanner was in charge of. Salzland uses their cultural projects for brand communication and partly sees this as its role to integrate audience and customers into the reception of art. Forums for discussions with cultural actors are also used to reassure decisions made in the organization. However, to ensure a high level of openness, Salzland decided to provide space for open-ended projects that do not have to contribute to any outcome like brand communication.

Each case revealed the important role communication and branding agencies played as intermediary and initiator. Compared to other agencies, like special facilitators for art and business

collaborations, as Berthoin Antal (2014) is reporting on, they know very well how to use these collaborations for communication/PR. They have a special access to companies, particularly if an agency has already worked with a company. In this way, the intermediary can easily bridge between both worlds of the organization and culture if links to corresponding cultural networks exist. Here, marketing and brand communication seem to serve as a valuable opener for collaborations with cultural actors.

Thus, intermediary organizations will also profit from this research in a better understanding of their contribution in interpreting cultural resources and how to adopt their own strategy. Lastly, artists and other cultural actors will get an additional view on collaborations between art and business.

The intention of this case study was to illustrate the concept and proposed research framework of cultural absorptive capacity and to shed light on the special role intermediaries can play. With this perspective, the case study aimed to contribute to the neglected individual perspective on absorptive capacity processes. Therefore, it focused on the relationships between the intermediary and boundary spanner. Because the access to each case was restricted and only an interview with each intermediary and boundary spanner took place, this study was not able to grasp all the details an ethnographic or action research approach could possibly deliver. Also, my research leaves out an analysis of the impact and role of further actors like the cultural actors or different employees in the organization.

As the literature (Rindova et al., 2011) and also the two presented cases show, absorbing cultural resources is difficult, costly, and risky – and the more distant these resources, the more challenging it seems to be. Here, the potential of intermediaries unfold, but their role of bridging between distant cultures and a company also turns them into a gatekeeper. An organization cannot make sure an intermediary connects the company to relevant cultural resources. Every organization has to evaluate on its own which intermediaries and which cultural reosurces make sense, this is even part of the knowledge building process.

The use of cultural resources for absorptive capacity building in companies is still quite new and best practices hard to find. This study was explorative and could only analyze two cases in medium-sized companies in a certain industry. It will be fruitful for future research to analyze such cases in more depth and breadth, especially to receive more insights on the outcomes of cultural intermediation such as on organizational learning, competitive advantage, new products, or strategy under consideration of the pros and cons of actively integrating a cultural actor into the organization. Furthermore, research on the requirements and differences of successful cultural intermediaries will provide valuable deeper understanding.

6 Conclusion

This paper built on the value of cultural resources in innovation management and introduced a framework of cultural absorptive capacity with the focus on intermediaries. It aimed to broaden the research on absorptive capacity and external sources for innovation beyond R&D and technological knowledge.

A case study on two medium-sized manufacturers for interior products incorporating cultural resources from the art register via communication agencies acting as intermediaries filled the framework of cultural absorptive capacity. The cases illustrated, coinciding with the findings of Rindova et al. (2011) on the Italian producer Alessi, the use of cultural resources to gain competitive advantage in terms of to envisioning versatile and unconventional strategies, building symbolic capital, coming up with the creation of symbolic value/meaning and culture-driven innovation creation. Cultural resources also infused identity redefinition depicted in an evolutionary development of branding claims within the case of Salzland – similar to what Rindova et al. (2011) had described with Alessi. Both firms started with an incorporation of cultural resources from the art register and used more and diverse resources in an increasing abstract way over the years. With the case of Wohlwerk, cultural resources stimulated organizational learning and change, which can be a first step for identity redefinition. Here, cultural resources were rather used "ad hoc" and directly provoked process and product innovation in a more radical way than at Salzland. Furthermore, the case of Salzland portrayed how cultural resources were used in terms of foresight and future orientation to explore knowledge on socio-cultural developments. Both cases of Salzland and Wohlwerk showed that the rhetorical use of cultural resources for self-reprensentation plays an important role in accordance with a substantive use of cultural resources. But in the case of Salzland, untying the use of cultural resources from their rhetorical use, opened more space for their substantive use in terms of strategic outcomes.

My research adds to a deeper understanding of the underlying process of absorbing socio-cultural knowledge from cultural resources. Todorova & Durisin's (2007) model of absorptive capacity was adopted to introduce a framework of cultural absorptive capacity with the crucial role of an external intermediary at the boundary of an organization. The intermediary is able to contribute in various ways for a successful absorption of cultural resources by exploring and monitoring, curating and networking, knowledge brokering, linking and mediating, initiating and pushing, as well as organizing and creating concepts.

Following the importance of social contingent factors in Todorova & Durisin's model (2007), the cases point out how the interplay between boundary spanners of an organization and intermediaries from agencies support in transforming knowledge through interactions and social integration, like the successful cooperation build on a long-term relationship and trust between the boundary

spanner and the intermediary at Salzland. The case of Wohlwerk showed the crucial role of power relationships as the intermediary and internal boundary spanner had to push hard to convince internal stakeholders. In this case, the crucial point of valuing new knowledge for absorptive capacity building becomes clear, too: At Wohlwerk, after the artist fulfilled his original task, the company accepts the artist's invitation into his world, thus the company recognizes the value of his contribution and opens up for new knowledge. However, in the beginning of the project, Wohlwerk rejected the alternative proposal of the intermediary because it was too far from their brand values. This reveals the limits of an at most broad search for external resources while in the same case showing the potential, once a transformation process in an organization has started. Both companies in the case study took risks when introducing cultural resources consciously in the first time. The case of Wohlwerk demonstrated the tensions between a cultural actor from the art world and rigid structures of a traditional medium-sized company. Thus, I can confirm the statement of Rindova et al. (2011) that incorporating cultural resources is difficult, costly, uncertain, and contradiction-ridden. Intermediaries provide a way to counter theses risks and difficulties as long as they have a good understanding of both worlds of the environment with its cultures and the organization. Still, an intermediary is no guarantee for absorbing the right choice of cultural resources and it will be difficult for an organization to check whether this is the case. And most work in the absorption of cultural resources remains to be done by the employees of a company through learning processes like identity redefinition and sensemaking in the transformation of cultural knowledge. Thus, a valuable field for future research to tap into consists of the internal and later stages of resource processing. To account for an integrative view, future research might consider coalescing the interplay of the described "seeding" of cultures with the "feeding" of cultures by organizations (Harrison & Corley, 2011; Ravasi & Rindova, 2008).

Introducing cultural resources into firms can deploy competitive advantages in many ways. Cultural resources help organizations to come up with new approaches for innovation and develop products with strong symbolic meanings. In respect thereof, drawing from industry distant resources sounds very promising to receive truly new input and to gain competitive advantage, but proves to be especially difficult. To bridge the distance, intermediaries hold a crucial position in brokering cultural knowledge from the world of cultural resources into the organization. In this way they expand concepts on intermediation in culture because their activities span from exploring to curating, knowledge brokering, linking, and initiation to organizing. Herein, my research adds to Howells (2006) assumptions and follows the call of Agogué, Yström & Le Masson (2013) on the neglected active role of intermediaries. If the latter name intermediaries as architects in open innovation, the intermediaries described in this paper constitute architects of cultural absorptive capacity building, paving the path to culture-driven innovation.

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Appendix A

Table A1: Quotes and their Translation

Position in document	Original quote in German	Translation by the author in English
5.1 Case Salzland	Und deshalb haben wir da angefangen uns mit möglichen Wegen zu beschäftigen wie wir für die Marke, aber auch für das Unternehmen auf der Produktseite, die nächsten Evolutions- und Differenzierungsschritte einleiten können. … Das erste Projekt und die erste Erkenntnis war, dass wir uns mit Ästhetik beschäftigen und unsere Produkte in Interior Design und Architektur verwendet werden. Wir haben uns überlegt wie in unserer Kultur Gebäudestrukturen, (Habitat-) Infrastrukturen entstehen und wie sie sich kulturell entwickeln über die Zeit.	That's why we started to fiddle with different approaches on introducing the next steps in evolution and differentiation for the brand, but also for the company in terms of product development. … The first project and insight was that we're dealing with aesthetics and that our products play a role in interior design and architecture. We we're thinking about the emergence of architectural patterns and how (habitat) infrastructures evolve over time in our culture.
5.1 Case Salzland	In so einer Reihe entsteht über die Jahre ein Erkenntnisweg, der dann immer mehr dazu führt, dass man einerseits eine unheimlich große Offenheit, andererseits aber auch einen Mut entwickelt aufgrund einer langfristig positiven Erfahrung. Das hat geholfen immer weiter nach vorne gebracht zu werden und dadurch entstehen auch Projekte, die in Form einer Überhöhung, einer Zuspitzung dem Publikum [und uns] etwas vor Augen führt wo erstmal ein Stutzen hervorgerufen wird, aber dann ein Reflexionsprozess einsetzt mit dem wir letztlich dieses Publikum mit auf so eine Erkenntnisreise nehmen.	In such art series a path of knowledge *(Erkenntnisweg)* is being built over the years that on the one hand leads you to a terrific openness, on the other hand fosters courage due to an enduring positive experience. This has helped to take a step ahead and that's why projects evolved that brought something home to [us and] the audience, which at first provoke a startle reaction by elevation, by exaggeration, but then turn into a process of reflection that took the audience and us on an insightful journey.
5.2 Case Wohlwerk	Es war das Mittel zum Zweck um diese Sache anzustoßen, diese Innovationsprozesse, diese neue Art von Denken, eingetretene Produktentwicklungspfade zu verlassen und ein Produkt in einer wesentlich kürzeren Zeit auf den Markt zu bringen.	It was a means to an end to initiate this innovation process, this new way of thinking, leaving old ways of product development, and launching a product in a significant shorter time.
5.2 Case Wohlwerk	Aber dann kam dieser Riesenwandel weil dann brachte wirklich [der Künstler] seine Meinung und seine Position als Künstler. Und dann sagte er: „Ok, ich bin hier eurem Wunsch gerecht geworden Wohlwerk zu interpretieren aber eben wirklich ganz stark aus Wohlwerk-Sicht. Und jetzt", hat er gesagt, „nachdem ich in eure Welt eingetaucht bin möchte ich auch dass ihr noch ein höheres Verständnis kreiert für meine Welt, für die Welt, für die ich stehe. Und jetzt möchte ich, dass ihr in meine Welt eintaucht."	But then came this tremendous change because [the artist] indeed weighed in and brought in his position. And then he said: "Well, I've met your wishes to interpret Wohlwerk, but very, very much from the view of Wohlwerk. And now," he said, "after I've dived into your world, I want you to get a fine grasp for my world, for the world I'm representing. Now I want you to dive into my world."
5.3 Table 3	Also grundsätzlich ist es so, dass es eine Produktneuheit gibt. Die wird von Seiten des Produktdesigns vorgestellt. Da fließen aber schon im Vorfeld Überlegungen von unserer Seite: Was sind allgemeine Entwicklungen, Trends? Wie verändert sich Gesellschaft? Wie verändern sich Bedürfnisse? Wie verändern sich Strukturen?...	In general, it starts with a new product that is introduced by the product design team. But in the run-up, considerations from our side are taken into account: What are general developments, trends? How is society changing? How are needs changing? How are patterns changing? …
5.3 Table 3	Also wir identifizieren immer diejenigen, von denen wir glauben die Künstler oder die Positionen von denen wir glauben, die sind Cutting Edge. Die sind noch nicht für alle bekannt, aber für einen kleinen Kreis von Insidern spielen sie eine Rolle. Sie sind tonangebend.	We're always selecting those, who we think are artists or perspectives from which we think they are cutting edge. They aren't well known to everybody, but for a small circle of insiders they do play a role. They are setting the tone.

5.3 Table 3	Dass man [der Intermediär] Dinge beobachtet, sie aufnimmt, sie in einen großen Mixer wirft, sie durchmischt, sie auf den Tisch haut, noch mal neu sortiert, guckt ob die Sortierung passt. Und wenn sie nicht passt sie wieder in den Mixer tut oder Teile wieder in den Mixer tut und sie so lange eigentlich immer wieder neu arrangiert, neu ordnet, neu organisiert bis man für sich selbst das Gefühl hat erstmal selbst verstanden hat und dass man auch das Gefühl hat dass man mit diesem Bild, was das vor einem liegt, auch anderen vermitteln kann.	One [the intermediary] is observing things, absorbing them, and throwing them into a big blender, mixing, throwing them on the table, sorting again and looking if this sorting is fitting. And if it's not fitting, one is again throwing them or pieces into the blender, rearranging and reordering them on and on, until one feels he or she has grasped it and is able to convey a picture of it.
5.3 Table 3	Es war wirklich so eine Wechselwirkung zwischen [dem Intermediär] und Wohlwerk und dem Künstler, die da entstanden ist. […] Die dritte Rolle war der Kommunikator zwischen dem Unternehmen Wohlwerk und dem Künstler. Weil zu Anfang musste sich erstmal das Verhältnis entwickeln und die verschiedenen Ansichten und Argumentationsweisen zwischen Künstler und einem Produktmanager sind jetzt doch recht unterschiedlich geprägt.	Indeed, interplay between [the intermediary] and Wohlwerk and the artist had been developing. […] The third role was communicating between the company Wohlwerk and the artist. Because, in the beginning a mutual understanding had to be evolved due to established different angles and manner of reasoning of an artist and a product manager.
5.3 Table 3	Und wir haben gesagt: „Wir müssen in Räume, die ihr normalerweise nicht filmt…" Es war eine Riesenprozedur, dass wir da reinkommen, vom Filmen überhaupt. „Aber wenn wir da jetzt nicht reindürfen, dann reisen wir ab. So, anders geht es nicht."	And we said: "We have to get into rooms you wouldn't usually film…" It was a hell of a procedure to gain access, more than ever to film. "But if we are not getting access now, we gonna leave. That's it. There's no other way."
5.3 Table 3	Also er hat das Projekt, neben der Konzeption, auch die Komplettbetreuung des Projektes bis hin zu den Roadshows übernommen. Also vom Anfang bis zum Ende, zum Teil auch die Kommunikation.	He has been taking care of the whole project from creating the concept until the roadshows. So, from start to finish, partly the communication, too.
5.5 Added values of cultural resources and summary	Und, ja (...) die technologische Entwicklung ist das eine, die kulturelle Erkenntnis das andere und wenn man das beides zusammenträgt in der Entwicklung eines solchen Produktes – dann entsteht eigentlich was Gutes denn dann entsteht die Idee.	The technological development is one element, the cultural insight *(Erkenntnis)* another, and if you're bringing both together in the development of such a product – actually, then something good is happening because then the idea is emerging.
5.5 Added values of cultural resources and summary	Also wir haben nicht nur eine neue Dekortechnik, sondern auch neue Farben, neue Anwendungsmöglichkeiten kreiert. (…) Ansonsten war auch das ganze Thema Schmuck [die zusätzlichen Kunstobjekte] spannend. Weil, wir haben uns ja nicht nur mit dem Thema Material beschäftigt, der Umsetzung, sondern auch was für Chancen das haben könnte für das Unternehmen Wohlwerk. (…) Dann das dritte Thema waren diese „Soft Key Learnings": Ich glaube, dass das Unternehmen sehr stark gelernt hat sich auch für andere Arten von Projekten zu öffnen. Und in dem Unternehmen, also wirklich dem einzelnen Mitarbeiter auf den unterschiedlichsten Ebenen, wurde das Bewusstsein gestärkt für was Wohlwerk steht.	We did not just create a new decoration technique, but also new colors, and new applications. Additionally, the jewelry topic [the additional art pieces] was exciting. That is, we haven't just dealt with the topic of material, the implementation part, but with the related opportunities for the company of Wohlwerk. (…) Then, the third point was on the "soft key learning": I think, the company has learned a lot to open up towards different kinds of project. As well, it raised awareness about what Wohlwerk is standing for – inside the company, for the single employee on all the different levels.

Conclusion and Discussion

This dissertation approaches the challenge of tapping into new knowledge that keeps firms and entrepreneurs ahead in the competition. Tapping into new knowledge becomes increasingly difficult in today's dynamic markets. The dissertation describes how organizations might master this challenge by opening up towards external sources of knowledge from their socio-cultural environment. The main aim of the work at hand lies in rising awareness of the potential of such cultural sources, as they have been neglected within innovation management. Therefore, the dissertation provides the foundations for an understanding and unlocking of cultural sources: It defines cultural sources, shows where and how to tap into them within a broader conceptual framework. Herein, it challenges predominant conceptions of innovation management and introduces those of cultural theories. Besides laying the foundations for acknowledging the potential of cultural resources in innovation management and contributing to the theoretical development, the dissertation also adds to methodological understanding and practical application of the phenomena. In the following, I sum up the theoretical, methodological, and practical contributions of the work. At the end, I discuss the dissertation, its limitations, and provide links to future research.

1 Contributions

Theoretical Contribution

The starting point of the dissertation is the observation that technology is increasingly becoming less a driver than an enabler of innovation. Meanings and emotions connected with products and services, aesthetical and intellectual dimensions play a bigger role and point to sociocultural aspects. Hence, non-technological knowledge from cultural sources is gaining in importance. However, innovation management has not yet responded to this development. And the nature of cultural sources requires different approaches of accessing knowledge than technological and other "classic" R&D knowledge. Paper two and three elaborate on the nature of knowledge in regard to cultural sources. From a practice theory lens, the papers describe knowledge as shared and created collectively. Knowledge from cultural sources is largely tacit, thus cannot be codified like information on, e. g. new technological patents. This makes it difficult to obtain, but on the other hand also hard to imitate, which is of competitive advantage. Cultural sources entail practices of styles, social trends, and tastes, art forms, etc. Paper three describes how culture in practice is related to knowledge and serves as a knowledge source. It adopts the culture as a toolkit perspective from Swidler (1986)

and follows Weber's transfer of the concept to organizations and their cultural repertoire (Weber, 2005). In this sense, organizations can draw on their cultural repertoire to choose strategies for actions. Accordingly, a large and broad cultural repertoire is advantageous. In a similar way, Dalpiaz, Rindova & Ravasi (2010) take the concept of Bourdieu's (2011) cultural capital and bring it to the organizational level. Both concepts complement each other, concluding that a large cultural repertoire coincides with a high cultural capital of an organization. Organizations benefit from a high cultural capital if it comes from a broad range of cultural sources so they can choose from various practices and are able to create new knowledge.

According to Dalpiaz et al. (ibid.), a company can build up cultural capital through hiring and collaborating with carriers of cultural knowledge (e. g. artists) and by creating boundary-spanning roles for the identification and development of knowledge. Furthermore, Dalpiaz et al. (ibid.) and Ravasi & Rindova (2004) borrow from knowledge management the notion of absorptive capacity and interrelate "cultural absorptive capacity" with a high cultural capital of a firm. As the idea of cultural absorptive capacity has not been elaborated within the literature, but offers a promising start for developing a conceptual framework about cultural sources from an organization's perspective, I take it to the next level. Paper three analyzes the literature on cultural resources and absorptive capacity from knowledge management and, based on the refined model of Todorova & Durisin (2007), introduces an adapted model of cultural absorptive capacity. This model describes the dynamic, interactive process of absorbing cultural sources from recognizing the value of knowledge to the outcomes and considers critical factors influencing the capacity. Following Todorova & Durisin (ibid.), the model reflects the importance of relationships and individuals and integrates micro and macro dimensions of cultural absorptive capacity. Therefore, I add the relationship between two actors, the intermediary and the boundary spanner, who sit at the interface of an organization and its environment. Their relationship at the interface is crucial in the early stage of unlocking cultural resources. From a literature review, the roles of the external intermediary in this stage have been derived and incorporated in the model as: exploring and monitoring, curating and networking, knowledge brokering, linking and mediating, initiating and pushing, organizing and creating concepts. The central role of the intermediary in the framework of cultural absorptive capacity accounts for the difficulty of obtaining cultural knowledge. The intermediary connects the organization with cultural sources and qualifies by knowing both – the organization and the world of cultural sources. Furthermore, the model of cultural absorptive capacity integrates specifics from the literature of cultural resources to the assimilation/transformation process of knowledge, that is the concepts of cultural registers, cultural capital, and processes of identity redefinition (sensemaking). The outcome of cultural absorptive capacity on competitive advantage is complemented and

specified as: strategic versatility and unconventional strategies, symbolic value/meaning creation, culture-driven innovation, symbolic capital (with an increased willingness to pay, allow for higher margins). Adapting Todorova & Durisin's (ibid.) model of absorptive capacity to the topic of cultural sources provides a solid starting point to frame further thinking and research about culture as a resource. Cultural absorptive capacity thus can be seen as a prerequisite for tapping into cultural resources.

The framework of cultural absorptive capacity, which largely reflects a macro view from the organization, but also stresses individual factors, points us to an important insight of this dissertation: To view the absorption of cultural sources as deeply intertwined macro and micro levels of a process. Drawing from the cultural theories of structuration and practice, culture is not only the source but also provides the embedding ground (the place) of knowledge in practice. Within a broader concept of culture, it is something that surrounds us in our daily practices. An organization is shaped by culture as well as it shapes the culture it is embedded in. So, knowledge from cultural sources cannot be imported like information or material stocks of resources. Practice and structuration approaches call for acknowledging the complex interplay of agency (the micro level) and structure (the macro level), respectively the influence of individuals and society on each other. They note that both levels are interdependent and reflect the complexity of social actions. The first paper connects to structuration approaches in the context of opportunities and entrepreneurship research while discussing the implications for network research methods. Drawing on the statement that economic action is a social phenomenon, the paper claims that the classic notion of Shane & Venkataram (2000) that entrepreneurship involves the nexus of individuals and opportunities reflects a structuration approach. Both authors requested entrepreneurship research to pay more attention towards opportunities and leave their focus on individual entrepreneurs. This is different than research from innovation management where macro views have been in favor of individual perspectives. Thus, both research streams are complementary and could benefit from each other. Also for both entrepreneurship and innovation management, knowledge sources are of huge importance. When Shane (2012) addresses understanding of the sources of opportunities as large research gap, these are the same kind of knowledge sources organizations seek for innovation, etc. The first paper goes on in referring to adoptions of structuration approaches in entrepreneurship research, such as those of Sarason, Dean & Dillard (2006) and Jack (2010).

The first and second paper concern the central source and place of knowledge: communities and networks. From a practice theory approach, knowledge is enacted and created in practices and interactions, not in the mind of individuals. Therefore, studying groups, communities, networks, and other relationships between people contributes to understanding knowledge sources.

While the first paper scrutinizes methodological ways to study networks, the second paper conducts network analysis by community detection. The first paper connects structuration theory with network analysis and describes the advantage of mixed methods to grasp micro and macro levels of networks (see below). Framed within network research, the second paper discusses different definitions of communities and their role in knowledge creation within the environment of organizations. Overall, community definitions are vague and have been broadened throughout the years. For the scholarly interest of this dissertation, the concept of producing communities (Gläser, 2001) describing related members by a common subject matter of work and the concept of communities of practice show relevance. As the name of the latter concept indicates, it reflects a knowledge of practice approach to communities. Particularly, Nonaka & Toyama (2003) describe with "ba" a physical space of networks of communities of practice in the environment of an organization, including such as suppliers, customers, or local communities (see Fig. 2 of overview chapter).

Methodological Contribution

The adoption of structuration theory to study networks suggests certain methodological implications. The first paper elaborates on this for the study of entrepreneurship because networks play an important role to understand the contexts and opportunities in entrepreneurship, that is the sources of knowledge. Drawing on a vast body of literature, the paper analyzes different approaches to studying networks with the insight that most literature deals with methods to grasp structural properties of networks. These studies largely build on methods of quantitative, numerical network research analysis and causal factors to analyze network relationships on a large level. Studies that do not seek non-structural information, but understanding the nature, content, meaning, and quality of relationships, by contrast, apply qualitative methods for network research. While the latter reflect the study of the micro-level of agency, the quantitative methods reflect the macro-level of structure. Following a structuration approach, the paper suggests integrating qualitative and quantitative methods in mixed methods study designs. Furthermore, in this way study designs enable to grasp the complexity of research settings and economic actions. They help to gain overviews of networks while not missing in-depth explorations, hence both an inside- and outside-view on networks. Also, mixing methods can outweigh the weakness of one method with the strength of another. Thus, mixed methods benefit the overall validity of research. Additionally, they allow for the development and testing of theory within one study.

Because qualitative network research has been neglected, the paper focuses on introducing qualitative methodological approaches from disciplines like sociology. These encompass "classic"

qualitative research methods like interviews, but also specialized ones: Network mapping for egocentric networks visualize networks during data collection and foster rich data collection. It helps participants to remember data and to give contextual information. The overall aim of paper one is to guide researchers in conducting mixed methods network research. Therefore, the paper draws on a classification of research designs and describes five different mixed methods research designs and their advantages and disadvantages: Sequential design, embedded design, parallel design, fully integrated design, and conversion design. This evaluation is followed by examples and recommendations from the literature of network research. Overall, mixed methods in networks research enable to address the structure as well as the content, context, and agency of networks. A fully integrated design most likely encompasses this complexity by different perspectives but is also the most demanding. Despite their benefits, mixed methods require large methodological knowledge and a lot of effort and time. For this, an understanding of the different research designs and their application given by the first paper is advantageous.

Practical Contribution

Paper two and three describe two different studies but complement each other on an overarching level: Paper two provides a macro view on external knowledge sources by describing the network structure of Meetup communities while the study of the second paper concentrates on a micro view of the role of intermediaries. The paper on Meetup communities tells us more about what kind of potential sources exist in local environments, while the paper about the intermediaries sheds light on how to tap into cultural sources. The intermediaries from the study in paper three – consultants of PR and brand agencies – rely on their own knowledge (cultural capital) and a network of cultural actors to suggest from where new cultural sources for an organization might come from. While in these cases, the sources come from industry-distant domains of art, the cultural sources in paper two belong to the close environment of organizations and can entail promising close and distant sources in terms of industry domains.

In paper two, I propose to unlock the knowledge potential of local communities that organize via the online platform Meetup and to actively engage in those communities. The data is based on Meetup groups, which deal with technology, business, and various cultural and "creativity" topics (e. g. music, writing, dance). As largely informal, interest-based groups, they gather many professionals from the startup and tech scene clustered in bigger networks of practice and themes offering a huge potential for the creation of new knowledge. Therefore, I demonstrate how to uncover the overarching clusters of Meetup groups via community detection methods of network research. For the case of Berlin the paper describes networks of groups, based on event

co-attendance of their members and a network of topics. Following this, there is a large, highly connected entrepreneurship cluster and separate mid-sized to big clusters about data and cloud/IT systems. Tech groups make the biggest proportion of Meetup groups and fall into various clusters, are less well connected with each other than entrepreneurship and business groups. Groups from the cultural topics make only a small proportion and mostly formed little mixed groups, besides a "Gaming" cluster and a "Writing & Art" cluster within the co-attendance network of groups. In the latter network, a cluster about "Agile & Product Management" and one about "UX & IXD" (User Experience and Interaction Design) derive as only separate clusters from the business and entrepreneurship field. They seem to bridge the tech and entrepreneurship field. Such bridging clusters, groups, or topics can obtain interesting insights for further investigation as the spreading beyond different backgrounds might be promising for the creation of new knowledge in terms of recombination. While the big "Entrepreneurship" cluster dominates the Meetup network, it is followed by a cluster of groups about "JavaScript & Frontend" and groups revolving around "Cloud & IT Systems". The analysis also allows diving deeper into the structure and contents and, e. g. depicting the most important groups. For Berlin, these are "Microservices Meetup-Berlin", "Berlin-Startups", and "Node.js Meetup Berlin". As these examples already tell, JavaScript is one of the most prevalent interests among Berlin Meetup groups. Such groups from technological clusters seem to undergo professionalization as they attract many sponsors. They show the potential of Meetup groups for firms to actively engage in communities, e. g. by exchanging knowledge about best practice cases from their own work. However, it is a fine line not to disrupt the informal, interest-driven and thus authentic character of such communities. Such communities cannot be formalized or set up artificially. Furthermore, the network analysis also demonstrated how to track the development of clusters over the last four years with the help of so-called alluvial diagrams. They enable to track the general development of the network and stability or instability of clusters. For example, the bigger "Cloud & IT Systems" from the 2015 cluster went through a lot of change during these years. Another way to track change and catch trending topics shows an analysis based on the largest new topics introduced by the latest group setups. Although this method is limited to smaller scales, it reflects trends within the last year, e. g. meetups about "refugees" or "Oculus Rift" (famous virtual reality glasses). In total, paper two demonstrates the breadth and likewise depth of Meetup communities as a knowledge source and how to gain an overview about these via network analysis.

Paper three provides concrete insights on how to unlock cultural resources with the help of intermediaries. The study describes two cases of German companies from the premium interior sector. Both companies opened up for collaboration with artists, which were initiated by a PR

and branding agency they were working with. The paper explores the roles of the intermediaries (consultants from the agency) and their relationship with the boundary spanners as the person in charge from the company. In the case of Salzland, the relationship between intermediary and boundary spanner had been existing for several years. In the case of Wohlwerk, the relationship had been shorter and the project was the first of its kind. Salzland had been collaborating with artists from various fields (music, performance, design, philosophy, etc.) on several projects since the mid-1990s. This company gave cultural actors a lot of leeways to explore topics to be challenged in the strategic development and future orientation of the firm. The case of Wohlwerk describes one larger project with a graphic designer who was integrated into the workflow of the company. He first had to deliver a commissioned work that sparked a new production process before the project developed to a second, unplanned phase in which the company dived into the "world" of the designer. In this second phase, the project also initiated organizational change. This is why the cases reveal two different approaches of absorbing cultural resources: Salzland is experienced with cultural resources and utilizes them on a quite abstract level, aiming for unlocking new repertoires. The owner of the company supports the projects so the intermediary and boundary spanner are able to continuously develop their project ideas. Thus, Salzland maintains an evolutionary opening up towards cultural sources from top-down. The main roles of the intermediary lie in exploring and monitoring cultural sources, knowledge brokering, curating and networking. At Wohlwerk, working with a cultural actor was new and experienced a lot of barriers in the beginning. The project first had to convince members of the steering board and then had a big impact by the end. In this sense, the intermediary and boundary spanner followed a bottom-up approach, which ended in a radical opening up of Wohlwerk. Here, the intermediary predominantly had to fulfill roles of linking and mediating (like between the cultural actor and the company), initiating and pushing, as well as organizing and creating concepts. In total, the different cases give insights on different "evolutionary" or cultural absorptive capacity levels. While we get an impression about the strategic use of cultural sources at Salzland, Wohlwerk shows how companies can start to integrate cultural sources. In the latter, it is advantageous to start with projects with clear and tangible outcomes that also serve for brand communication (in this case, e. g. a product and exhibition objects). Also, following the Wohlwerk case, it is recommended that especially in traditional companies sources should not challenge too much the identity definition of a firm. Even a radical opening up process should incorporate different steps. In the beginning of the project, the intermediary suggested another cultural actor who proposed even more distant and radical ideas but was rejected by the company because it was too far from their brand values.

2 Conclusion, Limitations, and Future Research

The work at hand lays the foundations for shedding light on the potential of opening up towards broader sources of knowledge – so far a blind spot of innovation management. Cultural theories point to the embeddedness of organizations and entrepreneurs in their socio-cultural environment, which are influenced by their environment but also influence the latter. Organizations can make use of these influences and actively interact with their environment to tap into new knowledge for competitive advantage. Practice and structuration approaches point to the tacit and interactive character of knowledge and the special role culture plays as both a knowledge source (cultural repertoires) and embedding ground for knowledge in practice (place). In this view, knowledge is created in and between networks of communities. The dissertation focuses on the locus of communities for knowledge sources and how to access them. If organizations decide to actively engage in such communities, they first have to detect them. Communities in the local socio-cultural environment offer a first opportunity to start. Groups of the platform Meetup promise a way to begin tapping into new knowledge sources and then proceed to open up for sources from more distant domains. Network analysis allows detecting overall clusters/communities and relevant groups among the Meetup network. Furthermore, companies profit from the support of intermediaries to unlock new knowledge sources, like consultants who are familiar with both the world of cultural sources and that of the company. Especially when starting to open up for external sources and for connecting with domain-distant sources, intermediaries fulfill a broad range of roles to facilitate access. The Meetup network also demonstrates that companies do not have to seek for geographical distant sources or online communities to embrace new and a variety of sources. The immersion of entrepreneurs and employees into local communities offers another quality for knowledge creation than online communities because the ease and informal character of in-person meetups foster valuable relationships and tacit knowledge.

Unlocking knowledge from external socio-cultural sources can help organizations to gain competitive advantage through innovation, future orientation, and strategy, discovering and creating opportunities, as well as organizational learning and change. Various scholars and the case studies of this dissertation about intermediaries point to the benefits of opening up towards broad, varied, and distant sources. Until now, innovation management has neglected this potential and stayed in the field of technological sources and explicit knowledge or limited the impact of new external sources to new product development. Cities have been spotted as a rich space for broad and new knowledge sources as they inhabit many subcultures, new lifestyles, creative people, etc. They stand in contrast to "mainstream culture" and common, widespread practices. Interactions between these different communities and exchange of cultural repertoires and meanings provide the hot bed for new knowl-

edge. Literature mentioned that irritation, tensions, and dissonance between these interactions foster the creation of knowledge. Likewise, companies could benefit from distant sources to radically challenge the knowledge about their domain and make a huge leap compared to competitors (cf. Öberg & Verganti, 2013; Verganti 2009). However, it can be costly to reach this stage and many organizations first need to develop a high cultural absorptive capacity to access and deal with such knowledge.

This dissertation lays the foundations for understanding absorption of knowledge from culture: Innovation that got inspired by knowledge sources from the socio-cultural environment of organizations. It adapts the absorptive capacity model of Todorova & Durisin (2007) as a framework to study the use of cultural sources. However, studying all aspects and phases of a cultural absorptive capacity is out of the scope of this dissertation. It thus concentrates on the early phase and the crucial role of intermediaries and communities for tapping into new sources. More research is needed and future research might zoom into other elements and phases of absorptive capacity and its antecedents, barriers, enablers, etc. This includes knowledge processing (e. g. Nonaka & Toyama, 2003), the different possible outcomes and impacts of absorbing cultural sources and other types of boundary-spanning relationships beyond a single intermediary and the internal boundary spanner. However, this might be challenging given the intangible nature of culture, which is hard to track and measure in terms of classic, positivist research approaches. Therefore, following practice and structuration approaches point to make use of interpretivist research methods and mixed methods. Methods used in relational sociology and actor-network theory also hold promise (cf. Mützel, 2009). One example is the recent work by de Vaan, Stark & Vedres (2015) who aim at developing a cultural network analysis and allow for measuring cultural/ stylistic repertoires. They compared repertoires with the structural folding of team members from game development. Their work might also help to learn more about distinct nodes for promising areas of knowledge creation in networks, similar to those I describe as intermediaries: Challenging the popular notion of Burt's (1995; 2005) structural hole, they claim for structural folds as the overlapping of strong ties – insiders of both groups who provide familiar access to diverse resources (de Vaan et al., 2015; Vedres & Stark, 2010). These structural folds in networks allow for recontextualization of knowledge from distant (friction full) repertoires and hint to innovation as recombination of knowledge and ideas (ibid.).

While underscoring the enabling role of culture as a resource and stressing the importance of intermediaries, there is the risk to overlook potential constraining aspects of cultures and possible gatekeeping by intermediaries, etc. (cf. McKeever, Jack & Anderson, 2015). Furthermore, companies might experience disadvantages by "overembeddedness" through engaging with too many sources and networks (Johannisson, 2011; Uzzi, 1996). Also, the cultural capacity of a firm has limits. Additionally, the gains of absorbing new and more knowledge from the outside come with the risks of knowledge leaking to the outside (Duguid & Brown, 2001).

Acknowledging culture as a source for knowledge and innovation does not neglect the usefulness of technological and explicit knowledge. Previous literature and the cases presented in this thesis demonstrate the usefulness of absorbing cultural sources within industries with a high potential to load products and experiences with emotional meanings. However, the application of cultural sources is not limited to these areas and the impact in technological industries will likely be even more radical with input from distant domains, thus especially advantageous for competition (cf. Verganti 2009; Verganti & Öberg, 2013). As stated above and by calls like that for open foresight (Heuschneider & Herstatt, 2016), the impact of absorbing cultural sources might benefit various areas beyond product and service development. And culture as a resource is not limited to culture in a narrow sense of design, art, etc. Cultural practices as knowledge source also encompass communities and networks about technology, and further.

This dissertation concentrates on the early phases of knowledge absorption and thus an outside-in perspective of knowledge. In the light of structuration approaches it is standing to reason not to limit the view of influences from the socio-cultural environment on the organization, but also to note the other way around. Such an outside-inside perspective would correspond to a holistic understanding of the complex socio-cultural embeddedness of organizations with further implications for theory and practice of innovation management. Harrison & Corley (2011) applied an outside-inside perspective for the case of an outdoor company and introduced a model of "cultural cultivation" that helps, e. g. to maintain the authenticity of an organization. This model reflects the influence of societal cultures through "cultural infusions" (outside-in) and the influence of organizational cultures through "cultural seeding" (inside-out) (ibid., pp. 391, 406). Also, Ravasi & Rindova (2008) point to the culture-producing role of organizations. Verganti (2009) also integrates an outside-in perspective within his design-driven innovation process of listening, interpreting, and addressing. However, the phase of addressing is rather limited by the notion of the intermediary role of interpreters as convincing customers about a new meaning proposal of a firm.

In conclusion, this thesis contributes to viewing innovation and entrepreneurship as a societal rather than economic phenomenon, which I claim will have positive impacts on the field (cf. Steyaert & Katz, 2004). The overall goal of this dissertation in introducing culture and the practice and structuration lens to knowledge searching and absorption in innovation management and entrepreneurship holds promise for further developments of the field. This is especially true for the acknowledgment of (informal and authentic) communities as the central locus of knowledge creation and the focus on collective practices enacted by individuals. As well, the contribution of this thesis will open fruitful opportunities for connecting innovation management and entrepreneurship with fields of organization studies (e. g. sensemaking), open foresight and open innovation, or creativity research.

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