ADDRESSING CHALLENGES FOR INFORMAL LEARNING IN NETWORKS OF ORGANIZATIONS

Complete Research

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Abstract

Current trends in information technology (IT) like social technologies and mobile devices lead to new opportunities for informal learning at the workplace. This is particularly true for physical workplace settings, in which the need to informally learn steadily increases. However, these current developments also lead to new challenges for informal workplace learning. Small and medium sized enterprises with their limited resources are overwhelmed and cannot address these challenges. Here, networks of organizations come into play. Literature states if networks provide IT capabilities for their members, the absorptive capacity of them can be increased. However, there is no research on how networks can design IT capabilities for their members to facilitate informal learning. In this paper, we are first identifying the challenges for informal learning in networks before discussing which IT capabilities networks should enhance to address these challenges to facilitate informal learning. Thus, we led 53 interviews in ten networks to investigate the challenges of informal learning in networks and the prospective IT support. Finally, we present the interview results and reflect the identified challenges and proposed solutions in light of the literature. These findings are put into a model outlining the role of IT capabilities enhanced by networks.

Keywords: Informal Learning, Absorptive Capacity, Networks, IT Capabilities.

1   Introduction

Due to resource constraints such as labor and capital, small and medium sized enterprises (SMEs) have limited capabilities to generate knowledge (Dezso et al., 2006). Thus, in order to stay competitive in today's global markets, SMEs are heavily dependent on exploiting external knowledge sources (Dezso et al., 2006, Egbu et al., 2005) and adopting short-term, unstructured ways of organizational learning with the focus mainly on external knowledge (Durst and Edvardsson, 2012) improving its ability to learn and to apply new knowledge (Wetherill et al., 2002). However, in today's distributed work environments, this transfer increasingly takes place through mediated channels of communication, in which the sender and receiver are geographically disconnected (Fadel et al., 2009). Thus, it is more interwoven with new communication channels such as social software (SSW) (Paroutis and Al Saleh, 2009).

The global penetration of information technology (IT), involving millions who spend large amounts of their time using SSW, creates opportunities for revisiting knowledge management (Pawlowski et al., 2014). With SSW, new heterogeneous kinds of technology enhancing informal learning are now widespread in work and private life (Klamma et al., 2007). Nevertheless, there is still a lack of an overall strategy for the use of SSW (Wang, 2011) to enhance an organization's absorptive capacity (ACAP) by supporting informal learning. Enhancing the ACAP (Cohen and Levinthal, 1990) for SMEs is also seen as an under-researcherd topic (Spithoven et al., 2011). So far, research mainly focused on knowledge workers (Durst and Edvardsson, 2012) and IT affine industries to investigate the IT support in office settings. Nowadays, organizations having predominantly physical workplace settings are also looking

for ways to make use of the current trends in IT, supporting their workers to acquire, assimilate, and transform new knowledge (Roberts et al., 2012). However, these positive effects of using SSW for external knowledge acquisition do not come without side effects, as the adoption of SSW increases the risk for unwanted knowledge spill overs (Manhart and Thalmann, 2015).

Organizations need to successfully absorb external knowledge to cope with the challenges arising from current trends in IT and they want to use the opportunities of these trends. However, SMEs do not have the resources for doing that. Organizations might not be able to access the required knowledge; even if this knowledge is available, they may not have the capacity to absorb and apply it for their own use (Tsai, 2001). Consequently, they see their traditional knowledge sharing networks in charge. Thus, focusing on networks of SMEs seems promising, as knowledge is known to be distributed over various actors (Tether, 2002) and accessible through multiple channels (Coombs et al., 2003, Howells et al., 2003, Acha and Cusmano, 2005). Hence, organizations become part of an environment having distributed knowledge (Spithoven et al., 2011) among members. It has already been shown that IT provided by networks can help to enhance ACAP of the member organizations (Spithoven et al., 2011) or, putting the lens on the network perspective, that ACAP can also be seen on an interorganizational level (Tsai, 2001). High IT capabilities of a network could be beneficial for its member organizations which then gain access to additional IT services (Sambamurthy and Zmud, 2000).

Thus, our primary research objective is to outline which IT capabilities networks should enhance to facilitate informal learning of their members. In order to do so, we will discuss the related work before presenting the procedure of our empirical investigation. Then, we present and discuss the findings of our empirical work, comprised of 53 semi-structured interviews in ten SME networks. Finally, we conclude our paper and discuss avenues for future research as well as our limitations.

2 Related Work

Many definitions of informal learning contrast it to the concept of formal learning (Hager, 2012). Formal learning takes place as intended within formally constituted educational institutions such as schools or universities (Hager and Halliday, 2007). It also takes place in a prescribed learning environment, by being an institutionally-based and organized learning, which is highly structured through the presence of a teacher and furthermore, learning outcomes that are externally specified (Eraut, 2004, Marsick and Watkins, 2001). In contrast, informal learning occurs in all other situations in which people learn (Hager, 2012). Formal learning promotes informal learning in the workplace as informal learning is often observed taking place in or near formal education settings (Eraut, 2004; Svensson et al., 2004) and organizations recognize that informal learning is the most pervasive type of learning in the workplace environment (Maier and Thalmann, 2010, Marsick and Volpe, 1999). Furthermore, informal learning provides a contrast to formal learning and has a stronger focus on the social significance of learning from others, as it takes place in a much wider variety of settings than more formal forms of learning or training (Eraut, 2004).

Thus, we define informal learning in this paper as either intentional or unintentional, non-institutional as well as not pre-structured, experiential and primarily under the control of the learner, and, furthermore, its outcomes are difficult to predict a priori (Berg and Chyung, 2008, Schulz and Stamov Roßnagel, 2010, Marsick and Volpe, 1999, Hicks et al., 2007). Linking it to the workplace context brings new perspectives as it encompasses a wide range of more- or less-structured environments (Eraut, 2004). Thus, workplace learning instead happens explicitly and implicitly via various work-related and social interactions (Eraut, 2000). It typically occurs through work-related interactions and contributes to both individual and socially shared learning outcomes (Maier and Thalmann, 2010). Thus, as informal learning often happens on the job, workers become more experienced and gain confidence in their own proficiency (Eraut, 2004). Both researchers and organizations are still in the early stages of experimenting with new technologies in organizational contexts, hoping to gain the benefits of lightweight informal collaboration among employees (Brzozowski et al., 2009). Thus, little is known about the current usage

of social technologies in mobile work situations, as current learning technologies mostly facilitate formal learning in well-structured domains (Ley et al., 2014). Here, modern mobile technologies and SSW are promising tools for scaling learning at the workplace (Ley et al., 2014) and supporting workers in their knowledge acquisition in mobile work situations, as they enable time- and place-independent information access (Balkin et al., 2000). Furthermore, the quantity and quality of learning can be enhanced by increasing opportunities for consulting and working alongside others in teams (Eraut, 2007).

Organizations should offer their employees capabilities to enhance the possibilities for workplace learning in order to enhance their competitive advantage. Cohen and Levinthal (1990) conceptualized the model of ACAP as a firm's ability to recognize the value of new external knowledge, assimilate it, and apply it to commercial ends. In this regard, we consider informal learning as one major approach to acquire external knowledge, which is related to the organizational ACAP. It has been shown that an organization's ACAP can facilitate or inhibit the acquisition of external knowledge, i.e. learning of individuals, and influences an organization's performance (Roberts et al., 2012).

From a knowledge management perspective, ACAP suits as a theoretical base for organizational learning, innovation, and dynamic capabilities (Mariano et al., 2015). The organizational ACAP describes the organizational capability to perform learning, both formally and informally (Sun, 2010), whereas its relationship to informal learning still seems to be under-researched. Putting the lens on networks, fostering extensive social networks already helped companies to successfully identify and adapt relevant external knowledge (Henderson, 1994). Tripsas (1997) showed that organizations with prior social relationships in networks outperformed others by allowing and fostering the effective identification of new external knowledge. Especially in networks, not only the assimilation of knowledge as suggested by Zahra and George (2002), but also knowledge identification and transformation, require investments in networks (Todorova and Durisin, 2007).

The concept of IT capabilities was developed by arguing that while resources in general can be easily duplicated, a unique set of capabilities developed and customized by an organization is much harder to be duplicated, which will result in sustained competitive advantages (Santhanam and Hartono, 2003). Wade and Hulland (2004) proposed three types of IT capabilities, namely outside-in, inside-out, and spanning, which facilitate ACAP. Outside-in IT capabilities are externally focused and facilitate the knowledge identification capability, whereas inside-out IT capabilities are inward-facing and increase the knowledge application capability. Here, the focus is on the actual use of knowledge. Spanning IT capabilities integrate a firm's outside-in and inside-out capabilities and facilitate the knowledge assimilation capability. Additionally, IT capabilities can be moderated by complementary organizational capabilities (Roberts et al., 2012).

Organizations participating in networks with high knowledge identification, assimilation, and transformation capabilities are more likely to successfully absorb external knowledge (Cheng et al., 2014). Although SME networks are similar to most alliances, joint ventures, and partnerships, all firms in these networks do not need to interact directly with each other (Varamäki and Vesalainen, 2003). Rather, a "network logic" is built upon smaller overlapping sub-groups of firms where strategic integration is present and the configuration of the sub-groups can be rather dynamic, since the idea is that membership firms should jointly perform work tasks to overcome the natural disadvantages that SMEs have, such as a lack of resources and limited market power (Wincent, 2005). Research showed positive effects between network capabilities and the ACAP of the network members (Tsai, 2001). Organizations may have already identified valuable external knowledge and yet have significant difficulty assimilating that knowledge (Roberts et al., 2012). Networks with their domain knowledge and higher resources could fill this gap and assist in localizing this knowledge for their members. Nevertheless, research still focuses mainly on ACAP within organizations, whereas the mechanism of how related factors affect ACAP across interdependent organizations in networks seems to be less explored (Unsal and Taylor, 2011, Mariano et al., 2015).

3 Procedure

The primary goal of our study is to investigate how networks can build IT capabilities to facilitate informal learning in their member organizations to enhance their ACAP. Based on this goal we will answer the following research question: *Which IT capabilities should networks enhance to facilitate informal learning for their members?* However, to answer this question, it is first necessary to identify the current challenges of informal learning in networks. Hence, we will also answer the following working question: *What are current challenges for informal learning in SME networks?*

We considered semi-structured interviews in networks sufficient to answer the research and working question. A semi-structured interview was selected because the varied professional, educational, and personal histories of the sample group would be highly likely to hinder the use of a standardized interview approach (Louise Barriball and While, 1994). In order to explore the respondents' opinions, clarify interesting and relevant issues, foster information completeness, and explore sensitive topics within each interview turned out as the main advantage (Louise Barriball and While, 1994) during the investigation.

In total, we led 53 interviews in ten networks of organizations between January and October 2014. We conducted the interviews in the scope of the LEARNING LAYERS research project, which focuses on IT support for informal learning.The networks and key informants were selected based on convenience sampling and the networks are affiliated to the research project. We organized our study in two phases. The interviews were held in German. We asked the individuals to describe their personal informal learning behavior and challenges acting as representatives or their organization as well as to reflect about learning behavior and barriers of others within their organization. Hence, our unit of analysis is the individual itself, however, acting in an organization that is part of one or many networks. First, we interviewed ten key informants occupying a central management role in one of the ten networks. The interviews took approximately two hours each and were conducted face-to-face. The goal was to get an initial overview of the networks and to identify promising candidates for the subsequent informant interviews. We approached ten SME networks in Germany and Austria and each key informant represented one. We selected networks in which informal learning at the workplace is important and in which IT is used for informal learning. Second, we performed 43 informant interviews with members identified by the key informants. We conducted the informant interviews via telephone, and they took approximately one hour each. Seven interviewees had less than five years, 46 had more than five years of working experience with the network which indicates that most interviewees had profound experience with the networks. Table 1 provides a description of the investigated networks (sector, number of member organizations) and the number of performed interviews.

Network (ID)	Sector	# Member orgs.	# Interviewees
Network 1	Construction	130	6
Network 2	Construction	30	6
Network 3	Construction	92	5
Network 4	Construction	270	6
Network 5	Construction	~ 1600	6
Network 6	Construction	85	5
Network 7	Information Technology	108	5
Network 8	Health	63	6
Network 9	Engineering	83	4
Network 10	Health	139	4

Table 1.   Overview about the investigated networks

The networks are active in different domains, but we identified overlapping similarities. First, focusing on SMEs in networks seemed to be a promising approach as these networks tend to be heterogeneous and need solutions for IT support without having resources for heavy IT investments. Second, these networks can gain a huge benefit by starting to offer their members structured ways of using already established social technologies.

The audio-recorded interviews were transcribed verbatim and cleansed afterwards. Thereby, we checked the raw transcripts for accuracy and reliability. Additionally, this procedure helped us to get familiar with the data material, as not all of us were involved in the data collection to the same degree. Transcriptions were translated into English for citing original voice. The data analysis of the transcripts was then done by applying an informed inductive coding procedure based on Mayring (2014), carried out via Atlas.ti. We used this inductive approach to reduce the material in a way where the essential contents remain, but we still created a comprehensive overview about the material with our abstraction (Mayring, 2014). In-line with the inductive category development according to Mayring (2014), we firstly defined a criterion for the selection process in category formation as a deductive element within our analysis. Thus, a coding table was created where the initial codes were described, an example was given, and rules for applying the codes were provided. Then, we scanned the collected material initially having the IT capabilities and the ACAP in mind. Based on these first insights, we developed ten codes for our dimensions of analysis (challenges, IT capabilities, informal learning at the workplace, networks) including coding rules which then were used to analyze the transcripts.

Furthermore, we started the first analysis round by assigning seven to nine transcripts to each of the six team members. The team members assigned codes to the respective text passages in their transcript sets based on the predefined dimensions of analysis, refined the codes and proposed additional codes if needed. During this phase the initial codes were refined and new codes proposed by each team member. In this very first round, the authors experienced a slight difference in applying the codes. Hence, in a subsequent discussion round, all codes in the sample were discussed and clarified. We did not calculate a value for the inter-coder agreement reliability, however, performed this routine until we had an agreement upon the sample of codes and their use amongst the coders. After having another team discussion, we performed a final passage through the transcripts and started with the interpretation of the data (Mayring, 2014).

In summary, the whole coding and data analysis process was accompanied by multiple meetings where (1) the meanings of the codes were clarified, the coded passages were discussed, and (2) initial findings were discussed and continuously challenged. The outcome can be summarized by stating the highest frequencies of codes as the following (The numbers in the brackets represent the frequency of each code assigned to text passages in the transcripts): Informal Learning (165); Challenges: Content Identification (106), Content Processing (102), Content Distribution (67); ACAP Capabilities: Identification (229), Assimilation (289), and Application (272).

4   Identified Challenges

In the following, we first present the challenges for informal learning at the workplace in networks. Then, we discuss how networks could design IT capabilities to cope with these challenges in chapter 5.

4.1   Identify Contents for Informal Learning at the Workplace

During our data analysis, we identified knowledge identification for informal learning at the workplace as a major challenge for our interviewees. Throughout all networks the network members tend to have challenges (1) during their active search for contents to informally learn and to solve occurring work problems and (2) with keeping up-to-date by receiving contents unintentionally. Additionally, limited time and time pressure at the workplace are crucial for employees.

During our data analysis, it turned out that selecting the right channels to identify new knowledge is a major challenge for informal learning. This became particularly challenging as the number of knowledge

sources increased a lot. In this regard, one interviewee stated [N7-a]: "Nowadays, there are so many IT platforms out there and you should look at all." Another interviewee outlined how he is overwhelmed [N5-a]: "I have an iPad, an iPhone. I use iOS and Android. I use mobile computing and I have RSS, Twitter, Google+. […] If you have all these channels to scan and you want to be on the cutting edge, you actually need a whole team of five to six people."

As informal learning at the workplace is mostly integrated into the work process, the employees experience a high pressure to solve their problems fast, and, thus, the time for learning is very limited [N2-d]: "Identifying new content always happens in different situations additional to the working stress. If there is a lot of work, then the work becomes piled up." Another interviewee stated in this regard [N-6-b]: "In the end, you have to select. I cannot read everything I am receiving every day. It is just not possible. Otherwise, I could only focus on the content identification and could not do my actual work." The increasing number of knowledge sources also makes it much more challenging to find trustworthy channels. One interviewee stated [N2-a]: "In the past you always used ring binders. Nowadays it is Google. Due to that I have to check where the trustful sources really are."

Parallel to the number of information channels also the amount of available content learners can use for informal learning increased. One interviewee stated [N5-d]: "Nowadays we are afraid of the fact that too much junk is created, which means that getting information itself is not a problem anymore, it is much more challenging to identify the information you need. Finding within this crazy huge amount of content the interesting snippets you need is the challenge nowadays." Thus, learners need support while selecting suitable contents fitting their learning needs. Here, the lack of supportive structures was mentioned [N3-a]: "As a company we are suffering a lack of clearly structured information." Another interviewee explains that structuring of content is needed to access contents [N2-c]: "The main challenge truly is to structure, filter the information to be able to clarify where you should get additional information that allows me to go on with my work."

Further, our interviewees found it challenging to quickly assess the content's relevancy and particularly to assess the content quality [N5-c]: "The challenge is to learn on the Internet, to distinguish between stupidity, half-truths, and true expert knowledge. That is truly a huge challenge." Searching for suitable content does not seem to be the challenging activity, rather the filtering and the selection, as one interviewee pointed out [N2-c]: "Very often you have to decide, is this really important, should I share it, or can I just skip it? Of course, you should never leave out important facts. Well, I cannot say that acquiring new information became harder, but sorting the information definitely did."

The first identified challenge of content identification for informal learning at the workplace has negative impacts on the identification capabilities of ACAP.

4.2   Individual Content Processing by Network Members

Network members experience the understanding of content and the application in their current work context as challenging. This is particularly important for informal learning at the workplace, as the learning is embedded into work and the learner needs to transfer the learned content into his work context to find a suitable solution. In all of our networks, interviewees perceived content processing and adoption as challenging.

Selecting the right contents by screening multiple channels and assessing available contents turned out to be challenging. Particularly challenging for learners is processing high amounts of information [N7-d]: "In the end, the challenge is being able to handle all the information you are exposed to." This limited processing capacity also holds for the scan of content push services [N4-d]: "Nobody is absorbing this whole information flood anymore. I cannot read all of it. It is just not possible."

The absorption capabilities of the employees are challenged by shorter life-cycles of contents. Our interviewees currently experience this as one driver for information overload [N3-b]: "Nowadays, a lot of laws are changed in one year and are being changed somehow again in the next year as they [government] found out the change was a bad idea. You see, everything is in motion nowadays, which probably

is the main driver for the information flood we are suffering." As they have to consider these changes for their work, this is also a driver for their need to informally learn. Interviewees experience also more pressure in processing content and informal learning much faster which leads to more stress [N3-a]: "A huge drawback is that the stress increases. I can remember the times, where you could say, right now I do not know an answer because the post man did not show up so far. Those times are over. Today, you get an eMail at 10:00 a.m. and at 11.00 a.m. you get a phone call why you did not respond yet. Everything is so much faster today."

This also shows the need for informal learning at the workplace, as traditional learning approaches cannot cope with this dynamic [N4-a]: "Who can go on advanced training for a month nowadays? Maybe we can do it in the construction industry during the winter as this is our off-season. But, why should anybody tell me that I am only allowed to learn in winter? If I use the new media, I can easily learn during the summer as well." However, learners need support while performing informal learning in a way that they are not overburdened with this task [N5-e]: "I got rid of all these new devices because they do not work at all. You have to cut it down to the really important stuff, otherwise you are lost."

The employees also face the challenge that the contents they can use for informal learning are not prepared in a suitable way [N4-c]: "Of course we have a huge amount of data, and if you read for example law texts on your smartphone, you can forget that. Well, you would need other things to do that." Additionally, network members are faced with content that is presented in an inapplicable terminology. Hence, this harms the content adoption and assimilation and can lead to a failure in their informal learning. One interviewee stated [N3-d]: "You are confronted with a thick book, and maybe you need the information from half a page. Everything else is regulations and historical data to justify the regulations. Well, the information we are interested in, is not more than 10% of the whole amount." Another interviewee points out how she has to adopt law texts for her network members [N4-b]: "The legal jargon is so terrible. Business people cannot and do not want to read those texts. That is why I have to transform the information in a way everybody understands. Those texts are so complicated, mainly only lawyers understand them."

Besides the terminology, textual descriptions themselves are not easy to grasp in workplace settings, especially if contents are accessed via mobile devices. Our interviewees consider multimedia contents such as pictures and videos as easier to process than texts. Particularly, the description of physical work steps seems much easier to understand from video contents [N4-e]: "If you have a video to explain the content, even non-professionals would be able to understand it much more easily. Understanding the procedures with a video is much easier than doing it based on text descriptions and pictures."

The challenge that employees face as they make use of learning contents in their current work seems to negatively affect the knowledge assimilation and transformation capabilities of ACAP.

4.3   Distribute Content within the Network

The employees of the network management are aware of the previously mentioned challenges their members are currently facing. Thus, they try to address these challenges while providing contents to support the informal learning of their members. They select the distribution channels and they pre-select contents to reduce the information flood. They try to adapt contents to the target group to facilitate the information processing and, thus, the informal learning. However, doing all of this properly is not easy, and the network management perceives the distribution of contents to be challenging. Our interviewees report that choosing the right channel to spread content within a network is a challenging task [N3-b]: "As I am experiencing it in my network, if we share information via eMail, a lot of them are not read anymore. People just click them away, which means you have to underline their importance by having a call right after you send an eMail. Then you tell them that you have important information and expect an answer. It is crazy sometimes." Further, due to the current trends in IT and particular SSW, employees feel compelled to use several distribution channels in parallel [N6-a]: "We are tracing the impact of our eMails, especially if we have mass mails such as newsletters. We know that people read this only to a

limited, to a very limited extent. Well, we are really struggling to reach our members via the classical media channels."

Choosing the right content in the right format is perceived as challenging for the network management [N7-c]: "Basically, a very important aspect is to address the current topics. Further, you have to present them in a way, where all members – even those who are not domain experts – understand it." Another interviewee pointed out the importance of the right format [N8-f]: "You need to find the right format, where you avoid the impression that it is too theoretical and gaining the impression that the people who are being addressed are on the same level."

Identifying the right target group can be challenging, as finding the trade-off between the size of the target group and the homogeneity of the target group is not trivial [N8-b]: "Identification of common interests and partner [companies] search. Well, an overview about all partners [companies] you get really easily, but identifying what your partner has in common with you in case of financial or social aspects or his real interests is very challenging."

Additionally, it turned out that the network members are getting more concerned about how the others react to the content they spread [N10-a]: "You might have somebody in CC on your eMail and you could have an outcome you truly did not want to being faced with." Another interviewee mentioned how a post in their forum led to negative discussions [N1-f]: "Well, and then they discussed back and forth and I had to read all of them. After reading through some posts, I stopped because I decided not to waste my time anymore by figuring out if somebody made a mistake or not."

Additionally, assessing legal consequences turned out to be challenging as well. One network member stated a legal issue his network was faced with due to spreading crucial content within the network [N7-d]: "I mean, once we were faced with the threat of a potential lawsuit. An employee used unintentionally crucial information he got from a colleague and suddenly we were confronted with a potential lawsuit, because the colleague spread the knowledge without permission[…]These problems are becoming more and more relevant for us."

Furthermore, trust plays an important role when content is spread within networks [N8-a]: "The main challenge is, especially when it comes to informal learning, that you need to have a trust basis. I need to convince the member that I handle the information with care, if they want me to." Another interviewee mentioned a similar challenge [N2-a]: "I must know that I have reliable sources. Well, if I share knowledge, I need to be sure that it is based on reliable information. I cannot spread wrong information. I need to spread good solutions."

Content distribution challenged by multiple channels, possible (legal) consequences, and undefined target groups will lead to negative effects on the knowledge utilization capabilities and, thus, could harm knowledge assimilation capabilities of ACAP.

5 IT Capabilities Addressing the Challenges

In the following, we discuss countermeasures and solution proposals for our challenges and how networks of organizations could build IT capabilities to facilitate informal learning of their members.

5.1 IT Capabilities for Content Filtering and Selection

Currently, our interviewees feel overwhelmed by the growing number of information channels and available contents under time pressure in work situations. Using content collections based on multiple sources provided by the network has been described as facilitating the organizational content identification capability. However, preparing such collections is laborious [N7-e]: "They are screening all public accessible information about companies […] documenting it and building a database on their own. Simultaneously, the information is collected to create new entries. Everything is very well structured and therefore, needs a lot of energy." Jarrahi and Sawyer (2013) observed that knowledge repositories are used extensively by consulting firms to offer communicative capabilities for their employees. Further, such

repositories are often based on community applications such as Microsoft SharePoint, where many people use it as an information source (Jarrahi and Sawyer, 2013). Putting it into the work context, knowledge repositories and wikis often serve as an organization's memory, embodying past experiences and engagements (Ackerman, 1998) to support the workers within their work procedures (Jarrahi and Sawyer, 2013). These solutions may not be affordable for SMEs, but networks may have the resources to fill the gap.

In our networks, people do not only expect to have searchable collections, they additionally expect that their networks provide push services to keep them up-to-date. However, networks should personalize this push service to avoid the information overload. Our interviewees highlighted that the provision of reliable and high quality content services is one of the key reasons to join the network [N7-a]: "[The motivation] is, to be on the cutting edge of technological and innovative ideas. That you do not get information from four year old articles on heise.de. You need to be one step ahead of the state-of-the-art. Well, offering on the one hand stable technologies to be competitive and adopt and improve existing products. On the other hand, pick up new trends." The existence of accurate content is of high importance and network members not value the quantity of posts rather their quality. Supporting the members in their content identification could be done by adding meta-data to the content such as tags or bookmarks (Maier and Thalmann, 2007). By making those tags visible to others with creating a user-generated informal taxonomy, the so called folksonomy (Noruzi, 2006), social bookmarking systems let individuals unnoticed discover what others are reading (Gray et al., 2011). From the network management side, organizations are already using several social media applications to manage both external and internal relationships (McAfee, 2009, Deans, 2011).

Employees rely on their professional networks, as SMEs usually do not have enough resources to provide all suitable contents. Consequently, SMEs expect such content services from their network, which is now confronted with the increased demand for providing high quality content services [N4-c]: "It is more and more challenging that the management has to offer a spectrum, that is simply too big for their capacities and people power." Besides having content collections including relevant content and push services provided by the networks, our interviewees point out how they are trying to reduce the content complexity and, therefore, refer to trusted information sources.

In this regard, social bookmarking tools allow people to classify, organize, and share content leading to a positive impact on the content quality (McLoughlin and Lee, 2007). Microblogs seem to be promising to enhance the outside-in IT capabilities as Razmerita et al. (2014), for example, concluded in a study that suggests microblogs are used by opinion leaders to increase their visibility. Hence, opinion leaders can use a microblogging service such as Twitter in our examined networks to pre-select potential knowledge, as well as support the other users by identifying content with online discussions and enabling the use of advanced networking functions (Razmerita et al., 2014). The importance of opinion leaders in networks for the knowledge identification capabilities has also been pointed out by one of our interviewees, as the broad domain knowledge of an opinion leader has been mentioned as crucial [N9-a]: "[The network manager] has notes that nobody knows of. Those are truly things he just knows from somewhere. He knows if another member has the right knowledge for a certain task. […] With that knowledge, he motivates others as they ask why he is aware of this fact, or they say with this person we want to work together in the future as well. He is really important." Thereby, it seems important that the opinion leader himself is a member of the network to increase the trust. Further, as a network member, the leader better understands the specific needs of the network and, thus, can better pre-select relevant knowledge.

However, simply collecting contents will not significantly impact the firm's ability to identify and recognize valuable knowledge (Roberts et al., 2012). If networks provide services for content filtering, adaption, search, and personalized content delivery, the challenge of identifying new knowledge could be reduced. Networks can use their good knowledge about the needs of their members during this process and localize the knowledge from outside. This localized knowledge is easier to find by employees and easier to process and thus facilitates their informal learning. The implemented services then help

organizations to acquire new knowledge from outside and thus enhance their outside-in capabilities and, finally, their ACAP.

5.2   IT Capabilities for Content Adaption

Our interviewees currently find it difficult to learn with contents which are not adapted to their context. First of all, it is difficult to access contents if they are not adapted to their device in use or are presented in an insufficient format. Secondly, if contents are less structured, it is difficult to extract the relevant content out of the mass. Thirdly, contents are difficult to process if they are written in a different domain language or in a different application context. Regarding content access, the lack of easily accessible and adaptable content hinders employees' ability to quickly process contents and to informally learn to find suitable solutions for their work problems (Thalmann, 2014). Hence, employees have to pre-structure and filter information first, as newly identified knowledge brought into the firm is in "raw"form, which makes it most likely not ready for immediate use by the firm (Roberts et al., 2012).

These efforts can be reduced if employees have easy access to related content in the right terminology. Consequently, contents need to be adapted beforehand and structured in a way that employees can easily access them. One interviewee highlighted the right format [N5-a]: "You can clearly say that all posts with a good mix of multimedial information such as word, pictures, video, and audio are the ones you can reuse the best. You could say, you need a good mix. It is not the video, the picture, or the figure alone. It is the combination of them. It has always been a combination of words, pictures, videos. Especially if you do not know the potential receiver."

Gaining a better understanding of how new external knowledge relates to already existing one inside an organization has already been identified as a crucial success factor for enhancing spanning IT capabilities (Roberts et al., 2012). Razmerita et al. (2014) argued for IT solutions that provide a collaborative environment to integrate new knowledge. Combining new and already existing content is one of the main drivers to adopt content and facilitate informal learning. Klamma et al. (2007) examined (group) blogs and wikis to point out the potential of IT in this regard and showed the potential for collaborative knowledge capturing, sharing, networking, and community building. Furthermore, wikis and group blogs can be effective collaborative knowledge capture systems that support learning communities in designing, creating, reviewing, commenting, modifying, and posting knowledge artefacts (Klamma et al., 2007). Other researchers argue for content communities in the context of collaboration, idea, and know-how accessing and processing (Kaplan and Haenlein, 2010, Angehrn et al., 2009) as you can gain support for gaining better knowledge of other team members (Razmerita et al., 2014).

Hence, if networks are able to offer such collaboration tools that enable their members to relate new external knowledge to existing knowledge of the network, it seems promising that the spanning IT capabilities of the network members will also be enhanced. In this regard, network members mentioned the importance of adapting and combining new knowledge with already existing knowledge. Here, networks could supply repositories that provide this needed storing capability. In our analysis, the need for support in adapting already identified contents to the user's needs became evident. Individuals require support while adapting content to their individual needs, as this is a non-trivial task.

If networks of organizations provide services for content adaption and preparation, the challenge of content processing can be reduced. Networks can use their good knowledge about the needs of their members to prepare contents in a way that members can easily process and absorb it. As employees' preferences, such as media preferences, content preferences, or preferences for didactical approaches are taken into account, their informal learning could be facilitated (Thalmann, 2014). IT services provided by the network then help organizations acquire new knowledge and relate new knowledge to their previous knowledge. Thus, networks could enhance the spanning IT capabilities of their members and, thus, possibly their ACAP.

5.3   IT Capabilities for Content Distribution

Our interviewees currently experience a difficulty in distributing contents suitable for informal learning. First, the selection of distribution channels is challenging. Second, the selection of the target group and the adaptation of contents for this target group was named. Third, the assessment of the impact and particularly the legal consequences is perceived as challenging.

Regarding the selection of distribution channels, one interviewee argued for focusing on social capabilities [N7-a]: "A lot of the content distribution happens informally via phone and eMail.[…]However, technology alone is not enough to deal with that. Personal contact is also very important." The potential of using other distribution channels with more social capabilities than eMail has been examined by McLoughlin and Lee (2007) as they point out the high potential of SSW by stating that content sharing is enabled through a wide range of software applications to foster the distribution of content within a network. Putting it into the light of informal learning, users with similar interests can identify and learn from each other through subscribing to the bookmarks and tags of others, and actively contribute to the ongoing growth and evolution of the "folksonomy" of (web-based) content (McLoughlin and Lee, 2007).

The decision about the right channel is not binary. Rather, a mix of communication channels is frequently needed to efficiently communicate, as our interviewees pointed out. Communication is seen as an important driver to foster content sharing in our networks. Jarrahi and Sawyer (2013) named those capabilities as network-driven resources, which support people in being confident that there is an expert around who can be reached for many work-related issues.

After identifying the target group, the right contents need to be selected. Thereby, the major challenge is to identify the preferences of the network members. Here, networks can use their strong domain knowledge to fulfill this task. Additionally, IT tools can seed as a supportive technology to identify the preferences of the target group, as the team members normally have to use a unique username to be represented in the system, thus making it relatively easy to track all of the content and objects uploaded, remixed, commented upon etc. by specific users (Elmer and Langlois, 2013).

Our interviewees pointed this out and highlighted that the right selection is important to avoid information overload. Besides the relevancy of content, the adaption of the content itself is seen as a success factor [N4-1]: "The content must fit to the target group."

Additionally, our interviewees highlighted possible solutions to assess the impact of spread content [N7-e]: "For us, it is a lot about hedging, because after a certain point it gets complicated regarding legal issues. That is why it is about trusting somebody in advance, and you stick to negotiated rules. But, if there is a conflict, it still can be complicated." Network managers need to support their members in order to assess the possible impact of content. One effect of this support is reducing uncertainty about the actions an individual might take, and hence, providing greater awareness amongst participants of each other's likely activities (Dourish and Bellotti, 1992).

Moderating and especially monitoring features fostered by social network tools enable team managers to monitor the progress of others, see what the users are talking about, monitor co-workers' activities, and show updates on content (Koch et al., 2013). Due to their revision mechanisms, wikis, for example, allow the monitoring of the edited section changes by team leaders (Razmerita et al., 2014). Similar features have been suggested by the interviewees in order to assess the impact of the spread content [N5-f]: "I think it is important to have the network moderated. That is very important […]. Somebody with a good domain knowledge needs to have an eye on the network. Otherwise, it can turn out very bad; people could get hurt with mean posts as I have already seen such cases." As it turned out, sharing content is done in our networks primarily via eMail, and network members tend to seek other ways to communicate. This observation has also been found in the literature, where it is stated that eMail is still considered as the single most common social technology in organizations (Dabbish et al., 2005). Furthermore, several researchers argue that independently from the eMail usage, SSW could provide crucial advantages for certain knowledge sharing practices (e.g. McAfee, 2009, Zhao and Rosson, 2009). Thus,

tools that enhance the efficiency of information exchange across organizational units can support the application of new knowledge (Zahra and George, 2002) by enhancing their distribution level.

If networks provide IT services for content sharing and personalized content distribution, the challenge of distributing content can be reduced. As employees tend to seek trustful sources, the network needs to provide mechanisms to convince the members that they are offered trustworthy and relevant contents. Furthermore, the network management needs to be aware of possible legal and social consequences of spread information. The implemented services, then, could help organizations to share new knowledge within their network and thus help to enhance their inside-out capabilities and, finally, their ACAP.

6   Conclusion and Outlook

We identified current challenges of informal learning occurring in networks and discussed the potential of IT support to enhance the network members' IT capabilities. For this purpose, we conducted 53 interviews in ten SME networks, in which we identified three major challenges. Figure 1 visualizes our findings and the role of the IT capabilities offered by networks. Thus, the reducing effects of the IT capabilities on the identified challenges, which then leads to a transitive relation between IT capabilities, challenges, and ACAP become visible.

First, the network members view their active search for learning contents, as well as keeping up-to-date by receiving contents unintentionally, as challenging. Thereby, the interviewees perceive the crowd of information channels and the vast amount of contents as particularly overwhelming, with negative effects on the organizational knowledge identification capabilities. Second, interviewees perceive the processing of contents, which are not or only insufficiently adapted to the workers needs in informal learning situations at the workplace under high time pressure, as challenging. This leads to negative effects on the organizational knowledge assimilation capabilities. This is particularly true if contents are presented in a format difficult to access, are less structured, or are embedded in a different work context, harming the extraction of relevant information. Third, members of the network management perceive countermeasures as challenging, particularly while selecting suitable distribution channels, identifying the target group, adapting the contents, as well as dealing with possible (legal) consequences of contents suitable for informal learning at the workplace, with negative effects on the organizational knowledge assimilation capabilities. We further state that the three identified IT capabilities provided by networks can help SMEs to cope with these challenges and thus possibly reduce their negative effect on ACAP.
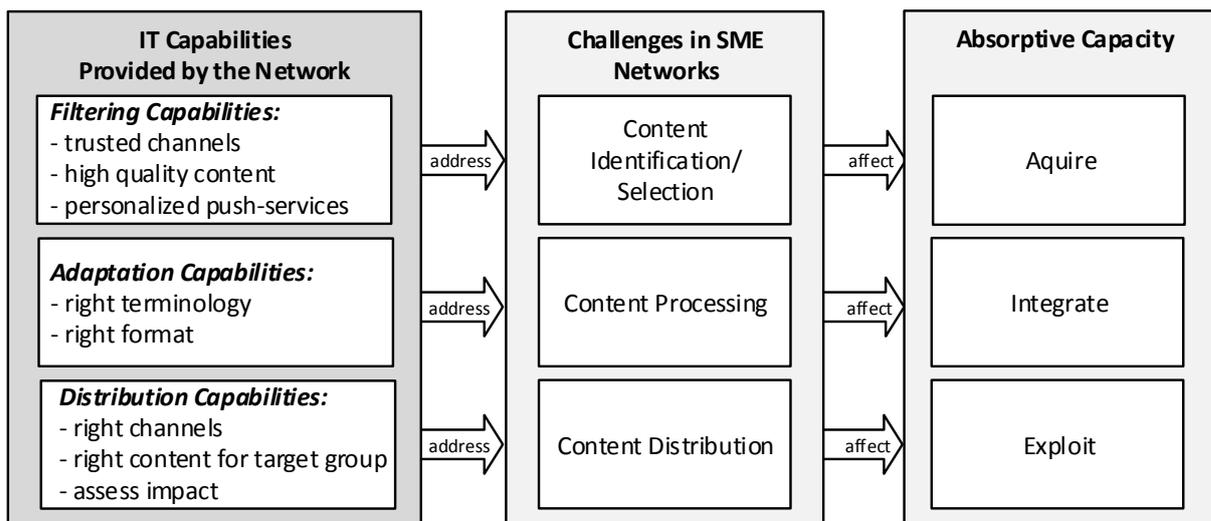

Figure 1.   Transitive relationship between IT Capabilities and ACAP

Thus, we discussed possible solutions to the identified challenges mentioned by our interviewees and proposed in the literature. Supporting the members in their content identification could be done by adding meta-data to the content such as tags or bookmarks (Maier and Thalmann, 2007), which would mediate the current negative impact of this challenge on ACAP. To do so, the network members tend to rely on the network management to provide the right tools for this task. Regarding content processing, Razmerita et al. (2014) argued for IT solutions that provide a collaborative environment to integrate new pieces of knowledge and the interviewees for a good mix of content formats in order to adopt it to their specific needs and context. Hence, this could reduce the drawbacks this challenge has on knowledge assimilation within ACAP. Lastly, having IT solutions combined with social capabilities are mentioned by our interviewees as very important to gain support during the content distribution of the network management, in order to reduce the challenge of content distribution and its effects on the knowledge utilization within ACAP. Jarrahi and Sawyer (2013) named those capabilities as network-driven resources, which support people's confidence that there is an expert around who can be reached for many work-related issues. Thus, networks have the resources to provide organizations with the needed IT capabilities even though they need to be customized by the organization.

In terms of the generalizability, we want to mention that we do not claim generalization as we have a small sample. Nevertheless, we selected ten networks with overlapping perspectives between them, showing the broad relevance. Another limitation is that we conducted the interviews in German and translated them into English for citing original voice. We minimized the translation bias as two researchers double-checked the translations. Regarding the selection of informants by key informants, we argue for our approach as they seem to have the best knowledge in their networks (Abdolmohammadi and Shanteau, 1992).

Our findings offer an initial glance at challenges for informal learning in SME networks, as well as the rising opportunities for IT support provided by the network. In future research, our research project LEARNING LAYERS develops IT tools for supporting SME networks to enhance the identified IT capabilities. Further, an operationalization of our identified network IT capabilities visualized in Figure 1 is planned to evaluate the effects of our developed IT tools. As already stated above, Figure 1 can be seen as a general approach for IT capabilities, which will highly likely need to be customized by organizations. Therefore, a quantitative approach could give additional insights.

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