Trust Fostering Competencies in Asynchronous Digital Communication

Jens Kanthak and Guido Hertel

Abstract The development of digital communication media fosters the employment of geographically dispersed teams by companies around the globe. Although virtual teams are widely employed today, only little is known about the required competencies of team members that arise from the challenges of digital communication and geographical dispersion. Especially, teams working across several time zones face several demands. According to Media Synchronicity Theory, the two main challenges that rise from asynchronous communication are coordination problems and low (perceived) interactivity. These challenges might negatively influence trust and performance of virtual teams. In this chapter, we develop a competency model for asynchronous communication in working teams. According to this model, central competencies to overcome the negative effects of asynchronous communication are extraversion, conscientiousness, proactivity, computer-mediated communication skills, self-management skills, and prospective memory. At the end of this chapter we discuss different research approaches in the field of virtual team competencies.

Keywords Asynchronous communication • Competency model • Trust • Virtual teams

1 Virtual Teams

The rapid development of digital media and the possibility to digitalize data have significantly influenced the way people live and work together. While in 2000, about 75 % of the data we used were in analogous form such as print media, by 2007 about 90 % of the data were digitalized (Hilbert and López 2011). The advantages of digitalized data are manifold. Digitalized data are easy to store. The data of a whole library can be fit on one modern hard drive. Digitalized data are quite easy to manage as one can use search programs to immediately find the required information. But probably the most important feature of digitalized data is the possibility to copy and share your data with other people around the globe within seconds. For

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B. Blöbaum (ed.), *Trust and Communication in a Digitized World*, Progress in IS,
DOI 10.1007/978-3-319-28059-2_10

business companies this has several implications. Companies are able to quickly share information between their various company sites, which significantly facilitates the central coordination of the company. Therefore, digitalization can be viewed as an important driver of the globalization and the development of globally acting companies. The requirements of a geographically dispersed company and the possibilities granted by digital data sharing and digital communication media brought forth a variety of new cooperation forms that can be subsumed as "virtual teams." In contrast to classical, co-located face-to-face teams "(v)irtual teams are groups of geographically and/or organizationally dispersed coworkers that are assembled using a combination of telecommunications and information technologies to accomplish an organizational task" (Townsend et al. 1998). Virtual teams are not a homogeneous group of teams but may vary widely on several dimensions. Therefore, it is more precise to consider the degree of these dimensions of virtuality than to make a clear distinction between virtual and non-virtual teams (Hertel et al. 2005). For example, the research department of Microsoft Corporation has 11 research labs around the globe (Microsoft Research 2015). Within such a lab, team members can meet face-to-face to quickly clarify questions and coordinate their work by just walking down the hall. They are likely to meet on informal occasions like lunch breaks and become easily acquainted with each other. In contrast, when team members reside in different research labs, chances to meet face-to-face are reduced significantly. If the two research labs are in the same city or time zone, team members might conference via telephone and arrange weekly face-to-face meetings. However, if the research labs are in different time zones, face-to-face meetings are rather difficult, and even telephone use might be reduced. For instance, if a team member in Redmond, WA works together with a team member in Cambridge, UK, the time delay amounts to 7 h. When a team member in Redmond starts her computer in the morning, her colleague in England is almost on his way home. Thus, spontaneous communication is limited and team members have to arrange for a phone call or a video conference. In the meantime, they have to rely on asynchronous media such as e-mail or voice message.

The extent of communication media reliance in comparison to face-to-face interaction can be considered as a dimension of virtuality. According to Kirkman and Mathieu (2005), asynchronicity has two implications for the virtuality of the cooperation. The first implication is the time delay of the communication. Team members working together across time zones are mostly restricted to using asynchronous communication media. Thus, there is a time lag in the communication that can negatively influence the communication and team coordination as arising questions might have to wait until the next work day. However, Dennis et al. (2008) argue that asynchronous communication is not always inferior to synchronous communication. Instead, the match between communication task and synchronicity is of importance. A synchronous medium is advantageous when a task requires fast feedback and exchange of arguments. If, however, a task requires the reliable conveyance of specific and detailed information, asynchronous media might be the better choice as the sender can take her time to craft the message, and the receiver can save and reprocess the message. Teams within the

same time zone can choose between synchronous and asynchronous communication media depending on the current goals and communication tasks. Teams working across time zones more often have to rely on asynchronous media regardless of their goals and communication tasks. It is therefore important to ask how coordination can be improved in asynchronously working teams.

From the limited choice of communication media that accompanies asynchronous cooperation arises the second implication for team virtuality. According to Kirkman and Mathieu (2005), asynchronous teams often have to rely on communication media low in information value. Information value is a concept that describes the ability of a communication medium to convey information that is needed for a certain task. For example, when the discussion of controversial issues is the task, face-to-face conversations have a higher information value than e-mails as they are able to convey nonverbal information via intonation and gestures that aid in resolving ambiguity. But, when writing software is the task, an e-mail with an attached program code might be of higher information value than the face-to-face conversation as a written code is easier to process than verbal instructions. Thus, geographical dispersion is not always a disadvantage for asynchronous teams with respect to information value of communication as long as the available communication media fit the task. As teamwork often includes a variety of different tasks, different communication media might provide the best information value. Again, while co-located teams or teams within a single time zone can choose from a wide variety of communication media, asynchronous working teams are limited to asynchronous media, which are sometimes a suboptimal choice regarding the informational value.

In this chapter we will discuss how virtual cooperation influences trust as an important driver for cooperative behavior in virtual teams. We will particularly examine the effect of asynchronous cooperation as it brings special challenges to the cooperation. After describing a model of asynchronous communication, we will deduce its implications for the building of trust in virtual teams. Based on these considerations we will develop a competency model for virtual teams that should help to overcome the main challenges of asynchronous communication. At the end of this chapter, we will depict a research agenda that might help to get empirical access to the field of virtual teamwork competencies.

2 Trust in Virtual Teams

In this section, we will give a short overview of the importance of trust in both face-to-face and virtual teams. We will further discuss how the virtuality of cooperation can negatively influence the formation of trust in virtual teams.

Within the literature on traditional face-to-face teams, trust is regarded as a central emergent state (e.g., Costa 2003). Mayer et al. define trust as the willingness of a trustor to be vulnerable to the actions of a trustee, expecting the trustee to perform a particular action. This is an important precondition for cooperation and

coordination in teams. Especially, when the tasks performed by individual team members are highly interdependent, team members are vulnerable to the actions of their fellow team members. If one team member misses a deadline and does not deliver results that are needed by other team members, the whole team process is slowed down. With low levels of trust, team members would not voluntarily engage in task sharing, and cooperation benefits would be difficult to achieve. Even if team members engage in cooperation, they will probably use additional time to monitor their colleagues' progress. The positive relation between trust and team performance has been shown in various studies (for a meta-analytical review see Breuer et al. 2015). It is important to note that the relation between trust and performance is not unidirectional. High team performance might also have positive effects on team trust and the appraisal of one's fellow team members. Besides the influence of trust on team performance, trust is related to various other positive outcomes in team contexts such as team cohesiveness, affective commitment, extra-role behavior, and a lower rate of counterproductive behavior (Mach et al. 2010; Colquitt et al. 2007). While there is quite a substantial amount of literature on the importance of trust in face-to-face teams, the importance of trust in virtual teams has been given less attention. Initial studies suggest that trust is an important driver for team cohesiveness (Jarvenpaa et al. 2004) and performance in virtual teams (Breuer et al. 2015). However, the structures of virtual teams often lead to a slowed development of trust. Due to the reduced contact in virtual teams it is more difficult for a team member to assess features of their colleagues that refer to trustworthiness (ability, benevolence, integrity; cf. Mayer et al. 1995). Members of face-to-face teams often share their coffee breaks and have the chance to learn about each other's interests and values in an informal way. Therefore, they should be able to estimate their colleagues' integrity and benevolence. In addition, they are more likely to know about the success or failure of their colleagues' tasks, and should therefore be able to estimate their colleagues' task-related abilities. Within virtual teams, informal communication is usually reduced and it takes team members longer to get to know each other. Hence, team members have less information about the trustworthiness of their colleagues and it should take longer to develop the same levels of trust as in face-to-face teams.

3 Asynchronous Communication

Asynchronous communication brings additional challenges to virtual teams, especially regarding the formation of trust. Therefore, we include the description of a theory of asynchronous communication and its implications for virtual cooperation in this section.

As mentioned earlier, working in different time zones constrains the choice of communication media a team can use and therefore negatively influences the performance on certain tasks. Daft and Lengel (1984) introduced the concept of "media richness" to rank communication media regarding their ability to convey a

certain amount of information in a certain time. The crucial factors of media richness are a communication medium's ability to handle multiple information cues, enable rapid feedback, build a personal focus, and use natural language. In this logic, face-to-face communication is the richest medium while written documents are the leanest media. The intention of media richness theory was to evaluate communication media within organizations regarding their appropriateness for a specific communication task. While unambiguous information can be either conveyed via a lean or a rich medium, equivocal messages require a high amount of media richness. It is important to note that the richness of a medium is a constant in media richness theory. Only the requirements of a communication task may change while the richness of a medium has to match or exceed the requirements of a message's equivocality. Therefore, regarding the success of a communication task it would always be an appropriate choice to use rich media such as face-to-face communication. But as rich media often only reach a few addressees, it is sometimes more efficient to use a leaner communication medium, as long as it is able to resolve the equivocality of the message. In asynchronous cooperation, team members are restricted to relatively lean communication media. Thus, media richness theory would predict a suboptimal fit for the conveyance of messages high in equivocality. The consequences of this mismatch could be prolonged time costs for additional explanations or, in the worst case, misunderstandings as a result of unresolved equivocality.

Dennis and Valacich (1999) and Dennis et al. (2008) advanced the idea of media richness and introduced the concept of media synchronicity. The premise of this theory is that media vary in their support of synchronicity in communication, which is defined as shared focus. Further, there are two basic categories of communication tasks that require different levels of synchronicity. Thus, for effective communication the level of synchronicity a medium supports has to match the requirements of the communication task. Media synchronicity theory identifies five characteristics of communication media that define their support of synchronicity: transmission velocity (time delay between sending and receiving a message), symbol sets (number and richness of media channels), parallelism (possibility to have several conversations at a time), rehearsability (possibility to take some time to craft a message), and reprocessability (possibility to reread or rehear a message). A high transmission velocity and the conveyance of several symbol sets enhance the synchronicity of a medium. Parallelism, rehearsability, and reprocessability are features of rather asynchronous media. A high transmission velocity enables team members to rapidly exchange ideas and arguments and equivocality can be resolved quickly. The more symbol sets such as language, gestures, and voice a medium transmits, the easier it is to avoid misunderstandings because messages can be sent on multiple channels. For example, in face-to-face interaction, an ironic statement can be marked by a change in voice or a hand sign for quotation marks. Even if the recipient does not understand the irony, the sender has the chance to explain the situation if recognizing a puzzled look of the conversation partner. Using a text based medium such as e-mail, an ironic statement might be misinterpreted more easily and it is less likely that the misunderstanding will be resolved.

Parallelism describes the number of conversations that can be held simultaneously via a medium. When using synchronous media such as telephone or face-to-face interaction, people can only have one conversation at a time. Even though the number of participants is theoretically not limited, only one participant at a time can effectively convey his/her message because the channel for the other participants is blocked during that time. In contrast, with e-mails people can engage in multiple conversations at a time, using the time delay in a specific single conversation for other conversations. Also, more than one person at a time can produce a message and send it via the medium without blocking it for the other users.

Rehearsability is the possibility for a sender to fine tune or to craft a message before sending it. In synchronous communication, a sender does not have much time to think about the exact wording of a message as recipients are waiting for a quick response whereas in asynchronous communication a sender can take his time to rewrite a message or to adjust the wording to the recipient. Research has shown that this additional time is particularly valued by introverted (as compared to extraverted) persons and by persons high in social anxiety, suggesting that asynchronous communications provide additional leeway and protection for the communicating parties (Hertel et al. 2008). On the side of the recipient, asynchronous communication offers the advantage that a message is saved for reprocessing. Whether it is a voice memo or an e-mail the recipient can rehear or review the message several times until he has fully decoded and understood the message. Additionally, while the content of a synchronous conversation is often prone to memory errors, the content of an asynchronous conversation is protocolled for later review.

Concerning conversation tasks, Media Synchronicity Theory discriminates between conveyance processes and convergence processes. Conveyance describes the one-way communication of new information from a sender to one or more recipients. Conveyance of information enables the recipients to create or revise their mental models of a situation. Convergence is the discussion of preprocessed information and the matching of individual mental models of all participants of the conversation. As convergence processes involve the discussion of information, they require a high transmission velocity. Hence, synchronous communication media are better suited for a communication task including a high level of convergence than asynchronous communication media. On the other hand, conveyance processes afford exact information processing on the side of the receivers. The possibility to craft a message to enhance its comprehensibleness and the possibility for the receivers to reprocess a message and take their time to decode it are beneficial for conveyance processes. Hence, asynchronous as compared to synchronous communication media might be better suited for communication tasks including high levels of conveyance.

As mentioned earlier, members of virtual teams often do not have the choice to use synchronous media, especially when they are dispersed over different time zones. Thus, communication media cannot always be matched perfectly to their communication tasks, making the coordination within the team more difficult. For instance, it is more difficult for members of asynchronously communicating teams

to discuss and build a shared schedule as it is harder to keep track of each member's progress. Especially, when the team task is highly interdependent, asynchronous teams might experience loss of efficiency if they cannot manage to coordinate their work. Poor coordination will not only directly affect the team's performance but will also negatively influence the trust within the team. If coordination problems occur, team members are likely to attribute them to stable internal factors of their colleagues (Weiner 2001). They will assume that their colleagues either lack the ability to perform their task in time or that they are not willing to do so and therefore lack integrity.

Another challenge for the development of trust in asynchronously communicating teams is the low perceived interactivity between the team members (Burgoon et al. 2010). As most people only rarely engage in informal chatting in asynchronous communication, team members are less likely to get to know each other and experience similarities between them and their colleagues. Thus, they are less likely to assume that their colleagues are benevolent toward them.

Taken together, coordination difficulties and low experienced interactivity as the two main challenges of asynchronous communication should complicate the development of trust in asynchronously communicating teams.

4 Competencies in Virtual Teams

In this section, we will discuss competencies that help to overcome the challenges of virtual cooperation. We will start by giving a short review of the literature on competencies in virtual teams. Based on this review, we propose a set of competencies that should be particularly crucial for building and maintaining trust in asynchronous virtual cooperation.

4.1 Literature on Virtual Team Competencies

The growing prevalence of virtual teams has triggered a great deal of research on the preconditions of effective collaboration in geographically dispersed groups. However, this research so far has focused on communication technologies, task fit, and interpersonal processes while the required competencies at the person level have been rather neglected (Krumm and Hertel 2013). This is quite surprising as knowledge of competency requirements is a necessary condition for efficient staffing and development of virtual teams.

Arguably, considering competencies for virtual teamwork might start with skills that are necessary for face-to-face teamwork (Hertel et al. 2006). Stevens and Campion (1994) proposed a taxonomy for traditional teamwork competencies, including taskwork and teamwork related skills. Taskwork skills are similar to skills required when persons work alone. They include the technical skills that are

necessary to perform a given task. For example, a software engineer needs to know the programming language and an accountant needs to know business sciences, regardless of working alone or within a team. More specifically for working in groups, teamwork skills include interpersonal skills such as conflict resolution skills, collaborative problem solving skills, and communication skills, as well as self-management skills such as goal setting and performance management skills, and planning and task coordination skills.

However, in addition to taskwork and teamwork skills, virtual teamwork might also require competencies as a consequence of the specific working conditions (Hertel et al. 2006). Research on such telecooperation related skills is relatively rare. The existing literature on competencies in virtual teams mainly comprises case studies that derive competency requirements based on the comparison of successful and unsuccessful virtual teams, or of theoretical analyses that derive competencies from the additional demands in virtual as compared to face-to-face teams. For instance, Shin (2004) argues that media literacy and virtual communication skills are important because members of virtual teams often depend on digitized and asynchronous communication for their team coordination. Moreover, as trust is harder to establish in virtual teams, a high trustworthiness on the one hand and a high propensity to trust on the other hand should foster the formation of trust. Since it is often difficult for a virtual team to track the progress of each team member (Harvey et al. 2004) in order to adjust the allocations of responsibilities within the team, it seems important that team members are capable of organizing and managing their own work. Hence, self-management skills and a high degree of conscientiousness should be advantageous. Members of virtual teams are often confronted with different cultural backgrounds (Ellingson and Wiethoff 2002). Even if a team does not work across geographical borders, team members can be confronted with different norms and rules based on the different sites of their organization. Therefore, openness for new experience, the ability to adapt to new circumstances, and tolerance toward ambiguity should be helpful in virtual cooperation. Although plausible assumptions about relevant competencies can be derived from the demands of virtual teamwork, empirical studies to test these assumptions are needed.

As perhaps the first quantitative study, Hertel et al. (2006) developed and tested a model of virtual teamwork competencies comprising the three factors of taskwork related competencies, teamwork related competencies, and telecooperation related competencies. The latter included competencies such as persistence, willingness to learn, creativity, independence, interpersonal trust, and intercultural skills. Based on this model the authors developed a web based selection tool for members of virtual teams (Virtual Teamwork Competency Inventory, VTCI), and validated this instrument using a sample of 258 members of organizational virtual teams. Participants completed the VTCI, and both individual and team performance were rated by the team managers. The results for the individual performance ratings confirmed only taskwork and teamwork related competencies as significant predictors. However, at the team level the selected telecooperation related competencies explained significant parts of the team performance, in particular cooperativeness and creativity.

Conscientiousness and independence had at least a marginally significant influence on performance.

In addition to the lack of empirical work, the current literature on virtual team competencies is rather unsystematic so far. Krumm and Hertel (2013) suggested linking the research on virtual team competencies to established general work competency taxonomies. In an empirical study Krumm et al. (2015) fitted 60 competencies from literature research on virtual teams to the eight dimensions of the Great Eight Model (Bartram 2005). This theoretical model was validated with 175 members of virtual teams and 205 members of traditional face-to-face teams, respectively, who were asked to assess the importance of each competency for the success of their team (either traditional or virtual). The results showed that the Great Eight dimensions of Leading & Deciding and Analyzing & Interpreting were considered to be more important in virtual than in traditional team contexts. Thus, this study provides an initial framework for structuring competencies relevant for virtual team members.

The research on competencies so far mainly focuses on performance as the primary outcome measure, neglecting socio-emotional outcomes such as trust. However, socio-emotional outcomes, and trust in particular, might provide more process-oriented information, enabling both a more thorough understanding of team processes as well as a more timely intervention (e.g., by team managers) when things go wrong. An initial study on competencies in virtual teams that also incorporates trust has been conducted by Cogliser et al. (2012). They examined the Big Five personality dimensions as potential predictors of performance, emergent leadership, and perception of trustworthiness in virtual teams. The results showed positive effects for the Big Five dimensions of Agreeableness, Extraversion, and Stability as predictors of perceived trustworthiness of team leaders. Although the authors did not include a direct measure for trust, trustworthiness can be regarded as an important antecedent of trust. Therefore, this study shows that personality can have a significant influence on the development of trust in virtual teams.

4.2 A Model of Competencies in Asynchronous Virtual Teams

Research on competencies in virtual teams is still in its early stages and empirical studies to test theoretical claims are scarce. This is even more the case for specific dimensions of virtuality, such as asynchronicity that have a strong impact on the demands of the teamwork. Despite the importance of trust for team processes like cohesion, satisfaction and performance, trust has so far been neglected as an outcome measure in empirical research. Therefore, we developed a model of competencies that should foster trust in teams that have to mainly rely on asynchronous communication media. We will describe this model in this section.

The two main challenges that asynchronous communication brings to virtual teams are hindered coordination and the feeling of reduced interactivity. Hindered coordination leads to negative attribution regarding colleagues' abilities and integrity. The reduced interactivity hinders the team members from getting to know each other. Hence, it is less likely that team members perceive their colleagues to be benevolent. Taken together, we assume that the evaluation of trustworthiness is lower in asynchronous contexts, which in turn reduces trust.

For our model we tried to identify competencies that help members of asynchronous virtual teams increase the interactivity of the teamwork and to improve the coordination of the team. When the perceived interactivity in a team is low, the probability that team members engage in conversations is also low. An extraverted team member would be most likely to start a conversation, engage in informal chats, and share private information. This action could trigger the colleagues to also engage in conversations and thus increase the level of interactivity within the team. Additionally, when the exchange between team members is relatively low, it is necessary for team members to be proactive, in order to share and ask for information. Team members who are familiar with the use of asynchronous media perceive them as richer than team members unfamiliar with these media. Therefore, team members who are familiar with asynchronous media should perceive more interactivity in their team and be more likely to engage in conversations. Further, they know how to adapt their message to a particular receiver and hence foster mutual understanding. Thus, the competencies of extraversion, proactivity and knowledge in computer mediated communication (CMC) should help team members to actively engage in conversations and increase the perceived interactivity.

Hindered coordination in asynchronous teams prevents teams from frequently attuning the responsibilities and tasks assigned to each team member according to the actual necessities of the team. Therefore, it is important that team members fulfill their allocated tasks within the deadlines, as the delay of one team member could block the whole team if their tasks are strongly interdependent. For this purpose, team members need self-managing skills that help them to estimate their workload when task allocation is discussed and to plan and execute their tasks within the deadlines. In addition to the ability to organize their own workload and to perform within agreed upon time limits, team members also need to be willing to do so. Conscientious team members work thoroughly on allocated tasks and try hard to fulfill them on time. In order to directly improve the coordination within the team, it would be essential to improve team members' knowledge about their colleagues' progress. Thus, proactive gathering and sharing of information would be productive. Asynchronous communication features the possibility to have more than one conversation at once. Some of these conversations are more important at a given time than other conversations. When a team member fails to deliver information that is needed by a colleague to fulfill a task, coordination losses occur. It is therefore crucial that team members keep track of their conversations and answer at the right time. The knowledge about the used medium helps to organize one's conversations and to address the right recipients. Additionally, team members need to remember when they have to answer a message or deliver a certain piece of

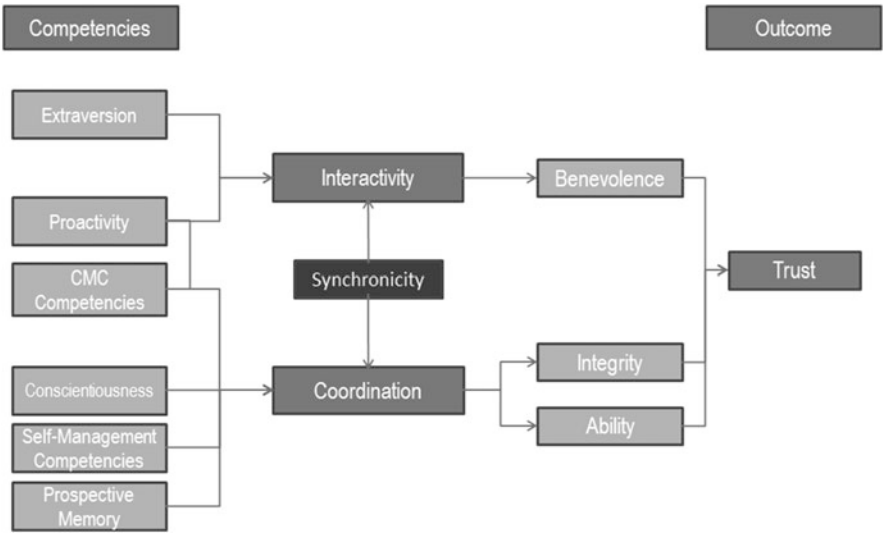

Fig. 1 A model of competencies in asynchronous virtual teams

information. In summary, self-management competencies, conscientiousness, proactivity, CMC competencies, and prospective memory can help to make up for coordination difficulties in asynchronous cooperation. A graphical overview of the model is provided in Fig. 1.

5 Research Approaches on Competencies in Virtual Teams

Virtual teams are widely established despite a lack of empirical knowledge about competency requirements. In order to develop a substantial basis for personnel selection and development of virtual teams, empirical research is necessary. In this section we will discuss some research approaches that could help to test theoretical claims and further develop competency models for virtual teams.

The goal of research should be the development of a taxonomy of competencies that are important for members of virtual teams. As Hertel et al. (2006) have argued, there might be a substantial overlap between competencies necessary for virtual and for face-to-face teamwork. In order to identify the competencies that are specific for virtual teamwork, it is necessary to include face-to-face teams as baseline measures into research designs (Krumm and Hertel 2013). Moreover, as virtual teams are not a homogeneous group of teams but might vary in group composition and dimensions of virtuality, it is necessary to further investigate the isolated influence of these traits on competency requirements.

Since a profound database from systematic empirical research is still lacking, pilot studies with experienced members and managers of virtual teams might

provide initial insights into the relative importance of competencies in order to develop a taxonomy and reduce the amount of possible competencies by finding higher order factors (e.g., Krumm et al. 2015, as an initial example for this approach).

In a next step, the actual relevance of the possible competencies might be tested in correlative field studies with outcome measures such as team performance and team trust. While such field studies might show the practical relevance of certain competencies, it is difficult to explain under which circumstances a certain competency becomes important as field studies lack the possibility to selectively manipulate the composition of the teams or the dimensions of virtuality.

Therefore, after identifying beneficial competencies via field studies, their effect needs to be replicated in controlled experimental studies. By selectively manipulating single dimensions of virtuality or aspects of team composition, experimental studies allow for investigating the isolated influence of these traits. However, it should be noted that such experimental studies need longitudinal designs to simulate team members' asynchronous coordination of subtasks as one main challenge. Additionally, outcome measures such as trust need interaction and some time to develop. Therefore, experimental studies require a complex task with sufficient interdependency of the team members to simulate a virtual team setting.

The overarching question, "Which competencies are needed in virtual teams?" is quite complex. The answer is dependent on team composition and the communication media the team uses. Additionally, some competencies that are needed for face-to-face teamwork might also be beneficial. In this chapter, we have given an example of a model development and discussed a possible research agenda that can help to add another piece to this puzzle. In order to achieve a final answer to the question, more theoretical framework that considers the dimensions of virtuality and, most of all, more empirical research is needed. This will lead to practical implementations that might help to improve the success of virtual teams via more efficient team staffing and development.

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