

## Appendices

### Appendix A. Description of Articles Included in Review

Authors	Year	Journal discipline	Type of trust	Study Design	Antecedents of trust	Outcomes of trust	Moderators of trust
Al-Ani, Bietz, Wang, Trainer, Koehne, Marczak, Redmiles, & Prikladnicki	(2013)	3	3	Qualitative	Open communication (+), Politeness (+), Shared goals (+), Shared Morality (+), Shared passion (+), Org Structure & Practices (+), Role Understanding (+)		
Al-Ani, Marczak, Prikladnicki, & Redmiles	(2013)	2	2	Qualitative	Team Size (-), Diversity (-), Leadership (+), Challenging Project (+)		
Al-Ani, Marczak, Redmiles, & Prikladnicki	(2014)	3	1,3	Qualitative	Technologies (Software, office technologies, organizational structures) (+), Visual technologies (+), Prior artifacts (+)		
Al-Ani & Redmiles	(2009a)	2	4	Qualitative	Team Size (-), Diversity (-), Challenging Project (-), Leadership (+), Time (+)		
Al-Ani & Redmiles	(2009b)	2	1, 2, 4	Qualitative	Team Size (-), Team Diversity (-), Leadership (+), Coordination Technologies (-), Project Innovation (-), Time (+)		

Al-Ani, Wilensky, Redmiles, & Simmons	(2011)	2	4	Qualitative		Knowledge Seeking (+), Knowledge Acceptance (+)	
Altschuller & Benbunan-Fich	(2010)	1	2	Experiment	Self-disclosure (+), Positive Impression Formation(+), Self-awareness (+), Perceived virtual co-presence (+)	Performance (+)	
Altschuller & Benbunan-Fich	(2013)	3	1	Experiment	Electronic Portrayal (+)		Communication and Virtual Co-presence moderates how electronic portrayal affects trust
Aubert & Kelsey	(2003)	5	4	Survey	Ability (+), Benevolence (+), Integrity (+)	Performance (+)	
Baskerville & Nandhakumar	(2007)	1	1,4	Qualitative	Individuals Interaction (+)	Team Effectiveness (+)	
Beranek	(2005)	2	2	Experiment	Relationship Skill Training (+), Trust Training (+)	Cohesiveness (+)	
Bierly, Stark, & Kessler	(2009)	5	2,3	Survey	Process Conflict (-), Relationship Conflict (-), Familiarity (+), Goal Clarity (+), Training (+)	Cooperation (+)	Virtuality moderates both antecedents of trust & trust, cooperation
Bosch-Sijtsema	(2007)	5	1	Theoretical	Expectation conflicts (-)		Virtuality moderates relationship between trust & effectiveness
Brahm & Kunze	(2012)	4	2	Survey	Team Goal Setting (+)	Team Cohesion (+), Team Performance (+)	Trust climate moderates goal setting and cohesion
Breu & Hemingway	(2004)	3	2	Qualitative		Virtualization (+)	

Brown, Poole & Rodgers	(2004)	3	5	Theoretical	Circumplex (+)	Collaboration (+)
Chang, Chuang, & Chao	(2011)	5	2	Qualitative	Cultural Adaptation (+)	Performance (+)
Chang, Hung, & Hsieh	(2014)	5	4	Mixed Methods	Cultural Adaptation (+)	team performance (+)
Cheng, Macaulay, & Zarifis	(2013)	3	3	Qualitative		Collaboration (+)
Cheng, Nolan, & Macaulay	(2013)	3	3	Qualitative		Collaboration (+)
Collins & Chou	(2013)	5	4, 6	Quasi-Exp		Satisfaction (+), Team Effectiveness (+)
Coppola, Hiltz, & Rotter	(2004)	1	1	Qualitative	Early Communication (+), Positive Expectations (+), Task-related communication (+), Predictable Communication (+)	Performance (+)
Corbitt, Gardiner, & Wright	(2004)	2	3	Experiment	Positive Team Dynamics (+)	Team Performance (+)
Crisp & Jarvenpaa	(2013)	4	1	Quasi-Exp		Team Performance (+)
Crisp & Jarvenpaa	(2013)	3	1	Quasi-Exp		Performance (+), Normative actions (studied as mediator)
Curseu, Schalk, & Wessel	(2008)	4	3	Theoretical	Virtual Teams (-), Communication Technologies(+), Informal Communication (+),	
de Laat	(2005)	3	4, 6	Theoretical	Virtual Teams (-), Social Cues (+), Reputation (+)	

DeRosa, Hantula, Kock, & D'Arcy	(2004)	5	1	Theoretical	FTF interaction (+), Appropriate Emotion (+), Reciprocity (+), Disclosure (+), Diversity (-)	Team Performance (+), Satisfaction (+), Turnover (+), Absenteeism (+)
Dorairaj & Noble	(2013)	4	2	Qualitative	Impersonal Communication (+), Evidence of Expertise (+), FTF Meetings (+), Feedback (+)	
Dorairaj, Noble, & Malik	(2012)	1	4	Qualitative	Vulnerability (-), Team Cohesion (+), FTF Communication (+), Cultural Understanding (+)	Commitment (+), Collaboration (+), Performance (+)
Edwards & Sridhar	(2005)	3	2	Experiment		Learning Effectiveness (+), Quality of Project (+), Team member Satisfaction (+)
El Khatib, Trang, Reimers, & Kolbe	(2013)	3	2, 6	Survey		Individual motivation (+), Team success (+)
Eom	(2009)	5	4	Theoretical	Transformational Leadership (+), Transactional Leadership (+), Individualistic Cultural Background (+), Communication (+)	Cultural background moderates leadership and trust
Erez, Lisak, Harush, Glikson, Nouri, & Shokef	(2013)	3	2	Survey		Cultural Intelligence (+), Global Identity (+) Trust moderates the impact of the project on developing global identity
Fuller, Marett, & Twitchell	(2012)	1	2	Experiment	Deception (-)	

Furumo & Pearson	(2006)	2	2	Experiment	Virtuality (-), Task Importance (-)	Task type moderates task importance and trust & technology moderates virtuality and trust
Furumo & Pearson	(2007)	2	3	Quasi-Exp	Gender (+)	
Gaan	(2012)	4	1,3,4	Qualitative	Communication Mechanisms (+); Misuse of Communication Technologies (-); Demographic Diversity (-), Prior Member Experience (+), Prior Success (+)	Morale (+), Overcoming Technology Failure (+)
Gao, Guo, & Chen	(2014)	5	2	Survey		Team performance (+)
Germain & McGuire	(2014)	5	1	Theoretical	Culture differences (-), Lack of leadership (-), Lack of social presence (-), Control structure (-), conflicting loyalties (-), Complex technical interface (-), Experience (-), synchronicity (-), risk propensity (-), fear of disclosure (-), lack of attachment (-), defensive routines (-)	
Giustiniano & Bolici	(2012)	1	4, 6	Theoretical	Communication Mechanisms (+)	
Gressgård	(2011)	5	2	Theoretical	FTF Communication (+), Informal Communication (+), Info Redundancy (+)	

Gwebu, Wang, & Troutt	(2007)	3	3, 4, 5, 6	Theoretical	Task Focus (+), Time (-)		
Haines	(2014)	3	2	Experiment	Goal commitment (+)	Team performance (+)	Time moderates team performance
Hambley, O'Neill, & Kline	(2007)	3	2,3	Qualitative	FTF Communication (+), Personal Leaders (+)		
He & Paul	(2008)	2	2	Experiment	Time Pressure (+)	Information Sharing (+), Project Quality (+)	
Henttonen & Blomqvist	(2005)	5	3,4	Qualitative	Timely Responses (+), Communication (+), Feedback (+), Social Status (+), Cooperation (+), Empowerment (+), Social Similarity (+), Information (+), Keeping Promises (+), Geographic Dispersion (-), Uneven Information Distribution (-), Communication Silence (-), Competition (-), Reliability (+)		
Hunsaker & Hunsaker	(2008)	5	2	Theoretical	Virtual Teams (-), Time (-), Distance (-), Cultural Diversity (-), Computer Mediated Technology (-), Goals (+), Feedback (+),		
Jang	(2013)	5	4	Experiment	Task Interdependence (+), Perceived Awareness (+)		
Jarvenpaa, Shaw, & Staples	(2004)	3	1	Experiment	Communication Level (+)	Cohesion (+), Satisfaction (+), Outcome Quality	

						(+), Performance (+)	
Jensen	(2014)	other	2	Qualitative	Culture (-)		
Joshi, Lazarova, & Liao	(2009)	5	4	Survey	Inspirational Leadership (+)	Team Performance (+)	
Kanawattanachai & Yoo	(2007)	3	4	Experiment	Task-Oriented communication (+)	Task Knowledge Coordination (+)	
Keim & Weitzel	(2005)	2	1,3	Experiment, Design Science		Role Formation (+)	
Keyzerman	(2003)	1	2	Theoretical		Partnership Building (+)	
Kotlarsky & Oshri	(2005)	3	2	Theoretical		Knowledge Sharing (+), Collaboration (+)	
Krebs, Hobman, & Bordia	(2006)	5	3	Experiment	Demographic Dissimilarity (-)		
Krumm, Terwiel, & Hertel	(2013)	4	5	Survey	Cultural Competence (+)		
Ku, Tseng, & Akarasriworn	(2013)	education	2	Survey		Team satisfaction (+)	
Kuo & Yu	(2009)	1	1,3	Survey		Cohesiveness (+), Communication (+)	
Lee-Kelley, Crossman, & Cannings	(2004)	3	2	Theoretical	Communication (+)	Commitment (+), Team Performance (+)	
Lee & Chang	(2013)	4	2	Survey		Affective Commitment (+), Normative Commitment (+), Teamwork (+)	Team experience moderates affective and normative commitment

Li, Li, Mädche, & Rau	(2012)	3	2	Experiment	Cultural Intelligence (+)	Satisfaction (+).	Language Proficiency Moderates CIQ to Trust
Lind	(2007)	2	2	Quasi-Exp		Team Identification (+)	
Liu, Magjuka, & Lee	(2008)	5	2	Quasi-Exp	Collaboration conflict management style (+)	Team Performance (+), Team Satisfaction (+)	
Lojeski, Reilly, & Dominick	(2006)	2	2	Survey	Virtual Distance (-), Goal Clarity (+),	OCB (+), Innovation (+)	
Lu, Watson-Manheim, Chudoba, & Wynn	(2006)	3	2	Survey	Variety of Practices (-)		
Majchrzak, Malhotra, & Richard	(2005)	3	2	Survey	Task Non-Routines (+)	Collaboration (+)	
Maruping & Agarwal	(2004)	4	3	Theoretical	Communication Type (+)		
McHugh, Conboy, & Lang	(2012)	2	2	Qualitative	Transparency (+), Accountability (+), Communication (+), Knowledge Sharing (+), Feedback (+)		
McNab, Basoglu, Sarker, & Yu	(2012)	3	3	Experiment	Message Based Stereotyping (+), Unit Grouping (+), Behavior Stereotyping (+), Technology Stereotyping (+),	Cohesion (+), Satisfaction (+)	Time (punctuated equilibrium) as moderator
Mirel & Johnson	(2006)	1	1	Survey	Collaborative (+)		
Mitchell & Zigurs	(2009)	3	2	Theoretical	Communication Frequency (+), Team Type (+), Perceived Risk (+), Task Type (+)	Cohesiveness (+)	



Mogan & Wang	(2007)	3	2	Survey	Communication (+), Professional Experience (+), Education (+), Professional Achievement (+)		
Monalisa, Daim, Mirani, Dash, Khamis, & Bhusari	(2008)	2	2	Experiment	Virtual Teams (-)	Communication (+)	
Morgan, Paucar-Caceres & Wright	(2014)	2	2	Qualitative	Previous experience (+), Functional differences (-), Competing priorities (-), Co-location (+), Differing goals (-)	-	-
Muganda & Pillay	(2013)	2	2	Survey	Participative leadership (+)		Power Distance moderates participative leadership
Mukherjee, Hanlon, Kedia, & Srivastava	(2012)	5	2	Theoretical	Organizational Identification (+)		Collectivism moderates trust and identification
Murthy, Rodriguez, & Lewis	(2013)	2	1,4	Survey		Activity on Technology (+)	
Nandhakumar & Baskerville	(2006)	3	1, 4	Experiment	FTF Communication (+), Virtual Communication (-)	Cohesion (+), Solving Problems (+)	
Newell, David, & Chand	(2007a)	5	4	Qualitative	Job Security (+), Identity (+), Age Diversity (-), Expertise (+), Knowledge Sharing Breakdown (-)		
Newell, David, & Chand	(2007b)	5	4, 6	Qualitative	FTF Communication (-), Social Distance (-)	Knowledge Transfer (+)	
Nyström & Asproth	(2013)	2	2	Qualitative	Face-to-face communication (+)		Time moderates face-to-face communication

Olson, Appunn, Walters, Grinnell, & McAllister	(2012)	3	4, 6	Qualitative	Webcams (+)	
Olson, Appunn, McAllister, Wal- ters, & Grinnell	(2014)	5	6	Qualitative	Webcams (-)	Familiarity moderates webcam technology, visual cues moderates webcams
Olson & Olson	(2012)	5	4,5	Experiment	Communication Medium (+)	
Pangil & Moi Chan	(2014)	5	2,5, 6	Survey		Team effective- ness (+), Knowledge Shar- ing (+)
Panteli & Duncan	(2004)	3	1,3	Qualitative	Contractual Agreement (+), Skill Database (+)	Performance (+)
Panteli & Tucker	(2009)	2	2	Qualitative	Facilitator Expertise (+)	Power(+), Power Shifts (+)
Paul & He	(2012)	2	2	Experiment	Cultural Diversity (-)	Information Sharing (+)
Peñarroja, Orengo,Zornoza, & Hernandez	(2013)	2	4	Experiment	Virtuality (-)	Coordination (+), Cooperation (+), Info Exchange (+)
Peters & Karren	(2009)	5	2	Survey		Performance (+) Functional diversity moderates trust and performance
Peters & Manz	(2007)	5	1,3,4,5	Theoretical		Collaboration (+)
Piccoli & Ives	(2003)	3	4	Survey/Qualita- tive	Behavior Control (-), In- congruence (-), Reneging (-)	Vigilance and salience moderates between contract breach and trust

Pinjani & Palvia	(2013)	3	2	Survey	Deep level dissimilarity (-)	Team effectiveness (+)	Task interdependence and collaborative technology moderate dissimilarity
Plotnick, Hiltz, Roxanne, & Ocker	(2011)	2	1,3,4	Quasi-Exp	Cultural Distance (-), Temporal Distance (-), Time (+)		
Polzer, Crisp, Jarvenpaa, & Kim	(2006)	5	2	Experiment	Virtuality (-), Faultlines (-)		Homogenous Dispersed teams moderates virtuality, faultlines and trust
Powell, Galvin, & Piccoli	(2006)	3	2	Survey	Member Effort (+), Team Processes (+)	Affective Commitment (+), Normative Commitment (+)	
Privman, Hiltz, & Wang	(2013)	2	2	Mixed Methods	Social identity (+)	Team effectiveness (+)	
Purvanova	(2013)	5	2	Theoretical	Feeling known (+)	Feeling known (+), project satisfaction (+)	
Purvanova	(2014)	5	2	Qualitative	Virtuality (-)		
Radcliffe, Schniederjans, & Schniederjans	(2003)	2	1,4	Experiment	Analytic Hierarchy Process, Goal-Programming		
Ramo	(2004)	4	2	Theoretical	Time Conceptualization (+)		
Remidez Jr, Stam, & Laffey	(2007)	3	1	Experiment	Communication Support Systems (+)		
Robert, Denis, Hung, Robert Jr., & Dennis	(2009)	3	1,3,4,5	Survey	Knowledge of Team Members (+), ICT Mediated Communication (+)		Difference between risk and trust belief moderates trust belief, trust intentions. Environment also a moderator

Rusman, Bruggen, Sloep, Valcke, & Koper	(2013)	2	4	Survey, Design Science	Information signals (+)		
Rusman, Bruggen, Sloep, & Koper	(2010)	2	4	Theoretical De- sign Science	Cognitive process (+), In- formation availability (+)		
Sarker, Ahuja, Sarker, & Kirkeby	(2011)	3	2	Survey	Communication Central- ity (+)	Individual Per- formance (+)	
Sarker, Valacich, & Sarker	(2003)	3	4, 5, 6	Quasi-Exp	Created a measure		
							Length of the team moderates trust to sat- isfaction & effective- ness
Saunders & Ahuja	(2006)	5	1,2,3,4	Theoretical			
Schiller, Mennecke, Nah, & Luse	(2014)	4	2,4	Survey	Trusting beliefs (+)	Team satisfaction (+)	Team boundaries mod- erates team satisfaction
Scott	(2013)	1	2	Qualitative	Video Conferencing (+), Open communication (+), Frequent Communication (+), Low Power Distance (+), Respect (+), Rituals (+)		
Skjerve & Rindahl	(2010)	2	4	Survey/Qualita- tive	Proper Work Processes (+), Sharing of Risk (+), Technology Literacy (+)		
Staples & Webster	(2008)	3	2	Survey		Knowledge Shar- ing (+), Team Ef- fectiveness (+)	
Thomas & Bostrom	(2008)	4	4	Qualitative	Technology Adaptation (+)		
Tsai, Ma, Lin, Chiu, & Chen	(2014)	5	2	Survey		Knowledge shar- ing (+)	Affective tone (+)

Tseng & Ku	(2011)	2	3	Survey		Performance (+), Satisfaction (+)	
Van der Land, Schouten, Feld- berg, Huysman, & van den Hooff	(2015)	1/5	2	Experiment	Social Attraction (o), Group Identification (o), More/better communica- tion (o)		
Verburg, Bosch- Sijtsema, & Var- tainen	(2013)	5	2	Qualitative	Aligned goals (+), open and clear communication (+)	Team Perfor- mance	
Walther & Bunz	(2005)	1	3	Experiment	Rule Following (+)		
Weimann, Pol- lock, Scott, & Brown	(2013)	3	2	Qualitative	Information and Commu- nication Technology (+), FTF (+)	Performance (+), team member satisfaction (+)	Tool-Task alignment moderates ICT and FTF
Yusof & Zakaria	(2012)	1	2	Theoretical	Virtual Teams (-)		
Zander, Zettinig, & Mäkelä	(2013)	5	3	Theoretical	Leadership (+)	Knowledge shar- ing (+)	
Zaugg & Davis	(2013)	2	2,3	Qualitative	Appropriate Communica- tion Technologies (+), Task Type (+)		

*Note.* Discipline: 1=Communication, 2=Computer science, 3=Information systems, 4=Psychology, 5=Management;  
Type of trust: 1=Swift trust, 2=Generalized trust, 3=Time-based trust (trust development), 4=Multi-faceted trust, 5=Dispositional trust, 6=Institution-based trust

## Appendix B. Conceptualizations of Trust

Category	Description	Sample Source
<b>Generalized trust</b>	Trust is a single, simple construct reflecting willingness to accept vulnerability to risk.	Altschuller & Benbunan-Fich (2010)
<b>Swift trust</b>	Individuals often enter a relationship with high levels of trust without having any previous interaction or knowledge of the trustee. Trust in temporary systems can be built quickly based on surface-level cues.	Meyerson, Weick, & Kramer (1996); Jarvenpaa & Leidner (1999)
<b>Time-based trust</b>	Trust as a dynamic construct. In most cases in our review it looks at trust in terms of varying degrees of trust over two or three points in time. In a few cases, it evolves to different forms of trust over time within a relationship. For instance, calculus-based trust evolves into knowledge-based trust and finally, identification-based trust. Trust early in a relationship is founded upon a rational calculation of the costs and benefits of maintaining or severing a relationship. Once the trustor and trustee have interacted for a sufficient period and know each other well, trust becomes more substantial and is built on predictability of behavior. Finally, as the relationship evolves, trust deepens and is based on identification with the other's preferences, desires, and intentions, as well as making decisions in the others' interest.	Lewicki & Bunker (1995), Lewicki, Tomlinson, & Gillespie (2006)
<b>Multi-faceted trust</b>	Trust beliefs as a multidimensional construct, such that individuals can be trusted in particular ways and for particular behaviors. The most common taxonomy of facets includes trusting beliefs of another's ability, benevolence, and integrity. Ability reflects the competence or capabilities of the trustee, whereas benevolence reflects one's goodwill, or care and concern, toward others, and integrity speaks to adherence to any principles of accountability, dependability, and reliability.	Mayer, Davis, & Schoorman (1995); McAllister (1995); McKnight & Chervany (1996)
<b>Dispositional trust</b>	Trust is a function of preexisting dispositions (i.e., propensity to trust). Therefore, some individuals are more likely to trust others simply due to their own individual differences.	Mayer, Davis, & Schoorman (1995); McKnight, Cummings, & Chervany (1998)
<b>Institution-based trust</b>	Trust is based on perceptions of security due to impersonal structures the organization has put into place. This has dimensions of situational normalcy and structural assurance	McKnight, Cummings, & Chervany (1998); Zucker (1986)

## Appendix C. Assessment of Virtuality in Empirical Research

Type of Research	Number	Comment about Measurement	Sample Source
<b>Conceptual/ Review</b>	16	No mention	NA
<b>Field survey</b>	33	Questionnaires or interviews of respondents who are/were on VTs or who were asked to think about being on a VT. Sometimes the rationale for determining whether a team was virtual or not was unspecified.	Brahm & Kunze (2012) survey participants in 91 teams that were scattered across different locations of the company and collaborated via electronic communication devices such as e-mail, discussion fora, wikis and blogs.
<b>Case studies</b>	24	In-depth studies of VTs where the researchers applied some criteria for determining if a team was virtual or not. Often rationale for determining whether a team was virtual or not was unspecified.	Chang, Chuang & Chao (2011) perform a case study on cultural adaption in VTs which appears to be based on Watson-Manheim and colleagues' (2002) concept of discontinuities as a way of defining VTs.
<b>Experiments in labs with students</b>	13	A VT was created by putting members of VTs in separate rooms with an internet connection (versus putting members of face-to-face teams in one room).	Altschuller & Benbunan-Fich (2013) experimentally created virtuality by dispersing participants in different cubicles in a computer lab and having them communicate with ICQPro. The students did not know where the other team members were.
<b>Field experiments</b>	37	A VT was designated when students (24) or employees (9) were in different geographic locations and communicated in part or entirely via computer-mediated communication.	Jarvenpaa, Shaw & Staples (2004) describe a field experiment with 94 six-person student teams with no two members from the same university or same home country.
<b>Design science</b>	3	Software tool was designed and developed for VT as assessed by the researcher.	Rusman et al. (2010) use design science to develop a web-based interface to gather information that would make it easier for VT members to trust one another.
<b>Scale used</b>	8	Virtuality was assessed using multi-dimensional scale.	Plotnick, Hiltz & Ocker (2011) used scales to measure temporal distance (based on differences in time zones) and cultural distance (absolute difference between two subteam scores of Hofstede's scales).

*Note:* Some studies used mixed methods so the total number of articles exceeds 124.

## **Appendix D. Summary of Findings about Antecedents and Consequences of Trust**

### **Antecedents**

#### *Member Attributes:*

**Cultural distance:** A main benefit of implementing VTs is to gain access to knowledge embedded in team members outside the local geographical constraints. However, most studies show that cultural distance (e.g., language, demographic, and cultural diversity) creates strong barriers to trust in VTs (Al-Ani, Marczak, et al., 2013; Al-Ani & Redmiles, 2009a, 2009c; Gaan, 2012; Krebs et al., 2006; Newell et al., 2007b; Paul & He, 2012). Team members with different cultural backgrounds come to the VT with different expectations on how to approach other team members, leadership, decision-making, and many other factors (Scott, 2013). Cultural understanding or intelligence can help build trust in these environments (e.g., Dorairaj et al., 2012). Specific technological tools that allow for fine-tuning of messages being sent may make the cultural differences less noticeable, though this line of research has been understudied. Also lacking are studies that delve deeper than just the demographic or surface differences to underlying aspects that are affecting trust such as in the study by Pinjani & Palvia (2013).

**Expertise:** Many studies of trust in VT area have shown that expertise and knowledge about others' expertise can lead to trust (e.g., Aubert & Kelsey, 2003; Li et al., 2012). Functional diversity, similar to other forms of diversity, is a barrier to trust in VTs (Peters & Karren, 2009). However, allowing VT members exposure to other team members' technical competency, especially through knowledge sharing activities, is an effective way to build trust across virtual settings (Dorairaj & Noble, 2013). Even simple interventions such as encouraging informal communication can drastically improve trust (Curşeu et al., 2008).



*Team structure:*

**Goals, roles:** VTs are usually different in structure than more traditional teams (Saunders & Ahuja, 2006). VTs with greater levels of aligned and shared goals have higher levels of trust (Al-Ani, Bietz, et al., 2013; Verburg et al., 2013). However, Bierly et al. (2009) found that goal clarity is more important for trust in completely face-to-face than in highly VTs. Additionally, well-defined roles are especially important in VTs (Al-Ani, Bietz, et al., 2013) since they allow the team members to direct effort to tasks within the role, correctly evaluate other's role performance, and, consequently confer swift trust.

**Size, hierarchy, and formalization:** While no longer geographically constrained by housing the team in one location, an organization might be tempted to increase the size of a VT. However, several studies indicate that it is harder to build trust in larger VTs (Al-Ani, Marczak, et al., 2013; Al-Ani & Redmiles, 2009a, 2009b). Thus, larger team size creates a barrier for developing trust. However, no relationship between the VT hierarchy and trust has been found (Liu et al., 2008). Yet, the organization's structure does have an impact on trust levels in VTs (Al-Ani, Bietz, et al., 2013). In more formalized organizations, employees feel that they can make better initial judgments of another's technical capabilities, thus increasing trust. Interestingly, Al-Ani and colleagues (2013) did not focus on swift trust or institutional trust. In all, it seems that having clear roles, smaller teams, and a formalized organizational structure help increase member's levels of trust in virtual environments that contain more uncertainty.

*Team management:*

**Leader behaviors:** Several leader behavioral styles have been studied in the trust in VT literature. In contrast to some earlier work (e.g., Piccoli et al., 2003), both Theory X and Theory Y leadership styles may build trust in VTs (Thomas & Bostrom, 2008). Others have found that

leaders who build more personal types of relationships trust (Hambley et al., 2007) or empower their team members (Henttonen & Blomqvist, 2005). Further, both transactional and transformational leaders build trust in VTs (Eom, 2009; Joshi et al., 2009; Muganda & Pillay, 2013). Not surprisingly, an unprincipled leader is a detriment to trust (Al-Ani, Marczak, et al., 2013). Overall, leaders are important to building trust in VTs. Zander et al. (2013) describes the activities a leader should perform in each phase of the team's life for the team to be successful.

**Leader characteristics.** While studies have been interested in leader impacts on trust, few have analyzed specific characteristics. A lack of leadership is a barrier to trust in VTs (Germain & McGuire, 2014). In VTs, leaders judged as appropriate role models and, thus, demonstrating follower's anticipated characteristics were important to building trust (Al-Ani & Redmiles, 2009a, 2009b). Still, few studies have explored personality characteristics or other leader characteristics impact on trust in a VT.

*Interpersonal relationships:*

Interpersonal relations can be especially difficult in VTs. With greater geographic and temporal distance, members tend to view each other as more abstract and psychologically distant (Wilson, Crisp, & Mortensen, 2013). Thus, anything that can help a team member anticipate the behaviors and actions of other team members (e.g., familiarity) builds trust, and anything that stands in the way of building these expectations (e.g., conflict) destroys trust.

**Familiarity:** Several studies have explored the role of familiarity in VTs. Familiarity with other team members is especially important to aspects that relate to multi-faceted trust (e.g., Skjerve & Rindahl, 2010). Similar to knowledge of another's technical expertise, familiarity with another's motivations and integrity predict trust in VT members. Knowing these factors, specifically through prior experience with other team members, helps team members make predictions

about another's behaviors that allow them to trust more, even in temporary VTs (Gaan, 2012; Kuo & Yu, 2009). To foster this familiarity, organizations establish socialization practices (Clark, Clark, & Crossley, 2010), have organizational rituals (Scott, 2013), and place a high priority on members getting to know one another (Bierly et al., 2009) in order to build stronger VTs that display greater levels of trust.

**Conflict:** Several studies have explored the impact of conflict on trust. Process conflict and relational conflict are more detrimental to trust in virtual environments than they are in non-virtual environments (Bierly et al., 2009). In VTs, expectations can be even more mismatched leading to incongruent psychological contracts of team members (Bosch-Sijtsema, 2007). This leads to contract breach and lower levels of trust. Due to fault lines, completely dispersed, rather than partially collocated teams, had better levels of trust (Polzer et al., 2006). Additionally, conflicting loyalties in a team lead to lower levels of trust (Germain & McGuire, 2014). Conflicts of loyalties can have important implications for teams that rely on members embedded within multiple teams. This is a common reality of practice that is not well studied in the academic literature.

## **Consequences**

### *Performance:*

Performance is one of the most studied outcomes of trust in VTs. Trust is related to individual member performance (Sarker et al., 2011) and team performance (e.g., Baskerville & Nandhakumar, 2007; Corbitt et al., 2004; DeRosa et al., 2004). Peters and Karren (2009) found a positive relationship between trust and team-reported performance but not manager-rated performance. Teams with higher levels of trust produce higher quality products (e.g., Altschuller & Benbunan-Fich, 2010; He & Paul, 2008; Jarvenpaa et al., 2004) and engage in more creative

problem solving (Murthy et al. 2013). Trust also extends outside the company to customer perceptions of performance (Chang et al., 2011). Finally, trust in VT members facilitates learning effectiveness (Edwards & Sridhar, 2005).

*Member well-being:*

**Satisfaction and morale:** In general, trust leads to higher satisfaction and morale within VTs (e.g., DeRosa et al., 2004; Jarvenpaa et al., 2004; Li et al., 2012; Liu et al., 2008). It leads to both overall satisfaction in team partners and satisfaction in their task contribution.

*Member support:*

**Cooperation-teamwork:** Teams, as opposed to individual interactions, are distinct in that they require cooperative outcomes and collective goal fulfillment. Unfortunately, virtuality creates difficulties in team members working together (e.g., Bierly et al., 2009). Several studies have shown that trust in VTs is positively associated with cooperation (Bierly et al., 2009; Kanawattanachai & Yoo, 2007; Peñarroja et al., 2013). However, this relationship is weaker for VTs than face-to-face teams (Bierly et al., 2009).

**Cohesion and turnover:** Team cohesion is especially challenging in virtual environments (Jarvenpaa et al., 2004). Several studies on trust in VTs show the importance of trust to cohesion. First, trust is closely related to commitment (Dorairaj et al., 2012; Lee-Kelley et al., 2004; Powell et al., 2006). Specifically, the relationship between trust and affective commitment is stronger in VTs than non-VTs (Powell et al., 2006). Additionally, trust is positively related to cohesiveness in VTs (Brahm & Kunze, 2012; Jarvenpaa et al., 2004; Kuo & Yu, 2009; McNab et al., 2012). This relationship is particularly strong early in the team's life, showing the importance of initial trust (Jarvenpaa et al., 2004). Lastly, trust is linked with increases in collective team identification (Lind, 2007) and lower turnover intentions (DeRosa et al., 2004)