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Is Anybody Out There? Antecedents of Trust in Global Virtual Teams

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ABSTRACT: A global virtual team is an example of a boundaryless network organization form where a temporary team is assembled on an as-needed basis for the duration of a task and staffed by members from different countries. In such teams, coordination is accomplished via trust and shared communication systems. The focus of the reported study was to explore the antecedents of trust in a global virtual-team setting. Seventy-five teams, consisting of four to six members residing in different countries, interacted and worked together for eight weeks. The two-week trust-building exercises did have a significant effect on the team members' perceptions of the other members' ability, integrity, and benevolence. In the early phases of teamwork, team trust was predicted strongest by perceptions of other team members' integrity, and weakest by perceptions of their benevolence. The effect of other members' perceived ability on trust decreased over time. The members' own propensity to trust had a significant, though unchanging, effect on trust. A qualitative analysis of six teams' electronic mail messages explored strategies that were used by the three highest trust teams, but were used infrequently or not at all by the three lowest trust teams. The strategies suggest the presence of

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"swift" trust. The paper advances a research model for explaining trust in global virtual teams.'

KEY WORDS AND PHRASES: antecedents of trust, global teams, global virtual teams, swift trust, transnational teams, trust, virtual organizations, virtual teams.

> "Virtuality . . . [means] without a place as its home. Virtuality requires trust to make it work." [10, p. 44]

TRUST IS CRITICAL IN NEW ORGANIZATIONAL ARRANGEMENTS where the traditional social controls based on authority give way to self-direction and self-control [26]. Trust is reported to reduce transaction costs [2, 10], increase confidence and security in the relationship, and promote open, substantive, and influential information exchange [4, 17, 40].

A global virtual team is an example of a new organization form, where a *temporary team* is assembled on an as-needed basis for the duration of a task, and staffed by members from the far corners of the world [11, 20, 25]. In such a team, members (1) physically remain on different continents and in different countries, (2) interact primarily through the use of computer-mediated communication technologies (electronic mail, videoconferencing, etc.), and (3) rarely or never see each other in person [13, 27].

Although trust is important in any type of team, trust is pivotal in preventing geographical distance from leading to psychological distance in a global team [33]. Trust is even more essential in global *virtual* teams. According to O'Hara-Devereaux and Johansen [27], "Trust is the glue of the global workspace—and technology doesn't do much to create relationships" (pp. 243–244). First, the global virtual context renders other forms of social control, such as direct supervision, inoperable. Second, other factors known to contribute to social control and coordination, such as geographical proximity, similarity in backgrounds, and experience, are often absent.

The challenge is that both the virtual context and the global context constrain, or perhaps even impede, the development of trust. Handy [10] points out that, in virtual organizations, trust requires constant face-to-face interaction—the very activity the virtual form eliminates. This study explores, in a virtual-team setting, the effect of factors that have been identified as sources of trust in traditional face-to-face relationships.

Conceptual Foundations

Concept of Trust

TRUST CAN BE VIEWED FROM A RATIONAL OR SOCIAL perspective. Most research on trust takes a rational perspective [15]. The rational perspective centers on the calculus of self-interest. Increases in trust decrease transaction costs of relationships because individuals have to engage less in self-protective actions in preparation for the

possibility of others' opportunistic behavior [16]. Thus, the existence of trust enables people to take risks. The social perspective of trust, alternatively, centers on moral duty. A social group holds values regarding one's obligations to others. "Hence, people help others and/or their group because they feel it is the morally appropriate action" [16, p. 5].

Within the rational perspective, some authors have studied trust as an individual personality difference [7], others as an institutional phenomenon [19, 32], some as a cross-cultural issue [6], and most in terms of interpersonal relations [3, 22]. In this paper, we take the last view, which allows us to take an affective, cognitive, behavioral, or "integrated" view of trust [2, 22, 24]. We will take an "integrated" view and adopt Mayer, Davis, and Schoorman's [22] definition of trust: "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party" (p. 712). In short, trust is based on the expectation that others will behave as expected.

Antecedents of Trust

Trust in a dyadic relationship arises from attributes associated with a trustee and a trustor [22]. The trustee attributes are his or her perceived (1) ability, (2) benevolence, and (3) integrity. *Ability* refers to the group of skills that enable a trustee to be perceived competent within some specific domain. *Benevolence* is the extent to which a trustee is believed to feel interpersonal care and concern, and the willingness to do good to the trustor beyond an egocentric profit motive. *Integrity* is adherence to a set of principles (such as study/work habits) thought to make the trustee dependable and reliable, according to the trustor.

In terms of the trustor attributes, *propensity to trust* is a general personality trait that conveys a general expectation of how trusting one should be. This trait is assumed to be stable during the relationship as well as from one situation to another, and is influenced by a trustor's cultural, social, developmental experiences, and personality type [22]. In terms of trustor versus trustee attributes, prior research has found that the trustee attributes explain more of the variance in interpersonal trust than does the trustor's general propensity to trust [31].

Trust on a collective level (i.e., trust in a group, team, or organizational unit) is more complicated than dyadic trust because there are multiple trustees, each with different attributes. Collective trust, as defined by Cummings and Bromiley [2, p. 303], is "a common belief among a group of individuals that another individul or group (a) makes good-faith efforts to behave in accordance with any commitments . . . (b) is honest in whatever negotiations preceded such commitments and (c) does not take excessive advantage of another even when the opportunity is available." Extrapolating from the dyadic trust literature to the collective trust context, we explore trust antecedents in a global virtual-team setting. Our baseline hypothesis is:

> *H1: In a global virtual team, team trust is a function of other team members' perceived ability, integrity, and benevolence, as well as of the members' own propensity to trust.*

Relative Importance of Trust Antecedents

In a traditional face-to-face context, trust takes time to evolve. Cummings and Bromiley [2] suggest that collective trust has an affective, cognitive, and behavioral intent component. McAllister [24] found cognitively based trust factors to be a precursor to the development of affectively based trust. Mayer et al. [22] maintain that, in the early stages of a relationship, integrity is more important than benevolence to the formation of trust. Assessing benevolence requires information, which takes time to gather. Although Mayer et al. [22] do not categorize the antecedents of ability, integrity, and benevolence into affective and emotional dimensions, they do associate benevolence with the process of relationship building.

In a virtual-team context, we might expect integrity and ability to be particularly strong predictors of trust because the context is a barrier to relationship formation. In this study's context, team members were limited to asynchronous electronic mail communication and to the occasional use of text-based synchronous "chat" facilities. According to Zack [42], "the degree to which the mode of [electronic] communication allows participants to experience each other as being psychologically close" (p. 211) depends on the richness of the existing shared interpretative context. This finding was reinforced by Markus [21] who found that "lean" electronic mail can be rich in the situation where the parties know each other, but if the parties are confined to electronic communication for long periods of time, they expected their relationships to be "cold and impersonal" (p. 520). Among strangers who do not share a common past and are unfamiliar with each other's personalities, there is no shared context. Hence, electronic communication can be expected to be impersonal and task-focused. Trust in a virtual-team context might therefore be more strongly related to ability and integrity, and less to benevolence.

> *H2: In the early phases, a global virtual team's trust is predicted more strongly by team members' perceptions of the other members' integrity and ability than by the other members' benevolence.*

In traditional relationships, Mayer et al. [22] predict that, with time, benevolence should increase. The interactions will reveal information about the benevolence of others. Recent work on computer-mediated teams suggests that benevolence might predict team trust after the members have interacted for a while. Walther [38] found that geographically dispersed and culturally diverse partners, who relied totally on computer-mediated communication and were never able to meet each other physically, communicated more affection and reported higher levels of intimacy, as well as social and physical attraction, than did colocated partners. In another study, Walther [36] did not find computer-mediated communication groups to be any more task-oriented than face-to-face teams. On the basis of his studies, Walther [34, 35, 36, 37, 38] developed a hyperpersonalization theory for groups limited to computer-supported communication. The theory argues that, because individuating information (cues that help others understand if they are similar or different, for example, physically) is so scarce in a virtual context, members assume similarity and tend to reveal factors and

cues about themselves that only reinforce this similarity. In turn, this overattribution of similarity may nurture perceptions of concern, care, and a belief in the virtue of a team relationship. Hence, we predict:

H3: Over time in a global virtual team, team members' perceptions of others' benevolence will have a stronger effect on team trust.

Team Building

To perceive integrity and ability, members must make their assessments of others on the basis of past history, namely, other's track record or recent performance in a team. This in turn suggests that, for integrity to be rated high, a member has to have information available on how consistently others met their past commitments and how closely their performance matched expectations of fairness and norms of reciprocity [24]. Likewise, to rate ability high, team members would have to have detailed information on the other members' backgrounds, work experiences, and current organizational contexts. To perceive benevolence, personal information must be revealed by others to reinforce beliefs about shared goals, rewards, and interest in establishing a good relationship. Thus, team exercises that focus on increasing information exchange among team members and encourage commitment and completion of tasks early in the collaborative process might be expected to have a positively impact on perceptions of other members' ability, integrity, and benevolence, as well as team trust overall. The effect on team trust is expected because the exercises should not only reveal information about the members, but also help create a team identity, which is an important facilitator of trust in a collective context [14]. Hence, we advance the fourth hypothesis:

H4: The level of participation in the team-building exercises will be positively associated with team trust as well as with other team members' perceived ability, integrity, and benevolence.

Figure 1 summarizes the research model tested via the four hypotheses.

Methodology

THE UNIVERSITY OF TEXAS AT AUSTIN HELD A GLOBAL VIRTUAL collaboration for masters' students over a period of eight weeks during the spring semester of 1996. Three learning objectives guided the collaborative process: to learn how to collaborate with others in a virtual setting, to obtain international exposure by working with people from different countries, and to learn about the Internet. This section describes the collaboration participants, collaboration activities, data collection, and measurements.

Collaboration Participants

Potential participants were recruited through contacts with professors who had participated in previous collaborations [13], correspondence with academic colleagues,

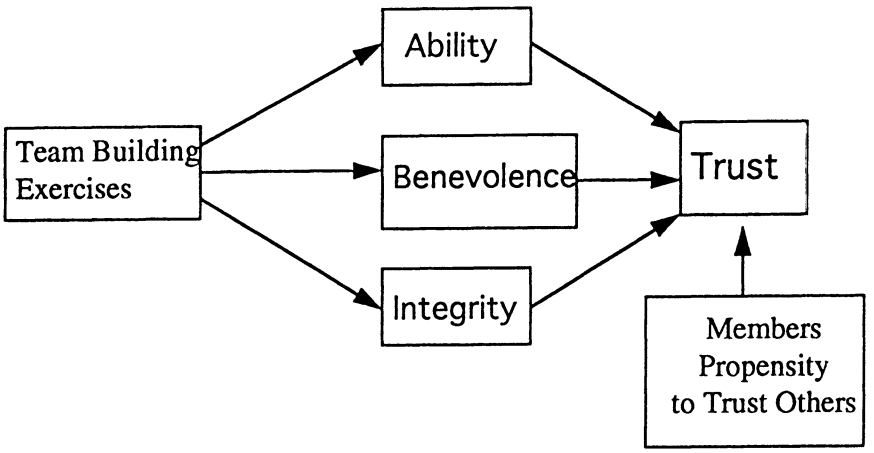

Figure 1. Research Model

word-of-mouth inquiries, and advertising via a newsgroup servicing information systems professionals and academicians. All professors received a common letter explaining the conditions for student participation.

Although the letter explicitly stated that one of the conditions for participation included having the exercise comprise 20 to 40 percent of the students' course grade, the context of the students' participation varied. Most professors folded the exercise into one of their regularly scheduled courses where it counted for 20 percent to 75 percent of their course grade. In a few cases, however, professors asked some students to participate in the project without any connection to a specific course. To further motivate the students' participation, the professors were provided with reports on the number of electronic mail messages their students sent after the first two and four weeks. Also, a monetary reward ($600) was promised for the best web site. Finally, all team members were asked to rate each other's contribution to the final project.

Three hundred and eighty-five masters' students from twenty-eight universities around the world elected to participate in the exercise (appendix A lists the universities). Of these students, 350 students sent at least one message to their teammates. The teams had the following characteristics: (1) Each member on a team resided on a different continent or subcontinent of the world. (2) Each team had a mix of students from low- and high-context cultures.

Tasks

The teams were charged with completing three tasks: two team-building exercises and a final project (see Table 1 for the timing of the exercises). The team-building exercises were voluntary. The students' course grade and the $600 reward were based solely on the successful completion of the final project.

Table 1. Collaboration Schedule

March 4	Collaboration began
March 24	Team-building exercise I completed
March 31	Team-building exercise II completed
April 2	First questionnaire administered
April 29	Final project completed
April 30	Second questionnaire administered

The Team-Building Exercises

The first two voluntary tasks encouraged participants to exchange information about themselves that would be relevant for assessing one another's project-related skills (ability), their motivations for contributing to the team effort (benevolence), and their work/study habits believed to be compatible with a successful effort (integrity). The first exercise asked participants to send a description of themselves to their team members. The first paragraph was to include a brief personal description. The second paragraph was to contain professional information—to describe past job experience, their current focus of study and why they chose to study that subject, what their aspirations were, and any international experience they had. The third paragraph was to answer two questions: what they wanted to learn from this project and what skills they had that would enable them to contribute to the project. The final paragraph was to describe what they felt would be the challenges of working in an international virtual environment and to raise any concerns they had with regard to the successful completion of the project.

The purpose of the second exercise was to enable the team members to assess how well their team members met their commitments and completed their work tasks (integrity) before the final assignment commenced. This exercise required each team member to locate one web site he or she felt was of relevance to business persons. Each team member was to report the address of the site as well as a one-paragraph explanation of what made the site relevant. Team members were asked to consider information-related characteristics and features of the page that made it relevant—the quality of links, the accessibility of the page, the options included in the page, and so forth.

The World Wide Web Project

The third assignment, the final project, asked the teams to propose a World Wide Web site (or pages) providing a new service or offering to ISWorld Net (ISWorld Net is an organization committed to disseminating information to both IS practitioners and academicians via the Internet and newsgroups). The teams were to present information of interest to global information technology practitioners working in a global business setting. The students had four weeks to complete this project. Each team member was required to submit the same deliverable, representing the collective efforts of the group, to his or her professor.

Technology

Students communicated solely through electronic means. The host institution established a WWW site on the Internet (**http://uts.cc.utexas.edu/bgac313/index.html**). The purpose of this central repository of information was to ensure that all students had access to the same information on the assignments, a schedule for completing the voluntary team building exercises and the required final project, pointers to other WWW sites containing relevant information, advice for virtual collaborators, decision-making methods and software tools, a list of time zones based on Greenwich Mean Times, a bulletin board addressing technical and assignment issues, and a research paper describing virtual collaborations.

Data Collection

The list processor archived students' mail messages sent to the "team address." Students were notified at the start of the exercise that messages were being collected. Occasionally students used the reply function to respond to messages sent by individuals, thereby communicating with that individual alone. In prior global virtual-team collaborations, we learned from student interviews and from questionnaire responses that team members rarely sent individual messages, and when they did, they sent very few [13]. Furthermore, when teams held chat sessions (and invariably not everyone could attend because of time zone constraints), our analysis of the electronic mail archives suggests that attendees summarized the meeting results for others.

Team members were sent an electronic survey to complete immediately following the deadline for the second trust-building exercise (after the first month). The team members were able to complete and submit the survey electronically. A second survey was sent to the team members the day following the deadline for the completed final project (after the second month).

Measurements

The items for each construct are reported in appendix B. The trust-building exercises were coded to give a measure of the participation in the exercise. A team was given one point for each member that contributed to an exercise. Thus, for a four-person team, the maximum number of points was eight if each member contributed to both exercises. The total points were added per team and then normalized to account for the differences in team sizes.

Because trust was the central variable of concern, we used two separate scales for trust that had been used before. Both were used because neither had been found definitive by previous research. The first measure was used by Pearce et al. [28, 29] to measure trustworthiness. The trustworthiness scales were modified to reflect the team rather than the organization as the unit of analysis. The second measure was a modified version of the Schoorman, Mayer, and Davis [30] instrument on trust. Schoorman et al.'s [30] measures were also used to assess ability, benevolence, and

integrity, and propensity to trust. The modifications to the Schoorman et al. instrument involved adapting the questions that were originally designed for a dyadic relationship to fit the context of multi-interdependencies found in a team context. Individuals were asked about their perceptions of the attributes of the other members (as opposed to a single other trustee). We could have asked each individual to respond to their perceptions of each trustee (i.e., each team member), but this would have been excessively tedious and might have reduced the response rate. In addition, trust in a collective entity is possible even if one particular individual is deemed less capable, benevolent, or honest than the others. The measure of propensity to trust was modified to take into account the international context. Because trust has an object—one trusts in someone or something—it is necessary to provide an object to the general propensity to trust. We felt that the international context might pose a major challenge to the teams because collective trust is suggested to be difficult to establish among culturally heterogeneous groups [12]. The modified measure captured propensity-to-trust students from other countries (i.e., foreign students). All of the above items were measured on a five-point scale ranging from 1 (to no extent) to 5 (to a great extent).

Analysis and Quantitative Results

IN TOTAL, 165 OF THE 350 TEAM MEMBERS COMPLETED THE FIRST SURVEY for a response rate of 47 percent. Two hundred and thirteen of the 350 team members completed the second survey for a rate of 61 percent. The response rates are reasonable given that most of the teams had one or two inactive members—members who did not send any messages to their team. Inactive team members were not expelled from participation since we felt that coping with such lack of commitment was a part of the learning process.

Of interest was team trust and trust antecedents at a team level of analysis. As such, for each team, it was necessary to collapse the responses of the various team members into a single team score. This was accomplished by averaging the responses of the individual members on each team. Before so doing, teams with responses from fewer than two members were eliminated from the data set because a single respondent was not a good representation of the team.

In general, the factor analyses supported the proposed scales with some exceptions. For example, one of the items of the benevolence scale, "The other team members were very concerned about the ability of the team to get along," was not retained. The items comprising each of the constructs are shown, with their factor loadings, in Table 2. The reliability measures are also shown. All variables exceeded 0.8 on the reliability score except the trust construct. Since trust and trustworthiness were highly correlated at time period 1 ($p = 0.019$) and time period 2 ($p = 0.003$), we dropped trust from further analysis and used the measure of trustworthiness to represent trust.

Descriptive Statistics

The descriptive statistics on a team level are shown in Table 3. The first section of the table shows the responses on the first survey administered upon completion of the

Table 2. Factor Analysis and Reliability

Variable	Alpha	Items	Loading
Trust	0.66	If I had my way, I would not let other members have any influence over important issues	0.78
		(–) I really wish I had a good way to oversee the work of the other members	0.64
		I would have been comfortable giving the other members complete responsibility for completion of this project	0.72
Trustworthiness	0.92	Overall, the people in my group were very trustworthy	0.81
		We were usually considerate of one another's feelings on this team	0.76
		The people in my group were friendly	0.76
		I could rely on those with whom I worked in my group	0.82
		Overall, the people in my group were very trustworthy	0.82
		(–)There was a noticable lack of confidence among my team members	0.71
Ability	0.90	The other team members had much knowledge about the work that needed to be done	0.72
		The other team members seemed to be successful in the activities they undertook	0.78
		I felt very confident about the other team members' skills	0.84
		The other team members had specialized capabilities that increased our performance	0.70
		The other team members were well qualified	0.84
		The other team members were very capable of performing their tasks	0.76
Integrity	0.92	The other team members displayed a solid work ethic	0.90
		The other team members tried hard to be fair in dealing with one another	0.77
		I liked the work values of the members on my team	0.84
		The other team members were strongly committed to the project	0.86
		(–)The other team members did not behave in a consistent manner	0.83
Benevolence	0.85	The outcomes of this project were very important to the other team members	0.77
		The other team members did not knowingly do anything to disrupt the project	0.81
		The other team members were concerned about what was important to the team	0.87
		The other team members did everything within their capacity to help our team perform	0.84

Table 2. Continued

Propensity to trust	0.86	Most foreign students tell the truth about the limits of their knowledge	0.70
		Most foreign students answer personal questions honestly	0.83
		Most foreign students are very competent in terms of their studies	0.68
		Most foreign students are honest in describing their experiences and abilities	0.84

trust-building exercises. The second section of the table shows the responses to the second survey administered upon completion of the final project. The third section shows the descriptive statistics for the teams having at least two respondents on both of the surveys. Table 4 shows the correlations among the variables. To compute the correlations, the data set was composed of those teams that had two or more respondents on both the first and the second surveys. This reduced our sample size to twenty-eight teams. Overall, trust and antecedents of trust increased over time. Of seventy-five teams, one team was combined with another team after the trust-building exercises because the team had only one active member. All other teams had at least two participating members. Only one of the remaining seventy-four teams did not submit the final assignment.

Hypothesis Testing

Hypothesis 1 predicted that, within a global virtual team, team trust is a function of members' ratings of the other team members' perceived ability, integrity, and benevolence, as well as of the members' own propensity to trust students from other countries. Hypothesis 2 predicted that early in the team's formation the team's trust would be predicted more strongly by perceptions of the other team members' integrity and ability than by others' benevolence. Hypothesis 3 predicted that others' perceived benevolence would have a greater effect on trust over time.

A MANOVA was run to test these hypotheses, followed by an ANOVA. The MANOVA used trust at time period 1 and time period 2 as the dependent variables and the antecedents of trust (ability, integrity, benevolence, and propensity to trust) as the independent variables ($F(16, 28) = 12.28$, $p > 0.000$). This first hypothesis was partially supported. Ability ($b = 0.190$, $p > 0.043$), integrity ($b = 0.533$, $p > 0.000$), and propensity to trust ($b = 0.198$, $p > 0.033$) at time period 1 were significant predictors of trust taken directly after the team building exercises (after the first month). Benevolence was not significant at time period 1. At the end of the project (after two months), integrity ($b = 0.443$, $p > 0.004$), benevolence ($b = 0.333$, $p > 0.004$), and propensity to trust students from other countries ($b = 0.152$, $p > 0.044$) were significant predictors of trust at time period 2, but ability was not (see Table 5). Hence, hypothesis 2, which emphasized the salience of integrity after the first month, was supported, as was hypothesis 3, which predicted that the relative effect of benevolence on trust would increase with time.

Table 3. Descriptive Statistics

	Mean	St. dev.	Min	Max	*N*
Teams with at least two respondents on the first survey					
Trust1	3.86	0.45	2.93	4.60	48
Ability1	3.70	0.41	2.67	4.42	48
Integrity1	3.70	0.50	2.40	4.60	48
Benevolence1	3.70	0.51	2.33	4.75	48
Propensity to trust1	3.82	0.38	3.00	4.60	48
Trust-building score	1.69	0.32	0.80	2.00	48
Teams with at least two respondents on the second survey					
Trust2	4.06	0.52	2.20	4.90	60
Ability2	3.77	0.57	1.75	4.92	60
Integrity2	3.72	0.71	1.60	4.93	60
Benevolence2	3.70	0.65	1.25	4.80	60
Propensity to trust2	4.00	0.43	3.00	5.00	60
Teams with at least two respondents on both surveys					
Trust1	3.95	0.42	3.00	4.60	28
Ability1	3.81	0.32	2.67	4.35	28
Integrity1	3.81	0.43	2.80	4.60	28
Benevolence	3.76	0.45	2.88	4.50	28
Propensity to trust1	3.85	0.39	3.00	4.47	28
Trust-building score	1.80	0.25	1.00	2.00	28
Trust2	4.04	0.40	3.00	4.60	28
Ability2	3.75	0.39	2.50	4.42	28
Integrity2	3.65	0.65	1.80	4.53	28
Benevolence2	3.66	0.49	2.25	4.42	28
Propensity to trust2	3.91	0.36	3.00	4.53	28

Hypothesis 4 predicted that the level of participation in the team-building exercises would be positively associated with ratings of other team members' ability, integrity, and benevolence, as well as overall team trust. The team-building exercises were designed to encourage participants to share information concerning their abilities that would be of value to the team (ability), their motivation for participating in the project (benevolence), and their work/study habits (integrity). Correlations were used to test this hypothesis. Hypothesis 4 was only partially supported. The exercise did significantly correlate with the antecedents of trust: ability ($r = 0.377, p > 0.024$), integrity ($r = 0.300, p > 0.061$), and benevolence ($r = 0.424, p > 0.012$) at time period 1. Surprisingly, though, the trust-building exercise did not positively and significantly correlate with the measure of trust at time period 1 ($r = 0.2210, p > 0.109$) or with the level of trust measured at time period 2 ($r = 0.2335$, $p > 0.095$). Hence, it seems that the exercise did increase the team members' knowledge of each other, but the exercise did not directly affect trust. Hence, any effect that the exercises had on trust appeared to occur indirectly through the antecedents.

Table 4. Correlations (Pearson Coefficients and Their Significance Levels)

	At time period 1				At time period 2					
At time period 1	Ability1	Integrity1	Benevo-lence1	Propensity to trust1	Trust2	Ability2	Integrity2	Benevo-lence2	Propensity to trust2	Trust-build-ing score
Trust1	0.400	0.784	0.739	0.619	0.610	0.380	0.506	0.556	0.485	0.248
	0.017	0.000	0.000	0.000	0.000	0.023	0.003	0.001	0.004	0.101
Ability1		0.257	0.156	0.448	–0.065	0.142	–0.111	–0.064	–0.020	0.377
		0.094	0.213	0.008	0.372	0.236	0.288	0.374	0.459	0.024
Integrity1			0.701	0.365	0.544	0.358	0.482	0.597	0.390	0.300
			0.000	0.028	0.001	0.031	0.005	0.000	0.020	0.061
Benevolence1				0.479	0.442	0.208	0.342	0.467	0.522	0.424
				0.005	0.009	0.144	0.037	0.006	0.002	0.012
Propensity to trust1					0.410	0.130	0.139	0.140	0.537	0.213
					0.015	0.254	0.240	0.239	0.002	0.138
At time period 2										
Trust2						0.744	0.885	0.801	0.627	–0.033
						0.000	0.000	0.000	0.000	0.433
Ability2							0.791	0.728	0.389	–0.049
							0.000	0.000	0.020	0.403
Integrity2								0.905	0.470	–0.052
								0.000	0.006	0.397
Benevolence2									0.337	0.061
									0.040	0.379
Propensity to trust2										–0.089
										0.327

Table 5. ANOVAs for Hypothesis Testing

	DF	F	p >	Regression coefficient	t	p >
Dependent variable: Trust at time 1 Independent variables: Ability, Integrity, Benevolence, Propensity to trust (at time 1)						
	4	45.2	0			
Ability				0.190	2.084	0.043
Integrity				0.533	4.179	0.000
Benevolence				0.149	1.192	0.240
Propensity to trust				0.198	2.206	0.033
Dependent variable: Trust at time 2 Independent variables: Ability, Integrity, Benevolence, Propensity to trust (at time 2)						
	4	76.7	0			
Ability				0.065	0.584	0.562
Integrity				0.443	2.972	0.004
Benevolence				0.333	3.029	0.004
Propensity to trust				0.152	2.066	0.044

In summary, the quantitative results suggest that the traditional antecedents of trust from the dyadic relationship literature were associated with team trust in a global virtual-team context. It appears to take time for benevolence to affect trust. Ability seems to be a significant predictor at the outset, but not after two months followed by a major task accomplishment. Mayer et al. [22], in discussing trust in dyadic face-to-face relationships, predicted that integrity would be most salient early in the relationship and that benevolence would increase as the relationship among the parties developed. Mayer et al. [22] made no specific predictions with regard to the temporal effects of ability on trust. Hence, our results are consistent with the predictions of Mayer et al. [22] with the additional caveat that the effect of ability on trust also seems to change with time. As the relationship forms among the members, the effect of ability decreases. The team-building exercises had a positive effect on the antecedents of trust related to perceptions of the other team members. The exercises did not appear to have any direct effect on trust.

Qualitative Analysis of High- and Low-Trust Teams

Although the above results are interesting, they revealed little about the behaviors and strategies that distinguished high-trust teams from low-trust teams. To explore this question about behaviors and trust, an analysis was conducted of the communication transcripts for the three teams with the highest final trust score and the three teams with the lowest final trust score. The transcripts for each team were treated as a case. The data analysis followed guidelines proposed by Eisenhardt [5]. The goal was to

identify similarities and differences across the six cases. Table 6 reports on the number of members, the total number of messages, and the countries in which the team members resided. A summary of the six cases follows. (All member names are disguised.)

Team A: High Trust

Team A was composed of five members, all of whom made contributions to the project and three of whom carried the majority of the load. This team exhibited a high level of optimism and excitement, task orientation, rotating leadership, good time management, a clear sense of task goals, and most of all high levels of individual initiative and accountability. The team was mindful of the need to communicate frequently and, even during their weekend trips, provided the team members with alternative ways to communicate with them. Even though three of the five members did most of the work, all members continued to address the whole team. The team members were cognizant of maintaining "team spirit," as they themselves referred to it.

From the start, all members expressed excitement about the forthcoming collaboration ("Looking forward very much to working with you all"; "It is exciting to work in a team with so wide a background and I think we can make a good assignment") and, rather than waiting for others to ask for their personal information, volunteered it with their first message. This optimism prevailed throughout the project. The team revealed many instances of positive reinforcement such as "great job!" and members would send messages congratulating a member on his or her excellent work. The positive individual and team references increased as the project went on and escalated at the end with vast amounts of enthusiasm at the effectiveness and commitment of the team members. In addition, many comments were made comparing their team to other teams, invariably referring to the problems that they had heard their colleagues speak about, whereas they found themselves on an extraordinary team. The final messages conveyed a sense of accomplishment and warm feelings toward team mates ("I shall be in touch soon, to congratulate us all on winning!!"; "It's been great fun as well as rewarding, keep in touch"). This team seemed to have trust from the start and maintained it through an upbeat tone in communication.

The team was task-oriented and rarely engaged in social comments of any kind, except for twice alluding to European football scores. The team had a clear sense of task goals and was very aware of time constraints, reminding each other of forthcoming deadlines. This team had their eye constantly on the clock even in the beginning weeks. For example, early during the project members stated, "We need to keep meeting the deadlines or the project will slip," "We don't have a large amount of time," and "there is this deadline." Compared with other teams, this team's communication was relatively free of excuses for not contributing to the team. Initially one member attributed lack of participation to access problems caused by a strike at his university; another member attributed lack of contact to a flu, and a third to a recent move to a new apartment. However, the third quickly noted, "Do you know what the devil's grandmother died of? Bad excuses. So therefore I will stop apologizing—and start working." From then on, there were few excuses about why members had not

Table 6. Communication Events of the Six Teams

Team	No. of members*	No. of members who dropped out	Total no. of messages	Messages per member**	Countries represented	No. of less active members***
A	5	0	114	22.8	Philippines Austria Denmark Finland USA	0
B	5	1	123	24.6	Brazil Ireland USA South Africa Denmark	0
C	4	1	123	30.75	Brazil Ireland Canada Austria/Denmark England	1
D	4	0	49	12.25	Australia The Netherlands Austria Finland	2
E	4	0	34	8.5	France Ireland USA Denmark	1
F	4	0	69	17.25	Finland Austria USA Denmark	2

* Does not include members that dropped out of the project.

** Does not include messages from members that later dropped out of the project.

*** Member considered less active when other members ask each other what happened to the member.

contributed. Rather, the members tended to inform each other in advance of forthcoming constraints.

The characteristic that most marked team A is that the members volunteered for explicit roles and engaged in independent work activities. That is, each individual took a great deal of initiative with regard to managing the group process and the major content work. Moreover, the members exhibited confidence in their abilities and in

their own independent tasks and did not wait for the approval of the group before embarking on their individual tasks. In several cases the strong individual initiative led to redundancy, with two members having worked on essentially the same thing unaware that someone else was working on it simultaneously: "Here is my weekend masterpiece. . . . Again, I made this without being aware that Jim already made an abstract. But it's okay . . . at least, now we're all in full gear! All the best to our group." Often a third member would collate the work of the two members who had been working independently and come up with a final version that merged the best ideas from the two (e.g., "Dear Virtuals! Mike and Jim have ideas that I like and I have things to add so I was going to do a cut and paste thing and add in my own bits").

In addition to independence of work, this team was characterized by rotating leadership in the sense that individuals acted as leaders when they saw the need. All five members made process suggestions and content contributions. Never did one person nag the other team members to give feedback, to complete their work, or to volunteer for tasks. Indeed, this team began with Jim immediately volunteering, "unless you prefer to have a vote," to coordinate the team-building exercises. Later, a member, Steven, suggested that the team have one member as leader each week, but that the leader rotate. He proposed a five-week/five-leader chart. The chart proved needless as leadership responsibilities rotated smoothly as the need arose. At one point, one member took the lead in preparing the final paper to be turned in, but a different member sent a message to the team to encourage everyone to review the document quickly and provide feedback so that the first team member could finalize the document for submission.

The team also had internalized a clear mutual goal ("a winning proposal") and kept reminding each other that the goal was within their reach ("we can do this together. Let's not give up the fight now! GO-GO-GO Team xx!!!"). This seemed to have a contagious motivational effect on members. At one point a potential problem appeared when Jim announced on April 19 that he would be unavailable until April 28 because he was tired and taking a trip. This would mean that he would be absent during the majority of the project time. The problem was ignored by the other members who continued working on the content of a draft proposal. Two days later, he informed the team that, having reread the contributions to date, he decided to postpone his trip. Jim then ended up contributing perhaps more than any other single team member as he completed a proposal draft, the html code for their web page, and the final paper.

Finally, team A had a serious focus on substantive comments: Rarely did members respond "looks good," "ok," "fine with me," when reviewing another member's work. Their feedback was specific, in-depth, and thoughtful, indicating a careful reading of each submission and a concern to contribute to the improvement of the material. There were in fact very few questions submitted among the 113 communication events—the members worked, submitted work, and responded to the work submitted by others. Team members did not ask "shall I do this" but merely acted and then asked for feedback. This is in marked contrast to some of the low-trust teams where individuals would ask what needed to be done, give very minor feedback, and always state what needed to be done but not actually do it themselves. Team A, in fact, wasted very little

time actually deciding what to do; on the contrary, individual members acted and then shared their results for improvement.

Team B: High Trust

Team B was above all characterized by frequent communication with a positive tone, by a very explicit division of labor, by acute attention to time management, and by proactive action. From the start, the team members sought to establish clear goals for the project and also to minimize redundant efforts. Compared with team A, this group exchanged more messages on "how," not just "what." That is, the members did not just divide work and work independently, but rather divided the work and gave each other detailed comments on how to accomplish the work. Like team A, team B communicated their excitement and optimism in their first messages ("I am very excited about working on the project with all of you . . . "; "I am really looking forward to work with you . . . the assignments do look very interesting"). Also like team A, team B engaged in very little socialization outside of the initial team-building exercises although short pleasantries were exchanged (e.g., "Happy Easter").

Team B engaged in a continuous stream of communication. This team sent several messages each day. Indeed, one member wondered why the other members wanted to have chat sessions when e-mail was working so well. The team did, nevertheless, engage in several chat sessions. In most cases not all members were able to connect. In order not to exclude these members, detailed minutes were kept and e-mailed to the nonchatting members.

As with team A, the leadership role of team B was neither fixed nor constant. Although the team discussed the appointment of a team leader and other roles given their past group work experience, each member was a leader of his or her portion of the work, with process leadership shared among all members. One member took a leadership role in terms of setting a schedule and defining procedures (such as agreeing to check mail at least once a day); however, the other members revised her suggestions until the entire group agreed.

This team was conscious of time and managed it by repeatedly setting milestones and revising them accordingly. A team member wanted to prepare explicitly for unexpected emergencies by including "buffer time" in the schedule. The team also deliberately tried to accomplish parallel although highly interdependent activities (e.g., design of the layout of the page and the content of the page) to save time.

This team was highly proactive: At the outset, the team had decided that members should push forward without waiting for approval from others, although redundancies should be minimized. The team also discussed how each should notify others of upcoming constraints. This team established early on an expectation of participation. This threatened the functioning of the team when a new member, Tom, was added after the team-building exercises. After an initial flurry of messages, this new member was silent for nine days. An active team member wrote, "Where is Tom?" On the following day, another team member wrote: "Some of us may have trouble devoting time, even if only an hour or so, on a daily basis till project completion. If we have

competing demands on our time, we should communicate our constraints and make efforts to contribute in a meaningful matter at the same time." Shortly after this message, Joe sent a message about a possible chat session specifically including Tom's name and asking Tom what he thought. Then, several days later Tom responded, "I am not missing. I am still chasing all your work. . . . You can thought [*sic*] that I am an investigator, not your teammate." Four days later, Anna remarked in the message, "We don't know what's become of Tom." Tom responded that the group's activities were beyond his ability. Seven days later, Anna again noted, "Does anyone know whether Tom has dropped out or is he still part of this team?" Joe responded, "I think he has dropped out: no participation in 'chat' session, no contribution, no news, no ideas . . . ." Then Anna sent a message to the whole team asking Tom to withdraw. Tom responded, "No problem." Although the whole situation could have resulted in some significant group disagreement, because of the initiative taken by one of the members to remove him from the team, the group norms of acceptable participation were reinforced.

In team B, successful team work was associated with rapid and thorough response to the ideas of others in the group, whether they were procedural or content-based, and whether they were in complete agreement or carefully stated disagreement. The members were very cognizant of letting others know when they would, and when they would not, be available. Indeed, the team grew so accustomed to rapid feedback that at one point a member seemed startled that no one had submitted comments to her abstract—when she had sent the abstract less than twenty-four hours before! Rarely did the members have to ask for comments and even more rarely did members only cursorily peruse their teammates' work; rather, their feedback gave evidence of thorough and thoughtful reading of their teammates' work. The members developed close affinity with each other, and the final messages conveyed a strong expectation of future interactions.

Team C: High Trust

Perhaps the most unique aspect of team C was that this team went through a metamorphosis or distinct transition halfway through the main task assignment. Before the metamorphosis, the team was very unlike team A and B, but after the transition, the team exhibited many of the characteristics of team A and B. The early messages from the members of team C were lukewarm at best and charged with social content and anxiety ("Am I alone here?"). The members kept begging for feedback and rarely received more than "GREAT" or a one-line response. The team was preoccupied with procedures about how members should label their messages, how the team should make decisions, how to behave in a chat session, who should do what, how much the project weighed toward a member's grade, and so on. The team had difficulty obtaining content from anyone—all the members seemed reluctant to proceed forward without approval from the others. One member constantly reminded the team of all of his work on the project, as if to imply that they were not working hard enough. Team members disappeared for days without prior notice, leading the

team to invent the notion of AWAL ("Absence Without Authorized Leave"). The progress was slow and largely accomplished as a result of external crises (e.g., a member had to report on the team's work in an organized class at his university).

Midway through the project, Kathy, after a two-day delay, reviewed the work that had been done and asked why her comments were "so bluntly" included in the page without discussion. She found this "a bit frustrating" and was "sad" that her contribution was not as much as the others. This seriously outraged another member, Jim, who felt that he was doing so much work and what did he get in response, complaints. The incident, however, was handled very promptly. Before even receiving any responses and only six minutes after her complaint, Kathy sent two messages stating that the team was nevertheless very good and she was very pleased. Evidently, before reading Kathy's two follow-up messages, Jim responded with his emotionally charged message, but he also immediately sent two follow-up messages apologizing (the first 25 minutes later and the second 72 minutes later)—before he, too, had heard anyone's response. Within hours the third active member, Jeff, wrote that disagreements were normal and that they were still a great team and should continue with the work. The incident, which easily could have permanently disrupted this team, instead helped to focus them and encouraged them to give feedback on each other's ideas.

After the incident, the members organized themselves, gave point-by-point feedback to each others' work, and felt greater confidence in their own portion of the work—indicated by less direct request for feedback. They also gave more positive feedback and thanks to each other for the work they were doing, as well as making remarks about how well the team worked together. The members themselves noticed the change in the team. At one point Kathy stated that she liked the "new group atmosphere"; the others readily agreed.

The team proactively excluded inactive team members. One member, who was receiving no course credit for the project, dropped off the team after a complaint that he was not contributing. Another member, Alex, made no comment for a long period and the other members informed the coordinator that he should be dropped from the team. However, he then returned and made some contributions that turned out to be of no value—a page of links he had designed without so much as a sentence description of where the links went and a set of pictures that were irrelevant to the project. This member again disappeared for a long period and the members began to ask "where is Alex?" and tried to decide what to do. One member sent another message to the coordinator that Alex should be dropped from the team. Alex again reappeared but this time was not forgiven. He tried to get into the good graces of one of the members, Jim, by addressing his message to Jim and stating that, while he knows that Kathy would never forgive him, he would like to rejoin. Jim did not respond. He then sent a second message to Jim saying that all the messages with documents from Jeff were unreadable, which he knows "may be on purpose," but he would still like to read them. Again, Jim did not respond. Alex sent a third message to Jim asking for the html code; again, there was no response. The team took active steps to redefine the team. From this point on, the team acted as if it were composed of three individuals.

The team established clear roles and divided work. Kathy searched for the informa-

tion that would be contained in the homepage, Jeff wrote the paper that was to be turned in and wrote definitions to be included in the homepage, and Jim did the page layout and coding for the homepage. Jim was the leader in terms of work; he consistently gave direction to the other two members on what needed to be done. At one point, Jim sent a fake message from Bill Gates that congratulated the team on their web pages. This message heightened the team's excitement and had continued motivational value even after Jim admitted sending the fake message. One of the other members took the lead in keeping an eye on the deadlines. This team consistently made promises of dates when they would do certain things and consistently stuck to their promised dates. They also made a point of notifying the members of dates when they would be unavailable to check their mail. Nine messages contained information concerning when they would not be available.

In summary, team C was able to make a transition from a rather passive team to one of the most active teams in the face of disaster. In the latter half of the main project, the team exhibited characteristics similar to teams A and B. Like teams A and B, the members expected to have future interactions, either virtual or face-to-face, reflecting the closeness that members had developed with one another.

Team D: Low Trust

Team D was characterized from the beginning by little communication, few goals for the project, and very little feedback. The team began the collaboration by checking to see if others were already on-line and if the system worked without actually introducing themselves. However, even when responding to members that their messages were received, the other members merely replied "ok, got the message" but neither introduced themselves nor greeted the other members. In what could be interpreted as a sarcastic reply, one member wrote "reply reply reply reply reply" in response to another member's request for a reply if his message was received. While the message may not have been intended as sinister, the failure to include a greeting or a closing as well as the fact that it was the first message sent by this individual would certainly not be expected to create positive feelings among the recipients.

The first several messages indicated a lack of understanding of the project and the lack of task goals. In an early message, one member asks "what the heck" they are supposed to do. One response was "I also don't know what to do." Another was similar. The same individual repeated the question one week later. Another individual responded by giving the URL address where the instructions could be located but did not summarize for the member what the project entailed.

The members of this team showed great reluctance to take on individual responsibility and be proactive. Rather than volunteer, members would ask who would like to volunteer to do this or that. Eventually one member, Blake, emerged as a leader. There was only one instance of positive feedback where a member thanked another for providing leadership.

Indeed, the only member who made any progress was the leader. Others were silent or absent. For example, on April 23, Blake had completed a draft site and gave the

location to the other members and asked for feedback. There was no feedback except by a member who asked, "anyone out there?" Blake sent the address again, along with a long description of the work he had done. The only reply was "Er . . . nice page . . . should I know these words . . . " There would be no further communication in team D from this point until the end of the project. In this message, the leader responded to his own messages—"Hi Blake. No, I have no comment. Bye, Blake"—in what can be interpreted as a cynical reflection of the lack of feedback from the other members. The leader completed the final assignment alone and submitted it from "Team D" without mentioning inactive members. Ironically, three weeks later a member sent a desperate request for the URL—he needed it to receive course credit. There was no response.

Team E: Low Trust

Team E suffered from so little communication that it appeared as if no one on the team was willing to contribute, unlike team D, where at least one member was willing to work. The first word to describe team E is blasé; the second is noncommittal. Each member in his or her introduction stressed time pressures. One member stated that his goal for the project was "to spend as little time as necessary but still get a decent grade." The other members had no particular goals. The concern with other commitments was evident throughout. One member asked each member to state how much the project was worth toward their grade. She appeared to want to know who should be mostly responsible for the project (i.e., the one for whom the project counted the most). This sort of logic appeared to be very destructive to the smooth functioning of a team. The same member later stated in a message how many projects she was working on. In a following message from another member, he too stated the number of different projects he was working on as though to suggest that she deserved no special leniency just because she had other work to do. The next message was from the third participating team member who stated that he had not checked his mail recently because he had "so much work" to do.

This team also suffered from lack of leadership. One member did volunteer to turn in the first team-building assignment and one member volunteered to code the team's project into html form. However, the latter offer was a mixed blessing as the member refused to do any other work, including giving feedback on ideas, aside from taking a final proposal and converting it to html form. The team was very task-oriented and never engaged in social comments of any kind. Only two instances of positive feedback were given—both when one individual thanked another for turning in the material.

The team communication was astoundingly low. At one point there was an eight-day lapse in communication (April 5–13) at a critical juncture in the project where the teams needed to choose their topic and define the parameters. On April 14, a member gave two seemingly interesting possible topics but never received any feedback on the ideas. On April 19 he asked again for feedback "even if you don't have strong feelings." Three days later there was a message—a team member volunteered to code

the project into html. She said, "Can we PLEASE try to respond" but did not even mention a word about the previous member's ideas. On April 22, a member gave four more ideas, again without commenting on the original two ideas presented by a member on April 14 and repeated on April 19. The contributor of the original ideas did provide feedback on the new ideas and contributed one more possible topic. The third participating member preferred the latter topic and that was the topic chosen. This member agreed to be responsible for two of the sections. He completed the sections by the determined date but his material lacked depth. The same problem occurred with the member responsible for the other three sections. Hence, the final product was a weak proposal prepared by individuals who divided the work and commented on no one's portions other than their own. This team did not choose the final topic until April 28—two days before the project was due!

Interestingly, this team had one nonactive member. One member asked what had happened to this member but no one responded. The nonactive member was ignored, perhaps because even the "active" members were barely active.

Team F: Low Trust

Team F was characterized by both lack of individual initiative and an unwillingness to give substantial feedback to others' work. Like team E, team F suffered from infrequent participation. Two individuals were primarily responsible for the total output of the project and both of them refused to put forth full individual effort given the lack of commitment from the other members.

Although the team members expressed their interest and commitment in early messages, no member was willing to take charge. Each time something was needed, a member would ask who was going to do the activity rather than volunteering. This began with the first exercise in which a member said that someone needed to coordinate the activity and asked for a volunteer. No one volunteered. The member who asked the question eventually volunteered himself. This same member later asked three times, "who is writing the paper?" but did not contribute so much as a sentence or an idea. Only one individual gave any ideas for the project itself. Another individual gave feedback on the ideas, essentially stating that they were all unfeasible because of their scope or difficulty, but gave no additional ideas himself. Another member said the ideas were too general but offered no suggestions on how to focus.

This team had participants who would give very minor contributions—such as a URL site to be included in the page—but would give no description of the site, hence leaving the work of deciding what to call the link, and how to describe it in the paper, to someone else. That "someone else" was the member who stated early on that he wanted to be responsible for coding and page layout. As with the coder in team E, this individual was entirely unwilling to make any decisions regarding content. Throughout the project, he reminded the others that he was just coding the information they sent—they were supposed to tell him what to include and what not to include. Each time a URL address was sent, he replied, "am I supposed to include this?" He neither reviewed the link independently nor gave any comments concerning its suitability.

Rather than the messages full of content found in the high-trust teams, the messages of this team were brief and full of questions. At one point a member asked if it was all right if he sent some site addresses he found, instead of just sending them and describing them. The response was: "alright, alright, alright." Team F members were also unwilling to do anything beyond what they already knew. The person coding the pages was very experienced with page development and hence insisted on doing the coding but would do nothing else. Toward the end, the coder informed the other team members that he was going on vacation and had "already done" his "share of the work."

At best, the members of this team, excluding the one member who did send some ideas and wrote sections of the paper, can be described as inactive. Only three instances of positive feedback occurred, two of which were rather mixed, "nice work, but . . . " The team was unable to complete the final assignment.

Discussion

A PATTERN-MATCHING APPROACH [5, 41] WAS USED TO INFER behaviors and strategies common to the high-trust teams, but less common to, or nonexistent in, the low-trust teams. Table 7 summarizes the results on the strategies. Strategies inferred were: proactive action, task versus procedural orientation, positive tone, rotating leadership, task goal clarity, role division, time management, nature of feedback, and frequent, sometimes intense bursts of interaction. The strategies are reinforcing of each other.

Proactive Orientation

The case studies suggest that the members in high-trust teams exhibited individual initiative, volunteered for roles, and met their commitments. The high-trust teams also dealt decisively with members who were perceived to be free-riders. The low-trust teams were opposite in these respects. The low-trust teams suffered from inaction, characterized by the asking of questions but rare delivery of any substantive work, and by asking for volunteers but rarely volunteering. The team members also rarely notified the team in advance of their absences.

On all three high-trust teams there were instances of members stating in advance that they would be out of town for the weekend, or for as much as a week, and then finding a computer from which to log in and contribute. The exertion of extra effort reinforced the level of perceived commitment the members had toward the team.

The high-trust teams dealt with free-riders by confronting, rather than ignoring or accepting, the problem. The teams took initiatives to inform the project coordinator of any nonactive members. Even though the teams were unaware of whether or not their complaints resulted in the official withdrawal of the nonactive member from the project, they were more comfortable as a team if they identified the members who were not contributing and redefined the team around the active members. By contrast, the low-trust teams ignoref the free-riders.

Table 7. Strategies between High- and Low-Trust Teams

Behaviors/strategies	High-trust teams	Low-trust teams
1. Style of action	• Proactive	• Reactive
2. Focus of dialog	• Task output driven	• Procedural
3. Team spirit	• Optimistic	• Pessimistic
4. Leadership	• Dynamic	• Static
5. Task goal clarity	• Team's responsibility	• Individual responsibility
6. Role division and specificity	• Emergent and interdependent	• Assigned, independent
7. Time management	• Explicit/process-based	• Nonexistence
8. Pattern of interaction	• Frequent, few gaps	• Infrequent, gaps
9. Nature of feedback	• Predictable, substantive	• Unpredictable, nonsubstantive

Task versus Procedural Orientation

In high-trust teams, the action orientation meant that team members were highly focused on results. The communication almost exclusively rallied around the assignments. Rarely did the teams have time for social dialogue. One of the high-trust teams discussed topics unrelated to the assignments, but this was only in the early stages when the team had difficulty in making progress. Although the communication in the high-trust teams was task-oriented, it is important to note that it was still empathetic. The team members discussed each others' tasks and results in a very supportive and amicable fashion, which in turn reinforced the team's collective commitment and good will.

Like the high-trust teams, the low trust teams engaged in little social communication. Yet, unlike the high-trust teams, the low-trust teams rarely expressed empathy: What little emotion was expressed tended to reflect uncertainty about whether anyone was reading their messages or frustration and disappointment that no one else was contributing.

Interestingly, the high-trust teams did not spend much time on group procedures, except one team in the early slow stages. Rather than being concerned that someone else was working on precisely the same thing, individuals on the high-trust teams tried to produce high-quality work and then share the work with the team for feedback and improvement. The low-trust teams spent relatively more time on procedures as members tried to evade responsibility and get others to do the work.

Positive Tone

The high-trust team members expressed excitement and showered other members with compliments and encouragement. On several occasions, the high-trust teams expressed how fortunate they were to have such a well-functioning team. Even at the end, the team members made explicit attempts to laud each other for excellent work.

Two of the high-trust teams were convinced by the start of the third assignment that they would be the winning team.

The high-trust teams handled disagreements so gently that it was barely perceptible that a disagreement had occurred. If a member made a suggestion with which another member disagreed, such as the suggestion of a member of team C that they should use majority vote to determine the idea chosen for the final project, the dissenting member responded not by directly addressing the point of disagreement but by offering an alternative along with an explanation.

The low-trust teams lacked positive tone in their communications. Compared with the high-trust teams, the low-trust teams exhibited little emotion of any kind in their messages. Nor did the team members express any interest in winning the $600 award; rather, the low-trust teams focused on what they might lose if they performed poorly rather than on what they might gain if they performed well. In addition, the low-trust teams were inordinately concerned with the differences in the course credit that team members received for completing the final project. The low-trust teams had few instances of disagreement, but because they were giving so little feedback on the other members' work, there was not much opportunity to disagree.

Rotating Leadership

The high-trust teams rotated leadership—the members each demonstrated certain leadership traits during the course of the project but the actual leader was neither chosen nor consistent throughout. As the perceived need for a member to press the others to present ideas arose, a member filled the position. As the need arose for someone to organize the remaining work, a member filled that position. In terms of the output, the same would apply. The members were leaders in their particular area of skill and the other members followed their directions. The members who took on responsibility for writing the html for the projects directed the other teammates during the coding period, whereas the members responsible for writing the draft made suggestions to the other team members concerning what to do. By contrast, the low-trust teams had no leadership or, in one case, a leader with no followers.

Task Goal Clarity

The high-trust teams discussed the goals of the assignments to a greater extent than the low-trust teams. In case of ambiguity in the assignments, the members in the high-trust teams did not hesitate to contact the coordinator with questions rather than making their own assumptions. Already during the team-building exercises, the high-trust teams exhibited knowledge of the assignment objectives and expressed what their personal goals were in the context of the overall collaboration and the assignments. Contrary to the high-trust teams, the low-trust teams undertook little discussion of task goals. Most of the communication concerning task goals was in the context of a member not knowing what they were supposed to do. In these instances, a member in the low-trust teams tended to provide only the URL to the site where the

assignment information resided rather than summarizing the assignments him or herself for the benefit of others. Members of the low-trust teams did not exhibit knowledge of the assignments and did not tie their own personal goals to the assignments during the team-building exercises beyond statements of "spend as little time as necessary."

Role Division and Specificity

Although the role of an individual team member tended to emerge after the individual had produced something on his or her own, each of the high-trust teams exhibited various roles for the team members. The fact that individuals were not assigned to teams based on their particular specialization or skill may have necessitated a flexible role arrangement whereby the role was decided after an individual took initiative for a certain task and produced a result ("You will be our webmaster"). Also in high-trust teams, the division of work did not mean complete independence. Rather, one person would come up with the first iteration of the work and others would provide detailed feedback. Hence, the high-trust teams associated roles with independence followed by several iterations of feedback and rework. The low-trust teams appeared to associate division of work with complete independence of work. In summary, the high-trust teams appeared to use roles so that they were able to reduce team interdependence to moderate levels. The low-trust teams divided work so that they could eliminate their interdependence.

Time Management

The high-trust teams explicitly discussed the assignment schedules, established milestones, monitored the milestones, and kept a close eye on time, reminding other members of impending deadlines. Furthermore, the high-trust teams were more aware of time zone differences and how to manage the global clock to reduce the "downtime" when no one was working on the common parts. The low-trust teams did not discuss time management apart from reminding others of the date when the assignment was due. The low-trust teams only referred to the time zone differences in the context of who should submit the completed assignments. The low-trust teams were also more likely to ask the coordinator for extra time. In short, the low-trust teams exhibited neither a sense of urgency from impending deadlines nor a notion of managing time.

Nature of Feedback

In the high-trust teams, members gave substantial feedback oriented toward improving the content of a fellow member's work. The feedback frequently involved some content contributions to add to the work, as well as some organizing and editing comments. In the low-trust teams, feedback was often a very minor "ok" or "looks good to me" statement that added very little value to the actual work. Thus, even if a

member specifically requested feedback on his or her work, he or she was likely to get only an acknowledgment that the work was perused, however cursorily.

Frequency and Pattern of Interaction

Probably to reduce the uncertainty of the global context, high-trust teams engaged in frequent communication, gave substantive feedback on fellow members' work, and notified each other of their absences and whereabouts. Overall, some of the high-trust teams had four times the message volume of a low-trust team. Frequent, and sometimes intense, bursts of interaction appeared to reinforce trust in the high-trust teams. Low-trust teams repeatedly issued messages of "Is there anyone out there?"

In both high- and low-trust teams, individuals were reluctant to believe that their messages were actually successfully sent if they did not receive fairly rapid feedback. As a means of appeasing the stress related to not knowing whether one's message was received and, if so, whether it was read, the members on the high-trust teams were careful to inform their teammates when they would, and when they would not, be available to check their messages. This gave the other members a degree of certainty concerning when their messages would be viewed and answered. By contrast, the low-trust teams suffered from lengthy unexplained lapses in communication followed by sudden unexpected reemergences.

A Model of Trust in Global Virtual Teams

Triangulation of our qualitative results with the recent literature on trust suggest that the three high-trust teams might have exhibited a form of "swift" trust. Swift trust [21] was developed to explain behaviors in face-to-face temporary teams. In a temporary team, team members "have never worked together and do not expect to work again" [21, p. 168]. Members of such teams do not have the time to develop trust in a gradual and cumulative fashion. Rather, the team members act as if trust is present from the start.

Whereas trust is typically conceptualized as either an affective or a cognitive construct, swift trust is a form of depersonalized action. According to Meyerson, Weick, and Kramer [23], "There is less emphasis on feeling, commitment, and exchange and more on action, . . . and heavy absorption in the task" (p. 191); "swift trust may be a by-product of a highly active, proactive, enthusiastic, generative style of action" (p. 180). The "swift trust" enables members to take action, and this action will help the team maintain trust and deal with uncertainty, ambiguity, and vulnerability while working on complex interdependent tasks with strangers in a situation of high time pressure.

Besides the action orientation, the other strategies associated with the three high-trust teams seem to align with the Meyerson et al. [23] coping mechanisms of temporary teams and hence to be associated with swift trust. Meyerson et al. discuss how there are few purely social exchanges in temporary teams because "anything that subtracts from task performance . . . should be a glaring threat" (p. 177). We found

the global virtual teams to be task-oriented. Meyerson et al. [23] also point to the need to have a moderate level, not a high level, of dependence on any particular member to reduce perceived vulnerability. The strategy of rotating leadership reduced dependence on any particular person. The strategies of clear task goals, role division, and specificity gave the teams a sense of clear expectation and task systems and thereby provided the illusion of reduced vulnerability. The sense of limited time and explicit time management is related to Meyerson et al.'s [23] comment that "temporary teams rarely exhibit certain kinds of dysfunctional group dynamics" that deal with "jealousy, misunderstandings, and hurt feelings" (p. 190). According to Meyerson et al. [23], "there is simply not enough time for things to go wrong" (p. 190). Finally, high levels of interactivity tend to reduce ambiguity and uncertainty and should strengthen trust in temporary teams [23]. In the three high-trust teams, members communicated frequently and provided extensive and substantive feedback to each other.

The high-trust teams appeared to exhibit swift trust from the outset. In particular, the teams' early messages contained traces of initiative and trustful actions. The low-trust teams did not exhibit any overt lack of trust in the beginning; hence, we can only assume that trust also existed *ex ante* in these teams. However, this trust decreased almost immediately, because the members lacked action and initiative. By contrast, the action orientation in the high-trust teams appeared to reinforce and strengthen trust. Hence, action seems to be an important antecedent as well as an outcome of trust. Action that went beyond the call of duty strengthened trust.

The current case analysis does not provide clear evidence on the relationship between action and the other antecedents of trust: integrity, ability, benevolence, and propensity to trust. Boyle and Bonacich [1] maintain that trusting behavior will affect trust directly. By contrast, Mayer et al. [22] argue that trusting behavior will influence trust indirectly through the antecedents of trust; that is, inactivity might be interpreted as a lack of goodwill (benevolence), a lack of ability to contribute (ability), and/or a lack of reliability and honesty (integrity).

In summary, trusting action is as much an antecedent of trust as an outcome of it. The relationship between action and trust appears to be highly recursive in a virtual-team context. Figure 2 advances a model of trust for global virtual teams.

Conclusion

THE PURPOSE OF THE REPORTED STUDY WAS TO EXPLORE the antecedents of trust in global virtual teams. Although the team-building exercises had a positive effect on the perceptions of other members' integrity, ability, and benevolence, they did not have a direct effect on trust. In the early phases of teamwork, team trust was predicted more strongly by perceptions of other team members' integrity, and least strongly by the perceptions of their benevolence. The salience of other members' perceived ability on trust decreased over time. The members' own propensity to trust had a significant, although unchanging, effect on trust. Perhaps the most interesting finding was that the qualitative case analysis suggests that high-trust

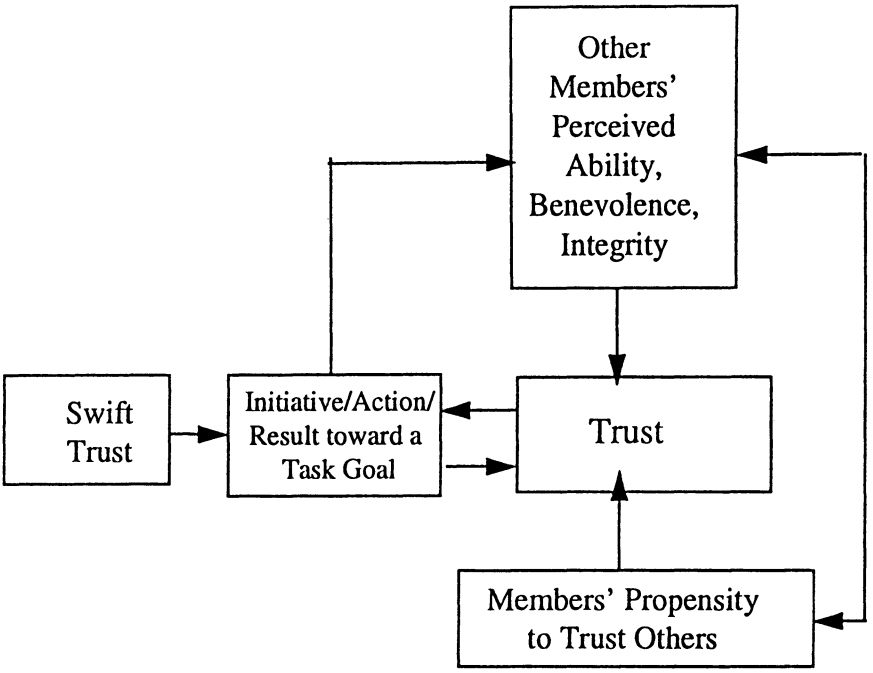

Figure 2. A Model of Trust in a Global Virtual Team

teams exhibit swift trust [23]. Prior to discussing implications for research and practice, we consider some of the limitations.

Limitations

Given that the teams did not have an opportunity to meet in person or use telephone or video conference facilities, one might argue that the current context was contrived. Nevertheless, from a practical standpoint, our study provides a glimpse of the future where compressed time windows and project budgets do not allow people to travel for overseas team meetings. The study provides a rare opportunity to examine pure virtual interaction free from any influences of face-to-face interaction.

The study's methodology can be criticized in several ways. First, the team-building exercises might have been too brief or might have been considered artificial by the participants. Devising exercises to increase trust in teams is a potentially lucrative project but was beyond the scope of the current study. Second, the tasks might not have been appropriate to all participants even though we had no evidence suggesting that certain participants found the project irrelevant to their studies. Third, the case analyses relied on members' using the team address rather than direct their mail to the individual members' addresses. Hence, the team analyses might be based on limited information. Our prior studies [13] suggest that teams send relatively infrequent individually directed messages because it is much easier to use a team address. Fourth, the measurements of trust and the antecedents of trust were modified from a scale

intended for dyadic, as opposed to team, relationships. Finally, although professors whose students were invited to participate were informed that the collaboration should count for 20 to 40 percent of a student's course grade, there were wide discrepancies in course credit and hence in participants' risk level.

The external validity of the results might be faulted for the use of students as participants. One should note, however, that the students were in masters' programs and most of the students had significant work experience. The theory of swift trust assumes that people are assigned to teams on the basis of their ability. In the current study this was not the case because we did not start this study by exploring swift trust. Many transnational teams have an appointed project leader. The current teams were self-directed and, unless they appointed a leader, a leader emerged, or leadership was shared, the teams were "leaderless." In addition, some teams had only two active members, where other teams had as many as four or five active members. Unfortunately, we were not able to ascertain whether or not all active members completed the survey. Hence, there is a potential bias in the responses in that some active team members may not have completed the surveys and we cannot determine the reasons for their failure to provide responses. Finally, the teams were limited to electronic mail and occasional chat sessions: No video conference or telephone conference facilities were available. Hence, the technology was of lower bandwidth than might be expected in situations where team members do not travel.

Implications for Research

The research on trust in global virtual teams is a wide open field. Future research should examine the relationship between trusting behavior and the other antecedents of trust. Our earlier study alluded to the importance of structure and norms in well-functioning virtual teams [13]. Future work might study how norms emerge and how they are enacted. The current study suggests tentatively that, once the high-trust teams agreed on, for example, the acceptable time lapse between messages, the members adhered to this relatively well and those who did not were asked to leave the team. It remains unclear whether the existence of trust allowed these norms to emerge or whether the consensus of norms reinforced the trust. We suspect both are true. Future studies should also examine if virtual teams go through the type of transition between inertia and revolution in the work behaviors and themes found by Gersick [8] in face-to-face teams. Such transition was only explicitly evident in team C, but our qualitative analysis of three high- and three low-trust teams might not have been in-depth enough. Future research also needs to verify the current findings and more rigorously assess swift trust and the means to maintain it. The initial list of strategies may or may not be unique to our context. Also, future work needs to develop an understanding of the relationship between swift trust and team behavior and should explore distrust versus trust in a virtual context. Finally, future research should study whether dyadic and team trust are substantially different and require fundamentally different measures.

Finally, much work remains in terms of the type of tasks, individuals, team size, and

the length of project duration that are most suited to virtual collaboration. There is a plethora of issues related to global clock management and the best ways to divide and integrate work in a team dispersed around the world. Future studies should assign individuals to teams on the basis of skill or specialization and should examine the concept of roles in virtual teams.

Implications for Practice

For practicing global virtual teams, the study suggests a number of strategies that they might deploy to reinforce trust and, in turn, to improve their team process outcomes. These strategies include proactive behavior, empathetic task communication, positive tone, rotating team leadership, task goal clarity, role division, time management, and frequent interaction with acknowledged and detailed responses to prior messages. The study also points out the importance of having as virtual members those who have a high propensity to trust. But, perhaps most important, virtual members should have high levels of initiative, results orientation, and integrity.

Concluding Note

The current paper has explored the emerging phenomenon of global virtual teams where only virtual, not face-to-face, interaction is possible. The antecedents commonly associated with trust in face-to-face dyadic relationships—trustor's perceived ability, benevolence, integrity, and trustee's propensity to trust—were found to predict trust in the virtual-team context. A number of behavioral strategies were identified that appeared to distinguish the highest-trust teams from the lowest-trust teams. These strategies suggested the presence of swift trust. The paper proposed a preliminary model of trust for global virtual teams.

Although the current analysis was on the team level, one might be able to infer implications for individuals. Those individuals who perform best in global virtual teams are not likely to be entirely different from individuals who perform best alone: individuals who are action-oriented, who are willing to take initiative on their own, and who are goal-driven. Latham and Lock [18] found that, in an international setting, a team member skilled in self-management, in goal setting, self-monitoring, and self-assessment was critical for performance. Snow, Snell, and Davison [33] found similar results: In successful transnational teams, team members were committed to the team's mission and norms, could be counted on to perform their respective tasks, and enjoyed working in a team. When such capable individuals commit to a team, they are able successfully to manage the uncertainties and unknowns of a global virtual-team environment.

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APPENDIX A: Participating Universities

Aarhus School of Business, Denmark	Keio Business School, Japan
Asian Institute of Management, Philippines	Latrobe University, Australia
University of Auckland, New Zealand	University of Montreal, Canada
University of Caen, France	National University of Singapore
University of Calgary, Canada	University of Ottawa, Canada
University of Canberra, Australia	Universiteit van Pretoria, South Africa
Copenhagen Business School, Denmark	University of Sao Paulo, Brazil
De Montfort University, Great Britain	San Jose State University, U.S.
University College Dublin, Ireland	University of Texas at Austin, U.S.
Ecole des HEC, France	Thammasat University, Thailand
Erasmus School of Business, Netherlands	Turku University, Finland
Fundacao Getulio Vargas, Brazil	University of Twente, Netherlands
University of Gdansk, Poland	Vienna University of Economics, Austria
University of Jyvaskyla, Finland	University of Western Australia, Australia

APPENDIX B: Measured Used

The items measuring benevolence, ability, integrity, trustworthiness, trust, and propensity to trust are as follows:

Benevolence

The other team members were very concerned about the ability of the team to get along.
The outcomes of this project are very important to the other team members.
The other team members would not knowingly do anything to disrupt or slow down the project.
The other team members are concerned about what is important to the team.
The other team members will do everything within their capacity to help the team perform.

Integrity

The other team members try hard to be fair in dealing with one another.
The other team members have a strong sense of commitment.
I never am doubtful about whether the other team members will do what they promised.
I like the work values of the members on this team.
The other team members do not behave in a consistent manner—I am never sure if they are going to do what they promise or not.
The other team members display a solid work ethic.

Ability

I feel very confident about the other team members' skills.
The other team members have much knowledge about the work that needs to be done.
The other team members have specialized capabilities that can increase our performance.
The other team members are well qualified.
The other team members are very capable of performing their tasks.
The other team members seem to be successful in the activities they undertake.

Trust

If I had my way, I wouldn't let the other team members have any influence over issues that are important to the project.
I would be comfortable giving the other team members complete responsibility for the completion of this project.

I really wish I had a good way to oversee the work of the other team members on the project.
I would be comfortable giving the other team members a task or problem that was critical to the project, even if I could not monitor them.

Trustworthiness

Members of my work group show a great deal of integrity.
I can rely on those with whom I work in this group.
Overall, the people in my group are very trustworthy.
We are usually considerate of one another's feelings in this work group.
The people in my group are friendly.
There is no "team spirit" in my group.
There is a noticeable lack of confidence among those with whom I work.
We have confidence in one another in this group.

Propensity to Trust

One should be very cautious when working with foreign students.
Most foreign students tell the truth about the limits of their knowledge.
Most foreign students can be counted on to do what they say they will do.
If possible, it is best to avoid working with foreign students on projects.
Most foreign students are honest in describing their experience and abilities.
Most foreign students answer personal questions honestly.
Most foreign students are very competent in terms of their studies.