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FURTHER UNDERSTANDING OF TRUST AND PERFORMANCE IN VIRTUAL TEAMS

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Trust has been deemed to be critical in ensuring the efficient operation of virtual teams and organizations. This study empirically verifies ability and integrity as being antecedents of trust formation in virtual teams. However, effective team performance was found to be independent of the formation of trust. Further analysis suggests that information symmetry and good communication distinguish high performance teams from low performance teams.

Keywords: trust; virtual teams; agency theory; organizational use of IS

Organizations today are being transformed. Recent advances in information technology, combined with a more flexible approach to job design, have led to an increasing number of people working away from their company premises or “teleworking.” Information technologies are also making possible new organizational forms while at the same time obliterating the notion of distance and compressing the time required to circulate information among teams and departments. The Internet allows people from around the world to work together on a common project in a cost effective manner. More and more, enterprises have employees who are not physically present at the traditional premises of the organization. Hence, many

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employees now work on teams that seldom, if ever, meet face-to-face. These “teleworkers” have the same responsibilities and challenges as regular employees, plus they have the added challenge of managing the efforts, dynamics, and processes of a team that may only meet in cyberspace.

Although these advances are promising, they raise complex management issues surrounding leading, controlling, and motivating virtual teams. As projects progress, group dynamics evolve and the team members need to deal with project task allocation, decision making, conflict, and team maintenance tasks (e.g., esprit de corps, cohesion)—all of which can have a positive or negative effect on trust. Determining how these factors affect virtual team members and their managers will increase our understanding of how to foster productive relationships between teleworkers and their employers.

The word *team* may be defined as “a group composed of a small number of people, with complementary skills who are committed to a common purpose, set of performance goals and approach for which they hold themselves mutually accountable” (Field, 1998, p. 264). During the years, many models of team dynamics (e.g., McShane, 2000; Shaw, 1981), developmental processes (e.g., Gersick, 1988; Tuckman, 1965), and performance and effectiveness (e.g., Gladstein, 1984; Hackman, 1987) have been developed both to explain how individuals come together to form teams and to determine how to reduce process losses in these teams and improve performance. Like every team, virtual teams are composed of groups of people performing interdependent tasks with a common purpose who are mutually accountable for their results and possess complementary expertise. Members can be from the same organization or a variety of organizations. Unlike conventional teams, virtual teams work across space and time, employing webs of information communication technology (Paré & Dubé, 1999) to form relationships and complete their work. Kelsey (1999) provided a more formal definition of *virtual team*:

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 who are separated by geographic distance and who use computer-mediated communications as their primary form of communication and interpersonal contact. (p. 104)

THEORETICAL FRAMEWORK

Although virtual teams have taken on more importance in recent years, dispersed collaboration has existed in most periods. As early as the Middle Ages, trade relied on coalitions of dispersed collaborators (Greif, 1989). Trust in these commercial partners and their fulfillment of promises, at a time when information could take months to travel from one partner to another, relied on the reputation of the partner and promises of future trading.

Similarly, for more modern collaborators, most researchers contend that trust is a determining factor in the effectiveness in any complex system requiring coordinated action (Granovetter, 1985; McAllister, 1995; Seabright, Levinthal, & Fichman, 1992). For example, trust in a contractual relationship can facilitate the exchange of information and bring about a reduction in control and its associated costs (Zand, 1972) because the parties do not have to fear any manifestations of opportunism (Granovetter, 1985; Hill, 1990; Nooteboom, Berger, & Noorderhaven, 1997). Yet, Simon (1991) indicated that the notion of trust has not been sufficiently considered in economic approaches, whereas management and organizational behavioral researchers only recently have begun any in-depth investigations of trust (e.g., Jones & George, 1998; Mayer, Davis, & Schoorman, 1995; McAllister, 1995). Our research is designed to increase our understanding of the role of trust in virtual teams from both an economic perspective and an organizational behavioral perspective.

One key component in a successful virtual team is the ability of the team members to deliver the promised work. It is generally assumed that a critical factor in the successful completion of a project is trust in fellow team members to deliver their share of the work on time and with sufficient quality (e.g., Jarvenpaa, Knoll, & Leidner, 1998). Agency theory provides some insight into the

dynamics that could be involved in the formation of this type of trust.

Two main thrusts of agency theory are the ability to trust and the contract conditions most conducive to motivating the agent to perform the agreed-on work to the principal's satisfaction. In all transactions between two parties, the economic partners act in their own best interests. This opportunism signifies that control mechanisms and incentives must be in place to ensure that they respect the terms of the agreement. The parties are limited by bounded rationality and they cannot foresee all the contingencies inherent in a contract (Williamson, 1985). In every contract, it is possible that the agent will not exert maximum effort or that he or she will cheat on the value of the services rendered. Each party may have no other choice but to monitor the other parties or to establish incentive mechanisms to motivate the collaborators. All these mechanisms are expensive. The agency costs represent the costs of writing contracts, costs of applying contractual clauses (e.g., surveillance, incentives, etc.), and the lost residuals resulting from imperfectly coordinating and motivating the contracting parties (Eisenhardt, 1989; Jensen & Meckling, 1976; Milgrom & Roberts, 1992; Sappington, 1991). The formation of trust is desirable because it reduces the costs of monitoring and controlling, hence, making the transaction more efficient.

Many of these elements, notably the development of trust, assume that observation is feasible. In a virtual team context, observing other team members' efforts is often impossible. Although collocated teammates may meet face-to-face to discuss a project's progress, it is often impossible for the remote members of the team to join these meetings. Collocated teammates can much more easily engage in monitoring, controlling, and trusting their local colleagues to ensure they are working effectively than can their remote teammates who must rely more on trust that their unseen virtual teammates are actually fulfilling their obligations. These remote members must rely on trust most of all because many of the mechanisms traditionally used to monitor and control partners are absent in virtual teams.

The Mayer et al. (1995) definition of *trust* encapsulates the dilemma faced by virtual teams. They defined *trust* as

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* [italics added]. (p. 712)

High trust, if justified, would enable virtual teams to work efficiently without incurring high agency costs.

Mayer et al. (1995) viewed three different antecedents as being critical to trust formation: the trustee's perceived ability, benevolence, and integrity. They postulated that integrity would have the most impact in the early stages of a relationship, whereas the impact of benevolence on trust formation would increase with time. Although not explicitly stated, Mayer et al. seem to have viewed the impact of ability on trust formation as remaining constant during the course of the relationship. A personality characteristic of the trustor, propensity to trust, was thought to moderate the impact of these three antecedents on trust formation as well as being an antecedent itself. Propensity to trust was thought to remain stable throughout a relationship. Jarvenpaa et al. (1998) tested the Mayer et al. model in their research study on trust formation in global virtual teams and found support for this model. They found that propensity to trust did have a stable effect on trust, whereas the effects of perceived ability, integrity, and benevolence changed with time. They did not test any links with performance.

McAllister (1995) developed a theoretical framework that incorporates the impact of trust formation and monitoring on performance. He viewed trust as having both cognitive and affective foundations. Cognition-based trust is based on the factual knowledge the trustor has of the trustee (which closely parallels agency theory's conceptualization of trust), whereas affect-based trust consists of the emotional bonds between people. McAllister found that the formation of cognition-based trust was positively correlated with the formation of affect-based trust and preceded its development. Affect-based trust, in turn, had an indirect impact on the performance levels of the managers in his study.

This current research tested the relationships between the antecedents of trust, trust formation, and performance outcomes. First, the antecedents of trust, as presented in Mayer et al. (1995) and in Jarvenpaa et al. (1998), were formally tested in a longitudinal manner evaluating their relationships with trust at the beginning of a project in a virtual environment and assessing again the same relationships at the end of the project. Hence, the first set of hypotheses were designed to test Propositions 2, 3, and 4 from Mayer et al. (pp. 720, 722). In all cases except where noted, these hypotheses apply to both collocated teammates and remote teammates.

Proposition 2 of Mayer et al. (1995) states "Trust for a trustee will be a function of the trustee's perceived ability, benevolence and integrity, and of the trustor's propensity to trust" (p. 720). Thus, the higher the level of perceived ability, benevolence, and integrity of a trustee, the more the trustor will trust him or her. The more a trustor is likely to trust someone, even without advance knowledge (i.e., propensity to trust), the higher the level of trust in the trustee. In addition, not only will propensity to trust moderate the impact of perceived ability, benevolence, and integrity on trust levels (Mayer et al., 1995), but propensity to trust will have a direct effect on the level of trust the trustor has in the trustee. The following hypotheses result from this analysis.

Hypothesis 1a: The level of trust a trustor has in a trustee is positively associated with the level of perceived ability, benevolence, and integrity of the trustee.

Hypothesis 1b: The level of trust a trustor has in a trustee is positively associated with the trustor's propensity to trust.

Hypothesis 1c: The trustor's propensity to trust moderates the relationship between the trustee's perceived ability, benevolence, and integrity and the level of trust experienced by the trustor.

Proposition 3 of Mayer et al. (1995) states "The effect of integrity on trust will be most salient early in the relationship prior to the development of meaningful benevolence data," and Proposition 4 states "The effect of perceived benevolence on trust will increase over time as the relationship between the parties develops" (p. 722). A critical factor in their theoretical development of these two prop-

ositions is that the trustor can observe the actions of the trustee as he or she interacts with other employees. In the case of virtual teams, the collocated teammates can observe how their local teammates treat others, but they cannot observe how the remote teammates are interacting with people in the remote city. Because being perceived to have integrity involves the trustee following a set of principles acceptable to the trustor and delivering on commitments when and how promised, the integrity of remote teammates can be judged only on how they deliver on their commitments, including preparation for and participation in group chat meetings. Thus, a trustor can assess the integrity level of a remote trustee, albeit using a reduced set of input. The same analysis can be applied to the development of perceived benevolence. Because benevolence implies an attachment between people and a desire to do good (Mayer et al., 1995), initial levels of benevolence should be low as it takes time to develop an affective bond between people. However, as the project proceeds, teammates will have sufficient opportunity for interaction and providing support to each other; hence, perceived benevolence should increase. Thus, the development of both perceived integrity and perceived benevolence should increase for both local and remote teammates. However, because the local teammates would know each other at the beginning of the project, but not their remote teammates, the levels of perceived integrity and perceived benevolence should be higher among local teammates than between the local and remote teammates.

Hypothesis 2: At the beginning of the project, the levels of perceived integrity and benevolence among local teammates will be higher than levels between local and remote teammates.

Hypothesis 3a: At the end of the project, the levels of perceived integrity and benevolence among all teammates will be higher than at the start of the project.

Hypothesis 3b: At the end of the project, there will be no differences in the levels of perceived integrity and benevolence between local and remote teammates.

The development of trust during the course of the project and the link between trust and performance were also assessed. Assuming

that most employees are committed to contributing quality work and to forming good working relationships, then the perceived integrity and benevolence between individual teammates should increase, as previously stated. As perceived integrity and benevolence increase, the level of trust the trustor experiences for the trustee should also increase. The direction of change in perceived ability is not as clear-cut. Not all employees have the same levels of ability, and as the project proceeds, certain teammates will be seen to have lesser ability than others, whereas others will be seen to be contributing excellent performance. Hence, overall, levels of perceived ability, on average, should remain stable. However, the impact of increased perceptions of integrity and benevolence should be sufficient to increase the level of trust overall.

Hypothesis 4: The level of trust between local and remote teammates will increase as the project progresses.

Finally, building on McAllister's (1995) work, the following can be hypothesized:

Hypothesis 5: The level of trust among local and remote teammates will be positively associated with effective performance.

METHOD

SAMPLE

Business students from two Canadian universities took part in this study. One of the universities is located in Toronto, Ontario, and the other in Montreal, Quebec. In total, 71 students participated in the study, which resulted in 68 sets of usable questionnaires being completed. All of these students were in the final year of completing their bachelor degree. The students were grouped into teams. First, the students self-selected their local teammates to form 11 teams. They were subsequently randomly grouped into 11 virtual teams composed of students from both Montreal and Toronto. They were asked to conduct a research project and submit

a formal report at the end of the semester. The typical team consisted of 3 students from each university. Because there were more Montreal students than Toronto students, some teams had 4 students from Montreal and others had only 2 students from Toronto.

The students had 3 months to produce a research paper on a topic of their choice. A list of potential topics was provided. Deadlines were also given. Teams had to write an abstract of their paper early in the process to verify that they were on a promising track. To communicate, they had access to a web site with several chat rooms and to e-mail. The papers were graded, and the results accounted for from 25% to 30% of the students' final evaluation for their course. All students in a given team received the same grade (in Montreal and in Toronto). It was clearly presented and implemented as a joint project.

Team members had access to online and on-site support for any technical difficulties, and a research assistant monitored the chat rooms and discussion forums on a regular basis to ensure that no technical difficulties went unresolved. There were pictures of team members on the site to increase the sense of community. It was clearly stipulated that none of the professors would access the web site, the chat room, or any discussion forum before the course was over and the marks allocated. This ensured that the students felt free to comment on any issues they wanted without having any concern about potential negative feedback from the professors.

MEASUREMENT

To assess the variables in the model, the measures used were those of Jarvenpaa et al. (1998). Appendix A shows the measures that were used; the measures are grouped according to the constructs being tested. The presentation of these measures on the actual questionnaire was randomized. Questionnaires were completed at the beginning of the project to assess the initial trust participants had in their colleagues and at the end of the project to assess the trust they had after completing their task. Measures were taken for two groups. First, respondents were asked to answer the questionnaire for their local partners. Then, they answered the same

questionnaire with respect to the members of their team in the other university (the remote group). Therefore, four sets of data were collected:

Initial measure–local members	Initial measure–remote members
Final measure–local members	Final measure–remote members

To validate the measures, partial least squares (PLS), a second-generation multivariate method, was used. First generation multivariate methods, such as multiple regression, factor analysis, analysis of variance, and others help evaluate constructs and relationships between constructs. However, such an evaluation has to be performed in subsequent steps. Other methods, called second-generation methods (Fornell, 1984), perform analysis of a model as a whole rather than evaluating each relationship separately. Instead of simply aggregating measurement error in a residual error term, these methods simultaneously evaluate both the measurement model and the theoretical model. They adjust the relationships between the variables accordingly (Aubert, Rivard, & Patry, 1996). Two of these newer methods, and probably the most popular, are covariance structure analysis (most often referred to as LISREL) and PLS. PLS presupposes no distributional form of the data.

The required sample size for analysis is 10 times the number of items in the largest construct. Five times the largest construct is considered adequate but less stringent (Gopal, Bosrom, & Chin, 1992). In this research, the largest construct is ability with 6 items. The sample (68 respondents) was deemed adequate; it exceeds the 10 to 1 ratio for all the constructs.

RELIABILITY ANALYSIS

The measures, as shown in Table 1, demonstrated a high level of reliability. Only one item, from the propensity to trust measure, was dropped after the reliability analysis. The measures are provided in Appendix A (all items were answered on a 1 to 7 scale). To evaluate the reliability of the measures, three evaluations were done. First,

the Cronbach's alphas were computed. Second, the Rho coefficients were computed. Finally, the average variance extracted was also calculated. Both the alpha and the Rho coefficients should be above .7 in a confirmatory study (Gefen, Straub, & Boudreau, 2000; Thompson, Barclay, & Higgins, 1995). The measures reached these acceptable levels (see Tables 1 through 4). All of the Rho coefficients are above .8. The Cronbach's alphas are all more than .7, with the exception of the initial measures of propensity to trust—remote team at .68 and trust—local team at .69. A suitable criteria for the average variance extracted is that it should be more than 50% (Aubert et al., 1996). Our measures all comply with this rule. In fact, 18 of the 20 measures have an average variance extracted of more than 60%.

CONVERGENT AND DISCRIMINANT VALIDITY

To evaluate convergent validity, the loadings of each questionnaire item on its respective measure were computed (see loadings in boldface in Tables 1 through 4). Two criteria are generally used to evaluate loadings. The most stringent criteria stipulate that loadings should have values of more than 0.707—indicating that they share half of their variance with their construct—and a minimum value of 0.5 (Barki & Hartwick, 1994). All the loadings are above the 0.5 mark with one exception: The first item measuring benevolence, for the initial—local evaluation, has a loading of 0.33. However, this same item had satisfactory loadings in all three other questionnaires and was kept. Eighty-four of the 96 loadings were above the strict 0.707 criterion. This strongly supports the convergent validity of the items.

To evaluate discriminant validity, the cross-loadings produced by PLS were used. A measure showing discriminant validity should be composed of items with high loadings on their appropriate constructs (convergent) but with low loadings on other constructs (Gefen et al., 2000). When looking at the results in Tables 1 through 4, it seems that discriminant validity is not as strong as convergent validity. Cross-loadings are high (often above 0.5) on many variables. The only reassuring element is that the cross-loadings are

lower than the loadings on the appropriate construct, which is the desired pattern (Gefen et al., 2000). This relatively weak discriminant validity is also apparent when considering the correlation matrix between the variables and the square root of the average variance extracted for each construct. A perfect matrix should have much higher numbers in the main diagonal (boldface numbers in Tables 1 through 4) than the correlation coefficients. Although the correlation coefficients are smaller than the numbers in the diagonal, they are only limitedly so. This indicates that the discriminant validity of the measures is limited.

These results are consistent with those obtained by Jarvenpaa et al. (1998). They reported high reliability (evaluated by Cronbach's alphas) and high loadings in a factor analysis (which supports the reliability and the convergent validity). No formal evaluation of the discriminant validity was done. However, Jarvenpaa et al. reported the correlation coefficients of their variables, and these were generally high and significant, thus presenting a very similar pattern with the data in the current study.

RESULTS

TRUST

A first examination of the results shows an interesting fact. Initially, the students tended to put more trust in their team members from their own university, as shown in Table 5. The difference between the level of trust in the local members of the team and the level of trust in the remote members of the team is significant (t test). The initial difference could be attributed to the lack of knowledge the students had of their remote partners. It is safe to assume that they knew most of their local partners from previous courses taken in the same program.

If this hypothesis were true (the lower level of trust was attributable to the lack of knowledge), the level of trust in the remote teammates should increase with time after several interactions with the

(text continues on p.591)

TABLE 1: Initial-Local Measures

<i>Questionnaire Item</i>	<i>Loadings (/100)</i>				
	<i>Benevolence</i>	<i>Integrity</i>	<i>Ability</i>	<i>Propensity</i>	<i>Trust</i>
1	33	19	-5	10	0
2	83	47	42	28	5
3	59	41	30	22	13
4	85	55	52	34	12
5	83	68	57	40	17
6	66	75	60	51	27
7	58	86	64	59	12
8	44	83	55	57	18
9	58	88	79	64	23
10	44	66	40	66	12
11	57	85	59	54	32
12	57	77	78	72	24
13	47	60	85	59	15
14	50	60	83	44	36
15	50	61	91	56	32
16	46	69	91	75	19
17	37	55	84	56	7
18	32	69	63	85	11
19	29	46	45	76	10
20	25	55	51	70	22
21	39	58	64	86	14
22	6	5	11	-4	83
23	13	32	28	27	77
24	16	27	26	21	88
<i>Reliability and Validity</i>					
α	.72	.89	.92	.81	.69
Rho	.83	.92	.94	.87	.87
AVE	.51	.65	.73	.63	.68
<i>Comparison Between Correlations and Square Root (AVE)</i>					
Benevolence	.71				
Integrity	.68	.81			
Ability	.56	.74	.85		
Propensity	.40	.72	.70	.80	
Trust	.14	.26	.26	.18	.83

NOTE: AVE = average variance extracted. Loadings shown in boldface.

TABLE 2: Initial-Remote Measures

Questionnaire Item	Loadings (/100)				
	Benevolence	Integrity	Ability	Propensity	Trust
1	83	68	44	37	22
2	84	79	68	52	44
3	87	77	52	43	46
4	89	71	53	38	39
5	91	86	57	58	47
6	86	87	64	45	48
7	81	90	65	58	54
8	65	78	54	50	53
9	74	88	83	63	64
10	74	82	66	71	64
11	64	81	71	48	46
12	45	65	72	44	61
13	59	69	88	56	65
14	52	60	87	62	53
15	52	65	85	68	56
16	59	77	92	52	70
17	53	73	88	49	70
18	36	51	48	76	33
19	28	36	38	61	35
20	33	43	44	75	17
21	54	60	55	75	33
22	40	54	63	23	85
23	38	53	58	48	86
24	41	61	69	33	89

Reliability and Validity

α	.91	.91	.92	.68	.82
Rho	.94	.94	.94	.81	.90
AVE	.75	.71	.73	.52	.75

Comparison Between Correlations and Square Root (AVE)

Benevolence	.87				
Integrity	.88	.84			
Ability	.63	.80	.86		
Propensity	.53	.66	.64	.72	
Trust	.46	.65	.73	.40	.87

NOTE: AVE = average variance extracted. Loadings shown in boldface.

TABLE 3: Final-Local Measures

<i>Questionnaire Item</i>	<i>Loadings (/100)</i>				
	<i>Benevolence</i>	<i>Integrity</i>	<i>Ability</i>	<i>Propensity</i>	<i>Trust</i>
1	67	42	7	16	20
2	87	65	38	46	29
3	83	65	46	45	53
4	86	79	45	61	31
5	88	69	46	49	52
6	77	80	48	56	45
7	68	78	50	54	23
8	66	88	72	65	50
9	61	85	55	52	40
10	31	51	33	53	9
11	54	78	57	48	46
12	31	54	58	39	53
13	36	54	83	42	40
14	26	46	85	55	37
15	34	58	90	57	54
16	45	54	75	51	51
17	48	66	84	64	51
18	34	49	43	69	20
19	35	58	52	83	33
20	44	48	46	77	45
21	57	66	63	86	37
22	37	37	50	32	87
23	42	53	67	47	90
24	43	37	41	36	91
<i>Reliability and Validity</i>					
α	.87	.82	.88	.80	.82
Rho	.91	.90	.91	.87	.92
AVE	.68	.60	.63	.62	.80
<i>Comparison Between Correlations and Square Root (AVE)</i>					
Benevolence	.83				
Integrity	.78	.78			
Ability	.46	.69	.80		
Propensity	.54	.70	.65	.79	
Trust	.45	.48	.59	.43	.89

NOTE: AVE = average variance extracted. Loadings shown in boldface.

TABLE 4: Final-Remote Measures

<i>Questionnaire Item</i>	<i>Loadings (/100)</i>				
	<i>Benevolence</i>	<i>Integrity</i>	<i>Ability</i>	<i>Propensity</i>	<i>Trust</i>
1	84	67	52	37	37
2	91	69	58	41	47
3	91	86	73	58	58
4	95	83	63	55	57
5	90	85	72	58	55
6	82	90	75	63	58
7	81	86	67	47	49
8	73	86	65	69	57
9	70	90	74	66	52
10	50	62	43	48	22
11	78	89	72	60	62
12	69	75	91	65	60
13	59	69	87	64	51
14	55	64	85	60	65
15	59	66	88	62	57
16	64	70	91	65	44
17	56	61	68	49	40
18	36	47	52	82	42
19	38	53	40	71	28
20	35	48	53	72	54
21	65	72	78	91	65
22	21	31	34	38	63
23	64	67	61	67	88
24	42	40	48	34	82
<i>Reliability and Validity</i>					
α	.94	.92	.92	.79	.74
Rho	.96	.94	.94	.87	.82
AVE	.81	.71	.73	.63	.61
<i>Comparison Between Correlations and Square Root (AVE)</i>					
Benevolence	.90				
Integrity	.86	.84			
Ability	.71	.79	.85		
Propensity	.56	.70	.71	.79	
Trust	.57	.60	.62	.60	.78

NOTE: AVE = average variance extracted. Loadings shown in boldface.

TABLE 5: Trust Levels

<i>Level of Trust</i>	<i>Initial</i>	<i>Final</i>
Local team members	4.81	4.99
Remote team members	3.52	3.23
Level of significance (local-remote)	.000	.000

team members. Looking at the results, it is clear that the frequent interactions (during more than 3 months) were not sufficient to increase trust. The results indicate that the difference between trust put in local members versus remote members did not decrease. In fact, the opposite occurred; the difference went from 1.29 to 1.76 (on a 1 to 7 scale). Interestingly, this increased difference is due to two combined effects. First, the trust in the local team increased significantly ($p < .05$), whereas the trust in the remote team decreased slightly (but the difference was not significant at the .05 level). Thus, Hypothesis 4 was disproved.

ANTECEDENTS OF TRUST

When observing the antecedents of trust, a very similar pattern is discernible (see Table 6). All independent variables show stronger numbers for the local team members than for the remote partners. In all cases, the difference between the two subgroups is significant (t test). This is observable for both the initial and the final evaluations. This trend, discernible for the trust level and its antecedents, indicates that virtual teams failed to establish the conditions necessary for trust to develop effectively during the process.

The results shown in Table 6 support Hypothesis 2. At the beginning of the project, the levels of perceived integrity and benevolence among local teammates were significantly higher than levels between local and remote teammates. However, this does not change over time. These levels did not differ significantly at the end of the project, and although the differences in absolute numbers were very small and not statistically significant, they were diverging: Levels among local members increased and levels between

TABLE 6: Means and Significance of Difference—Independent Variables (Initial–Remote)

	<i>Initial</i>			<i>Final</i>		
	<i>Local</i>	<i>Remote</i>	<i>Significance</i>	<i>Local</i>	<i>Remote</i>	<i>Significance</i>
Ability	5.59	4.49	.000	5.81	4.07	.000
Benevolence	5.81	4.83	.000	5.89	4.54	.000
Integrity	5.63	4.50	.000	5.67	4.04	.000
Propensity to trust	5.05	4.73	.029	5.23	4.41	.000

local and remote members decreased. Thus both Hypothesis 3a and Hypothesis 3b were disproved.

RELATIONSHIPS BETWEEN TRUST AND ANTECEDENTS OF TRUST

When observing the relationships between trust and the antecedents of trust, several elements can be noted. First, the elements pertaining to the initial evaluation will be mentioned, followed by the analysis of the final evaluation. It is interesting to note that in all cases, the percentage of variance explained in the PLS models is very good, ranging from 45% to 63%.

Figures 1 and 2 reveal the similarity between the patterns (PLS) observed for local and remote members of the teams in the initial evaluation. In both the local and the remote evaluations, integrity shows the strongest link with trust. The second significant link is the one between ability and trust. It was hypothesized that integrity would have the strongest link at the beginning of the team life and that the influence of ability would be constant. The propensity to trust does not appear to influence trust. In the local evaluation, benevolence shows a negative and significant (although only at the .1 level) relationship with trust. Perceived benevolence is expected to increase trust.

An interesting element perceived when comparing the two initial models is the fact that although they are similar, the local one is clearer. It shows more significant and stronger links, and the percentage of explained variance is higher. At the beginning of the experiment, the members had limited contact with their remote

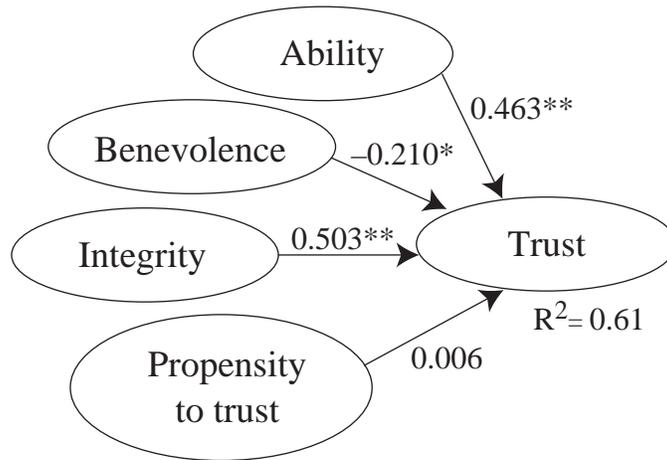


Figure 1: Initial Evaluation-Local

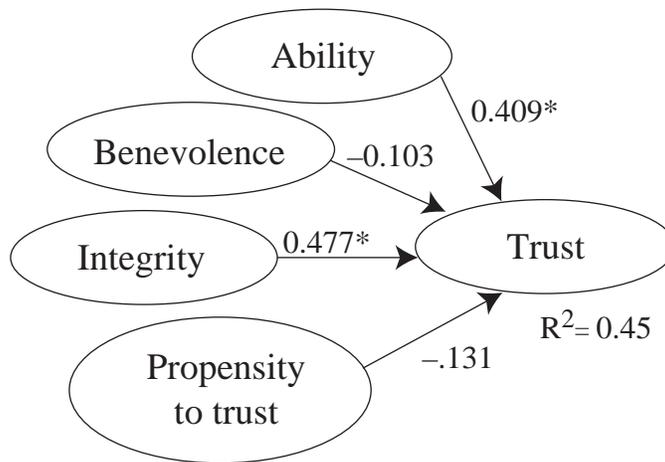


Figure 2: Initial Evaluation-Remote

counterparts, and this might explain the relative fuzziness of the distant model.

When observing the final evaluations (Figures 3 and 4), the pattern of the local team members (Figure 3) is similar to the initial one (Figure 1). Integrity still plays the strongest role, and ability comes in second. However, the significance level of the variable ability is better, suggesting less unexplained variation in the response pattern. Benevolence no longer has a significant negative impact on trust, removing that puzzling role. For the remote team (Figure 4), integrity remains the strongest driver, followed by ability. The main difference is in the role of the propensity to trust. For the first time, this variable presents a significant link, in the direction expected, with trust. At this stage, the subjects had much greater knowledge of their remote counterparts and this is probably why the links in the final-remote model (Figure 4) are strong and significant. It provides a clearer picture than the initial evaluation (Figure 2).

Thus, Hypothesis 1a received only partial support; perceived ability and perceived integrity were positively linked to the formation of trust, but perceived benevolence was not. Propensity to trust was significant in only one of the four evaluations; thus, no clear support was found for Hypothesis 1b.

To test the moderating influence of the propensity to trust, all periods were grouped together. The sample was split into two groups: high propensity to trust and low propensity to trust (using the median as the cutoff point). PLS models were computed to evaluate if the independent variables (benevolence, integrity, and ability) played different roles in the two groups (which differed in terms of their propensity to trust).

The results, shown in Table 7, are interesting. Of course, as observed before, perceived integrity and ability are the two main drivers of trust. However, although in the low propensity to trust group the perceived integrity is by far the strongest driver, the reverse is true in the high propensity to trust group. In this group, perceived ability is the strongest driver. However, none of the subgroup evaluation explains more variance than the one using all the cases, suggesting that evaluating both groups together did not incorporate too much "noise" in the data.

Although the results do not suggest that the propensity to trust has a simple or uniform effect on the relationship between the ante-

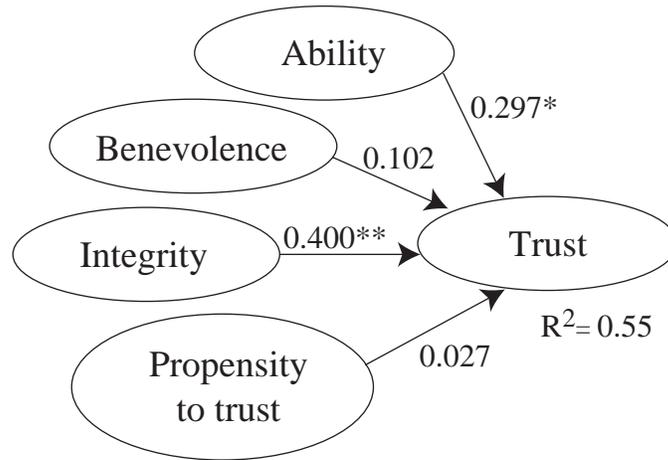


Figure 3: Final Evaluation-Local

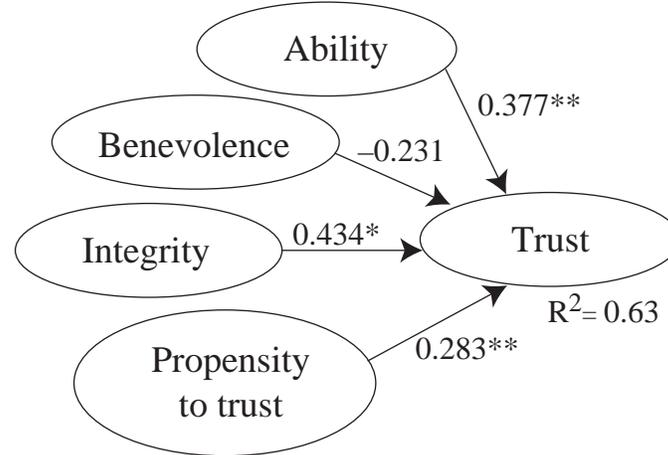


Figure 4: Final Evaluation-Remote

cedents of trust and the trust level, they do suggest that there is some effect. The main conclusion is that members with high propensity

TABLE 7: Moderating Effect of the Propensity to Trust

<i>Variable</i>	<i>All Cases</i>	<i>Low Propensity</i>	<i>High Propensity</i>
Benevolence	-0.115	-0.146	-0.100
Integrity	0.510	0.645	0.329
Ability	0.409	0.288	0.555
Variance explained	0.623	0.600	0.596

to trust will be more likely to trust people whom they perceive have strong abilities, whereas members with low propensity to trust will tend to trust others with high perceived integrity. However, all this is relative because in both groups, perceived ability and integrity are the main factors explaining trust. It is their relative importance that changes from one group to the other.

PERFORMANCE

The role of trust and its importance in a team process lies in its assumed link with team performance. Trust is assumed to be positively associated with team performance. To test this link formally, the following model was evaluated:

$$\begin{aligned} \text{Team performance} = & \text{constant} + \beta_1(\text{trust initial-local}) + \\ & \beta_2(\text{trust initial-remote}) + \beta_3(\text{trust final-local}) + \\ & \beta_4(\text{trust final-remote}) + \beta_5(\text{individual performance}) \end{aligned}$$

Team performance was evaluated using the final score obtained by the team for their paper. The four trust scores were computed using the items described in the previous section. To control for the quality of the students forming each team (individual performance), we used the standardized score of the students in their individual exams.

This enabled the evaluation of the effect of trust on performance, once individual quality of team members is taken into account. A regression analysis was conducted (instead of a PLS model) because only one indicator was available for both team performance and individual performance. PLS (of which linear regression is a special case) is more appropriate when variables are mea-

sured using multiple indicators (Gefen et al., 2000). The results follow in Table 8.

This model explains 29% of the variance. As can be observed in Table 8, the only component of trust presenting a significant positive influence on the team performance is the final-remote evaluation. This effect is very similar (in strength and significance) to the effect of the quality of the team members as measured by their individual performances. Thus Hypothesis 5 was not supported; for three of the four evaluations of trust, there was no significant relationship between the trust levels among teammates and the effectiveness of their performance. Table 9 summarizes the overall results.

DISCUSSION

The results of this study show that the level of trust among teammates has a negligible effect on team performance. This is quite surprising, given that a number of previous studies have found a significant, positive correlation (e.g., Jarvenpaa et al., 1998). Trust among local team members, both at the beginning of the project and at the end, never had a significant impact on performance. Initial levels of trust between local and remote subteams also did not have a positive impact on performance. However, the final levels of trust between local and remote subteams did have a significant impact on effective performance. In this case, the higher the level of trust between the two subteams when they submitted their project, the higher the final mark received on the project.

Furthermore, the dynamics of trust formation as hypothesized received only partial support. Trust for a trustee was positively associated with how the trustor perceived the trustee's ability and integrity. It was not linked with the trustee's perceived benevolence. Thus, it appears that good intentions do not build trust; only the ability to perform and actually deliver on commitments (i.e., integrity) will lead to the formation of trust in the trustee. This relationship holds true regardless of the trustor's propensity to trust. Even someone who tends to trust others can have that trust shat-

TABLE 8: Performance Evaluation

<i>Dependent Variable: Group performance</i>	<i>Standardized Beta Coefficients</i>	<i>t</i>	<i>Significance</i>
(Constant)		14.397	.000
Trust initial–local	.215	1.279	.208
Trust initial–remote	.043	0.282	.779
Trust final–local	.052	0.312	.756
<i>Trust final–remote</i>	<i>.333</i>	<i>2.289</i>	<i>.028</i>
<i>Individual performance</i>	<i>.326</i>	<i>2.259</i>	<i>.030</i>

NOTE: Italics indicate variables with $p < .05$.

TABLE 9: Summary of Results—All Hypotheses

<i>Hypothesis</i>	<i>Result</i>
Hypothesis 1a: The level of trust a trustor has in a trustee is positively associated with the level of perceived ability, benevolence, and integrity of the trustee.	Supported for ability and integrity Not supported for benevolence
Hypothesis 1b: The level of trust a trustor has in a trustee is positively associated with the trustor's propensity to trust.	Not supported
Hypothesis 1c: The trustor's propensity to trust moderates the relationship between the trustee's perceived ability, benevolence, and integrity and the level of trust experienced by the trustor.	Supported
Hypothesis 2: At the beginning of the project, the levels of perceived integrity and benevolence between local teammates will be higher than levels between local and remote teammates.	Supported
Hypothesis 3a: At the end of the project, the levels of perceived integrity and benevolence among all teammates will be higher than at the start of the project.	Not supported
Hypothesis 3b: At the end of the project, there will be no differences in the levels of perceived integrity and benevolence between local and remote teammates.	Not supported
Hypothesis 4: The level of trust between local and remote teammates will increase as the project progresses.	Not supported
Hypothesis 5: The level of trust among local and remote teammates will be positively associated with effective performance.	Not supported

tered if the trustee does not produce work of sufficient quality and does not deliver on commitments and meet deadlines. So again, our

results contradict the findings of Jarvenpaa et al. (1998) and do not support the relationship of the three antecedents of trust formation as hypothesized by Mayer et al. (1995).

The key question now is Why did trust play so negligible a role in delivering effective performance in these virtual teams? To answer this question, we conducted a series of post hoc analyses suggested by organizational behavior theories of group processes and dynamics. When people work together in teams, they need to address both task-related issues and socioemotional ones (i.e., interpersonal relations and their own reactions). In addition to conducting the task activity, groups generally pass through stages of group development (e.g., Tuckman, 1965), establish norms regarding work, establish roles and resolve role conflicts and ambiguity, and address status and cohesion issues (Field, 1998). Groups that fail to satisfactorily address these issues often suffer productivity losses as a result of expending effort on discussions that are extraneous to the group's tasks and goals or by engaging in behaviors designed to meet individual needs at the expense of group goals. Steiner (1972) called these activities "process losses," and they are evident to the degree to which the task performance of a particular group falls short of what its predicted performance should be, based on individual capabilities. The goal of Steiner and others was to help groups work together efficiently and effectively so that their performance would exceed what would be expected from the individuals; that is, the groups would experience "process gains."

Tuckman's (1965; Tuckman & Jensen, 1977) pioneering work on group stages in face-to-face groups is still relevant today because virtual teams often go through forming, storming, norming, and performing stages before adjourning (e.g., Kelsey & Aubert, 1997). Teams that effectively handle the processes in each of these stages generally benefit from process gains and synergy, meaning the final result is of a higher quality than could have been expected if each person had done the work individually. Teams that address these issues ineffectively suffer process losses as their efforts are often focused on simply getting their team members to work together. Thus, less effort is devoted to the project at hand, and the final result can be a poorer product than any of the individual

members themselves would have produced. This is particularly true of groups who get bogged down in the storming phase; they continue arguing throughout the project as to what needs to be done, the best way to do it, what norms to follow, and who should be doing what (but often is not). These teams may end up having incompatible norms (e.g., each individual has a different perception of the word *quality*). They end up performing simply because there is a deadline and something must be produced, in our case, a team research report to be submitted to their professors. However, the final product is of lower quality than would normally be possible because the team members wasted a lot of effort on trying to get the team to work together (i.e., process losses occurred).

To determine if group process losses could account for the lack of a relationship between trust and performance and between individual marks and performance, we looked at both the final team project mark and the marks assigned to each subteam's team analysis report. Each of the subteams in both cities was required to produce a second report that described, analyzed, and evaluated the team dynamics that occurred while producing its research paper. Students were asked to reflect on the experiment and take stock of the whole experience. Although we wanted the students to experience working in a virtual team for its own sake, we also wanted them to reflect on the experience and compare what it was like to work in a virtual team with their previous experiences working in traditional teams. Table 10 presents these results. Although it appears that there were few process gains (see numbers in italics) (i.e., the team report mark significantly exceeded at least one of the subteam report marks), there definitely appears to have been significant group process losses (see numbers in bold) (i.e., some teams who produced excellent subteam reports developed poor team reports). For example, Team 1 received a project mark of 67%, yet the separate subteam reports were of much higher quality (78% and 82%).

To determine if the performance of individual team members was correlated with the mark received on that individual's subteam

TABLE 10: Team and Subteam Report Marks (in percentages)

<i>Team</i>	<i>Team Mark</i>	<i>Montreal Subteam Mark</i>	<i>Toronto Subteam Mark</i>
1	67	78	82
2	<i>84</i>	<i>90</i>	<i>72</i>
3	<i>68</i>	<i>76</i>	<i>74</i>
4	<i>77</i>	<i>86</i>	<i>72</i>
5	<i>78</i>	<i>84</i>	<i>76</i>
6	68	82	88
7	<i>92</i>	<i>78</i>	<i>92</i>
8	64	70	74
9	72	92	78
10	<i>75</i>	<i>80</i>	<i>78</i>
11	<i>74</i>	<i>86</i>	<i>68</i>

NOTE: Numbers in italics denote few process gains. Boldface numbers denote significant group process losses.

report, correlation was measured. There was a significant positive correlation between the marks received on the examinations by each team member and the mark received on that team member's subteam report (correlation = .339, $p = .007$). This suggests that good students are capable of generating good results as subteam members, whereas poor performers delivered mediocre results as team members. However, it does not explain why some subteams composed of poor performers were able to produce a good team report; nor does it explain why a few subteams composed of good performers ended up producing a poorer joint report. We conjecture that although individual subteams might have experienced some process gains, or at least neutral team processes in their face-to-face teams, some of these same subteams were partners in ineffective virtual teams that suffered process losses. It also appears that some virtual teams were able to overcome the barrier of working with strangers to produce a report at least as good as one of the teams by themselves could have produced. It is interesting to note that teams showing process losses had lower levels of trust at all times (both within local and remote teams) than teams showing process gains. However, none of these differences was significant at the $p < .05$ level.

INSIGHTS GLEANED FROM SUBTEAM REPORTS

The subteam reports provide some insights that help explain this pattern of performance. It is possible that these reports might not be entirely accurate because they were being submitted to the respective professors for marks. However, because marks were being assigned for the quality and depth of analysis of the team dynamics, and not for convincing the professors that their team was the best or the worst, this possible bias should have a limited effect. Although the reports do not provide the same kind of reliability and validity as the questionnaires, they do provide insight that the researchers could not have anticipated and which future research can pursue. Reports produced by Teams 1, 2, 6, and 7 were selected for further analysis. Teams 2 and 7 were high performers. Teams 1 and 6 had a very low team score but high subteam scores. These were deemed the most interesting teams to analyze because it can be argued that all components (subteams) were of high quality and that the only varying component is the team result. In a laboratory setting, it would be equivalent to observing high and low performers while controlling for subteam quality.

The two low-performing teams shared some common characteristics: they had different perceived goals, they experienced communication problems, and they recognized that they had performance and process problems but did not address them satisfactorily. On the other hand, the two high-performing teams behaved quite differently. One team (Team 2) experienced high trust, shared common work ethics and norms, and communicated frequently and effectively. The other team (Team 7) experienced a very asymmetric relationship. The Toronto subteam did not trust the Montreal subteam, recognized there were performance and process problems, and devised an effective strategy to overcome the problems to deliver a high quality report. The Montreal subteam trusted the Toronto subteam initially, acknowledged that their own performance was sometimes not as good as it could be, but did not come to grips with the process problems. These characteristics are further explained below, and the relevant quotes are provided in Appendix B along with their corresponding numbers.

Low performers had different perceived goals. Many elements suggest that subteams in the low-performing teams had different perceived goals (Quotes 3, 7, 8, 14, 19, and 20). The Toronto half of Team 1 had higher standards (Quote 3), which were perceived as being too perfectionist by the Montreal subteam members (Quote 7) who were more interested in the process than in the end result (Quote 8). These differences were also visible in Team 6, where the Montreal subteam members were deemed more interested in making friends than in working on the project (Quote 14). The differences in perceptions were also recognized by the Montreal subteam (Quotes 19 and 20). Interestingly, this had little to do with how the team members got along together. Although relations could be cool (Quote 6), generally these low-performing team members liked each other (Quotes 4, 12, and 24).

Low performers had communication problems. In both low-performing teams, communication problems occurred and complaints about responsiveness were frequent (Quotes 1, 2, 15, 18, 21, 24, and 25). Team members reported a lack of punctuality (Quotes 20 and 26), absenteeism (Quote 26), and insufficient feedback (Quotes 1, 2, 9, and 10).

Low performers recognized they had performance problems but did not effectively resolve them. The low-performing Team 6 reported that information asymmetry was present in many elements associated with the content of the work (Quotes 22 and 23). Both teams reported asymmetry with respect to the process, most notably problems in meeting deadlines (Quotes 11, 13, and 17). It appears that although they recognized some process problems, they did not recognize the potential negative impact on their final report (Quotes 5 and 16).

High performers who trusted agreed-on work ethics and norms. Team 2 shared the same work ethics and norms (Quotes 28, 31, and 35) and acknowledged their trust in their teammates (Quotes 27 and 34). They felt comfortable dividing the project into separate tasks and letting each person do his or her own portion (Quote 31).

High performers who trusted had high levels of transparency. In Team 2, information was shared to a great extent. Many quotes support the fact that they ensured high levels of transparency within their work, enabling all members to know what each one was doing, communicating frequently, and providing access to work already done (Quotes 26, 29, 30, 32, and 33).

High performers who did not trust recognized performance problems and devised effective strategies to resolve the problems. Team 7 shows a very interesting pattern. The Toronto subteam members were unsure about their Montreal teammates (Quotes 36 and 37). Although they discussed their concerns among themselves, when chatting with Montreal they pretended that everything was all right (Quote 38). They acted as if the entire team was functioning effectively and consciously put on a brave “virtual face” that was not always real (Quote 40). It appears that they correctly assessed how to motivate the Montreal subteam and implemented a strategy based on the self-fulfilling prophecy theory (Rosenthal & Jacobson, 1968) (i.e., if we pretend they are working well, they will actually work effectively). Results seem to prove their point (Quotes 39 and 41). The Montreal subteam never perceived this duplicity, and members did their work thinking that everything was fine most of the time (Quotes 42, 43, and 44).

These insights help us understand the team process as a whole and extend our understanding of virtual teams and trust. We began this study by hypothesizing that trust was associated with lower agency costs and therefore would be beneficial to team performance. Although our results show that trust did not directly influence performance, many elements in the subteam reports suggest that the overall process effort was lower in teams who also trusted their teammates. They experienced reduced information asymmetry and an increased understanding of the progress of each member's work. They also reduced the amount of time required to coordinate efforts by constantly communicating their ideas and progress, hence, eliminating the need for additional messages to monitor each other. All these elements suggest lower agency costs.

This may be why there was a significant relationship between the final remote evaluation of trust and performance. It is possible that teams who went through the process without incurring severe agency costs—facilitating the production of high quality output—might have developed trust among their teammates. On the other hand, teams that did not develop trust during the process, but still produced high quality output, may have expended significantly more effort and incurred significantly higher agency costs to produce the same level of output as the trusting teams. Future studies, using a modified design, should address this issue.

CONCLUSION

This study assesses the relationship between the antecedents of trust and the level of trust formation in virtual teams, as well as the relationship between trust and performance. The empirical findings reveal that the perceived ability, integrity, and benevolence of remote teammates were significantly lower than the ratings of local teammates and that this gap increased as the projects proceeded. Trust was also higher among local teammates than among the remote partners. The results also show the critical role of ability and integrity in the formation of trust.

Interestingly, the results indicate that the formation of trust is not necessary for a virtual team to deliver a quality result. Some teams showing low levels of trust were able to provide high quality output. It seems that one explanation of this lack of relationship between trust and performance may reside in the notion of process loss or gain. Although some low trust teams might have delivered high quality result, they may have expended significantly more effort to do so than did high trust teams.

The results of this research have revised our understanding of the role of trust in facilitating effective performance and point to the importance of improving our understanding of the complex relationship that exists between effort exerted, ability, trust, and final performance levels.

APPENDIX A
Trust Survey Measures

TRUST

- If I had my way, I would not let the other team members have any influence over issues that are important to the project. (*reversed*)
- 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. (*reversed*)
- 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.

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.

BENEVOLENCE

- The other team members are 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 in their capacity to help the team perform.

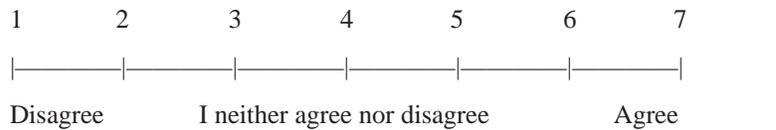
INTEGRITY

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. (*reversed*)
The other team members display a solid work ethic.

PROPENSITY TO TRUST

One should be very cautious when working with students. (*reversed*)—dropped
Most students tell the truth about the limits of their knowledge.
Most students can be counted on to do what they say they will do.
Most students are honest in describing their experiences and abilities.

SCALE FOR ALL QUESTIONS



SOURCE: Adapted from Jarvenpaa, Knoll, and Leidner (1998).

APPENDIX B
Selected Quotes From Subteam Reports (translations are in italics)

<i>Quote Number</i>	<i>Quote</i>
Team 1—Low Performer—	
Team Report = 67%	
Toronto Subteam	
Report = 82%	
1	“The research outline was established through a number of iteration processes among the Toronto team. The outline was sent to all members waiting for their confirmation. However, the other members’ responsiveness appeared to need additional pushing.”
2	“There was an observable norm with most of the members that they did not provide feedback on the message they received. This norm persisted throughout the project period. To the sender, sometimes it was a frustrating experience like having something going into a void without making a sound.”
3	“Although Chantal and Pierre [names changed] anticipated a relatively high factor to satisfy group members, their goal was set to achieve the project at a ‘good enough’ level. This seemed to disrupt the working ethic Sara and John [names changed] were accustomed to. With high standards aimed for completion, John and Sara felt on several instances that the Participation of the group members was not sufficient to support the amount of quality that was desired.”
4	“The working attitude of the members had created a cohesive environment that allowed each of us to interact comfortably.”
5	“The Toronto team overall viewed a steady progress in the completion of the report towards the last quarter of the project. Even though there were slight barriers, a solution was always available. . . . In terms of performance as a whole, our group was able to collaborate under pressure in terms of deadlines and have information and data available upon request.”
Team 1—Low Performer—	
Team Report = 67%	
Montreal Subteam	
Report = 78%	
6	“Nous avons trouvé que dans les réunions virtuelles, les relations sont beaucoup plus froides et impersonnelles.” <i>We found that in virtual meetings, relationships are more impersonal and cold.</i>

- 7 “Nous croyons que le perfectionnisme de deux des membres de Toronto ont fait en sorte que nous avons perdu beaucoup de temps sur des brouilleries relevant de la présentation et non pas de l’intérêt commun de finaliser le contenu du travail.”
We think that the perfectionism of two members from Toronto led us to lose a lot of time for unimportant activities linked to the appearance of the report instead of working on the common element, the content of the work.
- 8 “Nous croyons aussi que notre attitude de laisser-aller n’a pas aidé la cause. . . . Alors que nous voyions ce travail plus général et comme une excuse pour expérimenter les réunions virtuelles plutôt qu’une recherche très approfondie.”
We think that our laid-back attitude did not help. We saw the task more as an excuse to experiment with virtual meetings rather than an in-depth research to conduct.

Team 6—Low Performer—

Team Report = 68%

Toronto Subteam

Report = 88%

- 9 “Feedback was not always prompt, though it was dealt with before long.”
- 10 “Frustrations in making the time and balancing the workload of other courses (projects) made it difficult to bear in mind that this was a simulation. Group member, Sophie [name changed], had no access to the communication tools from home so it was hard for Mary [name changed] to update and communicate the progress of the team to her physically as their schedules rarely coincided with each other. In turn, Sophie felt powerless in contributing to the group.”
- 11 “The Toronto members submitted their portions of the project during the assigned dates, making the management of this team a lot more effective, while the Montreal members did not.”
- 12 “[The Montreal subteam] was a very pleasant group of students to work with.”
- 13 “In terms of ‘Performance Management Mechanisms,’ Paul [name changed] dealt with the Montreal group members on an individual basis. Acting in the ‘parent’ ego state, Paul openly criticized his Montreal members for not finishing their work on time, and for not completing it according to our group’s overall specifications.”
- 14 “It was as if Suzanne and Line [names changed] wanted more to make friends with Sophie and Mary, rather than work on a group project. Social conversation was of high importance to the girls from Montreal.”
- 15 “Only two to three times did all six of us arrive on chat at the same time.”
- 16 “Our group dynamics conformed to that of any team triumphant in achieving their goals and accomplishing one’s goals cooperatively could be deemed a success all on its own.”

APPENDIX B (continued)

<i>Quote Number</i>	<i>Quote</i>
Team 6—Low Performer— Team Report = 68% Montreal Subteam Report = 82%	
17	<p>Respect des échéances: “Le respect des échéances globales est contrôlé par le consort des deux chefs d’équipe. S’il y a retard, le chef d’équipe ainsi que les autres membres veilleront à discipliner le coupable et à s’assurer que le résultat global n’en soit pas affecté.”</p> <p><i>Deadlines: The two team leaders ensured that the deadlines were met. If there was a delay, the leader and the other team members made sure that the guilty person was disciplined and that the global result was not affected.</i></p>
18	<p>“En ce qui a trait à disponibilité et à la bonne communication, le contrôle s’effectue de façon simple pour l’équipe locale car nous nous rencontrons à chaque semaine en classe. . . . Par contre, cela est différent pour l’équipe distant, dans le sens où il est impossible de contrôler leur disponibilité et leur ponctualité. . . . Bref, il est très difficile d’exercer un contrôle accru à distance sur la disponibilité ainsi que d’établir une communication fiable avec des partenaires en télétravail.”</p> <p><i>With respect to availability and good communication, control was easy for the local team since we met each week for class. However, it was different for the distant team, because it is impossible to control their availability and their punctuality. It is very difficult to exercise remotely a higher control on availability and to ensure good communication with distant partners.</i></p>
19	<p>“Elles semblaient organisées et sérieuses. Toutefois à la lecture du plan directeur, nous nous sommes aperçu qu’ils n’avaient pas la même vision que nous quant au contenu et à la structure d’un tel travail . . . nous avons constaté que leur plan ressemblait plus à une introduction du travail qu’à un plan.”</p> <p><i>They seemed organized and serious. However, after reading their plan, we realized that they did not share our vision of the content and the structure of the paper. We noticed that their plan looked more like an introduction than a plan.</i></p>
20	<p>“Mais comme c’était seulement pour le plan, nous nous sommes dits que ce n’était pas si grave et qu’ils ne pouvaient sûrement pas voir le commerce électronique d’une manière si différent de la nôtre. Mais un doute s’est installé.”</p>

- 21 *Since it was only the plan we said to ourselves that it was not so important and that they could not have such a different view of e-commerce from ours. But a doubt was set.*
 “Il semble que tous les membres n’étaient pas au courant, car nous avons été sans nouvelle d’un membre de l’équipe pendant deux semaines.”
It seems that some members were not aware because we were without news from a team member for two weeks.
- 22 “Les membres qui n’ont pas communiqué leurs parties à tous sont ceux de Toronto en plus qu’ils avaient la responsabilité de mettre le tout ensemble. De notre côté à Montréal, nous nous sommes dits que la majeure partie du travail était faite . . . Et nous considérons qu’elle était très bonne. Donc, ne pouvant rien faire de plus, nous leur faisons confiance.”
The members that did not send their parts to everyone were the ones from Toronto. Moreover, they had the responsibility to put together all the parts. In Montreal, we said to ourselves that most of the work was done . . . and we considered our work very good. We could not do more, we trusted them.
- 23 “Nous avons supposé que le travail avait été remis tout en étant déçu de ne par avoir pu relire la version finale. Par la suite, nous avons reçu le travail, mais quelle mauvaise surprise! Les gens de Toronto ont refait en majeure partie tout le travail sans nous avertir et en supprimant des parties qui nous paraissaient essentielles. Nous avons été déçu de la mise en page ainsi que du contenu du rapport, alors que si nous l’aurions complété, il aurait été très différent. Il va s’en dire que nous étions frustré, car nous avons mis beaucoup d’efforts à la rédaction, compte tenu que l’anglais n’est pas notre langue maternelle.”
We supposed that the final paper was handed in but we were sad that we did not have a chance to read the final version. Later, when we received the paper, we had a bad surprise. The people from Toronto redid most of our work, eliminating parts we considered essential. We were unhappy with the layout. If we had done it, it would have been very different. We were upset because we did put a lot of effort into writing our parts, especially since English is not our first language.
- 24 “La confiance entre les membres de l’équipe est moins forte lors du travail virtuel. . . . Lors de notre première discussion, l’atmosphère amical de la discussion et l’enthousiasme de nos deux collègues nous a amenés à leur accorder notre confiance. Cependant, lorsque Sophie a cessé de nous donner de ses nouvelles, puis qu’elles nous a annoncé qu’elles ne lisaient ses e-mail que le vendredi, elle a perdu notre confiance.”
The trust between team members is lower in virtual work. During our first meeting, the atmosphere was friendly and the enthusiasm of our colleagues led us to trust them. However, when Sophie stopped sending us news, and when she told us that she read her e-mail on Friday only, she lost our trust.

APPENDIX B (continued)

Quote Number	Quote
25	<p>“Les membres de Toronto se sont souvent joints à la discussion avec plusieurs minutes en retard, voir près d’une heure!” <i>Toronto members often joined discussions many minutes late, even close to one hour!</i></p>
<p>Team 2—High Performer— Team Report = 84% Toronto Subteam Report = 72%</p>	
26	<p>“Our in-person meetings were brief and limited as most of our discussions were held via WebCt, in which all our group members had access to the information posted.”</p>
27	<p>“Because our communication paths were very limited, no one emerged as a leader. Trust played a huge role in the way these communication patterns unfolded.”</p>
28	<p>“To our delight we were matched with a hard working and intelligent group of people from Montreal who shared our work ethics.”</p>
29	<p>“We found we were able to be more open with constructive criticism and took it better from faceless members and found that coming to a consensus on the team goals were reached in an orderly and time conscious manner.”</p>
30	<p>“It was hard for us at times to get in contact with virtual group members. Messages would be posted and quite often a day would pass before everyone would be able to read those messages. So, unlike when you communicate in a face-to-face group, interaction in a virtual group is rarely real time. Just agreeing on a meeting time through the WebCT was often difficult. A group member would suggest a meeting time and would not know until the next day whether or not the meeting time was ideal for everyone. If the time was not ideal, another day or two would pass before all group members could finally agree on a time. . . . To remedy this problem we had no choice but to divide the workload of the project so that everyone could go and do their own part and then meet later to put it all together.”</p>

Team 2—High Performer—

Team Report = 84%

Montreal Subteam

Report = 90%

- 31 “Après les premières réunions de discussions sur le sujet du plan du travail, l’équipe a établi certaines normes qu’elle se devait de respecter si elle voulait remettre un document qualité. Conséquemment, des tâches furent délimitées et assignées à chacun des membres de l’équipe.”
After the first meetings held to discuss the work plan, the team established norms that had to be respected in order to do quality work. Consequently, tasks were defined and assigned to each team member.
- 32 “Il était rare que nous n’ayons pas de nouvelles des membres de l’équipe basé à Toronto pendant plus de trois jours. Chacun allait voir régulièrement sur le *bulletin board* pour savoir quelles nouvelles y étaient affichées.”
We were rarely without news from the Toronto team members for more than three days. Everyone went regularly on the bulletin board to look at the news.
- 33 “Nos idées ont toujours été écoutées, discutées et améliorées afin d’arriver meilleur travail possible.”
Our ideas were listened to, discussed and improved to produce the best outcome possible.
- 34 “Nous avons décidé qu’une seule personne serait chargée d’intégrer les différentes parties du travail final. Cette décision impliquait une grande confiance de toutes les parties; que ce soit au niveau de la personne intégrant les parties qui courait la chance de se retrouver avec six parties médiocres ou pour les autres qui ont confié ce travail à une personne inconnue.”
We had decided that only one person would integrate all the parts for the final paper. This decision implied high trust in all members, whether it was for the person doing the integration (who risked having six lousy parts to integrate) or for the others trusting to a stranger this work.
- 35 “Étant donné que nous ne nous connaissions pas du tout, nous avons tous éprouvé un peu d’incertitude et un manque de confiance face à nos coéquipiers étrangers, mais tout cela s’est dissipé très rapidement, lorsque nous avons senti leur enthousiasme face à ce travail. D’ailleurs, nous avons eu des partenaires au moins aussi efficaces, sinon plus, que ce que l’on aurait pu retrouver ici.”
Since we did not know each other at all, we all felt some uncertainty and distrust toward our foreign team members. This dissipated rapidly, when we felt their enthusiasm toward the task. Moreover, we had partners at least as efficient, maybe even more efficient, than partners we may have gotten here.

APPENDIX B (continued)

<i>Quote Number</i>	<i>Quote</i>
Team 7—High Performer—	
Team Report = 92%	
Toronto Subteam	
Report = 92%	
36	“The Montreal subteam did not appear very eager to answer our messages. Their first reply was just two days before the project outline was due. By this time our subteam had become frustrated with their lack of response and decided to complete the outline without their input.”
37	“Ultimately, their lack of response led us to visualize them as procrastinators and not as committed to the task as we expected. Their initial behaviour established a lack of trust by our subteam which lasted throughout the project.”
38	“As a subteam, we discussed our negative feelings about the group in Montreal and decided not to address these feelings in our first chat meeting but to behave in a rational, objective manner.”
39	“The Montreal team predominantly played the ‘follower’ role and rarely objected to our suggestions or ideas. In our opinion, this behaviour added to the success of our team. . . . The fact that the Montreal members agreed with our project outline and assigned tasks acted as a conflict avoidance mechanism and made it easier for the entire team to successfully complete the paper.”
40	“We can honestly say there were times when the messages we were typing during chat sessions were contrary to what our facial expressions portrayed. However, we felt justified in these actions because we thought that if we put any further pressures on the Montreal team, it would further jeopardize their unpredictable communication patterns.”
41	“Even though we were pleasantly surprised by the calibre of their work, we continued to have feelings of uncertainty towards the Montreal group. . . . We still felt uncertain of their commitment toward the entire group.”

Team 7—High Performer—

Team Report = 92%

Montreal Subteam

Report = 78%

- 42 “Dans notre équipe, malgré un niveau initial de confiance élevé, nous avons choisi de nommer en quelque sorte un chef dans chacune des sous équipes afin de gérer les situations difficiles à l’intérieur de la sous équipe mais aussi entre les deux sous équipes.”
In our team, despite a high initial level of trust, we named a leader in each subteam to manage difficult situations within the subteam and between the two subteams.
- 43 “Pendant ces séances de chat, nous mettions à jour le travail effectué.”
During chat sessions, we updated the work done.
- 44 “Nous pouvions vérifier l’efficacité du travail d’équipe selon le respect des rendez-vous et des délais de production fixés. . . . À partir de ces opinions, nous connaissons mieux les idées de nos coéquipiers et nous pouvions organiser nos idées pour qu’elles soient cohérentes avec l’ensemble de l’équipe et pour qu’il n’y ait pas de contradictions.”
We could check the efficiency of the team work using the meetings and the deadlines met. Through this evaluation, we knew better the ideas of our team members and we could organize our ideas so that they were coherent with the overall team and without contradictions.
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