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IT Alternatives to Social Control in Organizations

Greg Elofson
Emory University

Nainika Patnayakuni
Southern Illinois University, Carbondale

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Greg Elofson
School of Business Administration
Emory University

ABSTRACT

This paper extends theories of control as an organization design tool and empirically explores the efficacy of delegation technologies in providing the equivalent of social (clan) control for effort-averse agents engaged in low programmable, low outcome measurement task environments.

The exploratory evaluation of delegation technologies suggests new control alternatives that are trust building and therefore offer alternative organizational design possibilities in lieu of social control.

1 INTRODUCTION

Theories of agency and control assume that an agent's productivity can be measured and fairly evaluated; and if it cannot be measured, that trustworthy agents can be found and socially controlled to undertake those tasks that escape such measurement. But not all organizational activities can be either satisfactorily measured or assigned to trustworthy individuals. In such instances, these activities may be "designed-away," outsourced, or treated with *ad hoc* administrative responses that result in, at best, temporarily acceptable results.

An example of such an organizational activity is environmental scanning; identifying threats and opportunities to the organization. In attempting to perform environmental scanning: organizations have used *ad hoc* administrative measures combined with outsourcing to circumvent the problematic nature of controlling the activity — but with only mixed success. Problems that continue to reduce scanning effectiveness consistently relate to the following constraints: 1) recognizing organizational threats and opportunities is at a low stage of knowledge and is difficult to program, 2) turbulence in the competitive environment makes performance evaluations based on the number of correct predictions unrealistic, and 3) finding trustworthy agents who have undergone a lengthy period of training for this task is also unrealistic.

So, given that there are organizational activities that may be characterized as having low task programmability, low outcome measurability, and effort-averse agents, theories of control need to be extended to encompass these issues. This paper augments current theories of control to, first, recognize that there are organizational tasks that do escape traditional approaches to control. That is, while the tasks are necessary, they can neither be fairly evaluated nor charged to trustworthy agents. The recognition of this phenomenon is necessary for establishing a theoretical foundation from which to further develop approaches to control.

Second, the promotion of principal trust in agent behavior, facilitated by the use of delegation technologies, is suggested as an alternative approach to bureaucratic, market, and social control. Trust promoting delegation technologies, permitting the dynamic re-allocation of decision-making heuristics to machine actors, facilitate an agent's productivity while communicating the agent's decisions and activities to the principal. Delegation technologies are considered as a control alternative because they offer the same fundamental advantages as social control, fostering a principal's belief that an agent can be trusted to act in his or her interest. Delegation technologies offer this alternative without the necessity of either an apprenticeship program or a lengthy period of socialization.

Last, a series of exploratory studies are reported that support the hypothesis that a delegation technology will increase a principal's belief that an agent is acting in his or her interest. Evidence for the plausibility of this approach to control is provided, through direct and indirect measures, by showing several groups' preference for trusting and hiring an agent whose work was performed through a

delegation technology over a second agent whose work was not supported by a delegation technology.

Thus, this paper approaches these questions of control in two parts. The first part draws on the work by Ouchi (1979, 1977; Ouchi and Maguire 1975) and Eisenhardt (1989, 1985) to discuss extensions to current theories of organizational control and the need for alternative designs to permit necessary tasks to be performed. The first part continues by citing a well researched task, environmental scanning, that has been difficult to control because the work is difficult to program, the outcomes are difficult to fairly evaluate, and scanners are not the beneficiaries of a long-term socialization process. The first part ends by asserting that principal agent goal congruity can be supported with the use of delegation technologies because they promote a principal's trust in a scanning agent.

The second part is empirical and reports on several exploratory studies that lend support to the validity of a delegation technology based approach to control under circumstances of low task programmability, low outcome measurability, and absent social control. Deciding whether a delegation technology can establish a significant degree of trust is the focus of this part because it suggests that an agent is working in the principal's interest.[1]

2. THEORIES OF AGENCY AND CONTROL

Ouchi (1979) describes three fundamental types of control (Figure 1): market, bureaucracy, and clan. The appropriate use of each is contingent on the nature of the task being performed. Market controls are appropriate when the outputs of employees are clearly measurable and relatively independent of external events. Bureaucratic methods are appropriate when interdependencies make output measurement difficult and call for monitoring an agent's behavior. Clan control methods are appropriate when both outputs and behaviors are difficult to measure. Clan control relies on the internalization of values that are congruent with the organization's goals.

Eisenhardt (1985) has shown that agency theory provides an underlying rationale for matching control methods to situations. Agency theory suggests (Eisenhardt 1989) that an agent prefers outcome based contracts as the influence of external factors on his/her productivity diminishes. As the influence of external factors on outcomes increases, agents prefer behavior based contracts. Concerning principals, agency theory suggests that as the behavior of an agent becomes easier to measure, principals prefer behavior based contracts. As the behavior of an agent becomes more difficult to measure, principals prefer outcome based contracts.

3. THE ABSENCE OF CONTROL

Agency theory presumes that the agent is effort averse and may shirk. Ouchi's control strategies imply the same agent tendencies toward effort aversion — except in the instance of the socialized or "clan" controlled agent. This agent, because of lengthy periods of socialization and/or apprenticeship, is assumed to have personal goals that are congruent with the organization's, making the clan controlled agent, in effect, *not effort averse*. So, while neither the outputs nor the behaviors of the clan controlled agent can be satisfactorily evaluated, he is trusted to perform in ways that are in keeping with the organization's goals.

Interestingly, these prescriptions tacitly introduce agent "type" into the choice of control strategies. That is, when either behavior or outcome measurability is high, the implicit assumption is that the effort-averse agent is the subject of control. Conversely, when neither behavior nor outcomes can be measured, the model assumes that a goal-congruent agent will be selected (and that the organization doing the selecting has access to such agents and is capable of successfully implementing a program of social control).

This discontinuity, however, need not exist. Figures 2a and 2b illustrate this by augmenting Ouchi's model to include separate matrices for each kind of agent.

In these two illustrations, control mechanisms are described for both the goal-congruent and the effort-averse agent. Figure 2a illustrates Ouchi's framework, changed to recognize the absence of socialized agents. This framework, showing control strategies for the effort-averse agent, differs from Ouchi's in the lower right quadrant. Here, clan control has been changed to "no control." This change is descriptive of available control mechanisms for the effort-averse agent performing tasks having low behavior and outcome measurability in an organization that will not be exercising social control in a way that inspires trust in that agent.

Alternatively, Figure 2b illustrates what can be expected from an organization employing goal-congruent agents. When outcome measurability is high, the choice between market or clan controls would be based on efficiencies[2] and whether the agents were risk averse (truly goal-congruent agents would, by definition, be risk neutral). But when outcomes are difficult to measure, a clan mechanism would probably be preferred (because the cost of "clan control" would probably be less than the information acquisition costs of behavior based control[3]).

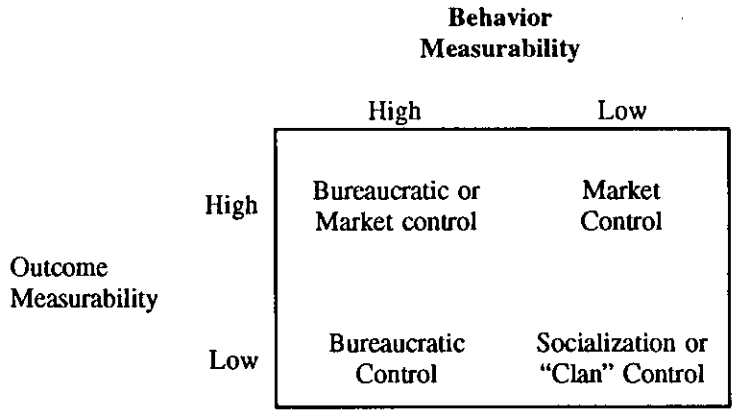

Figure 1. Control Strategies

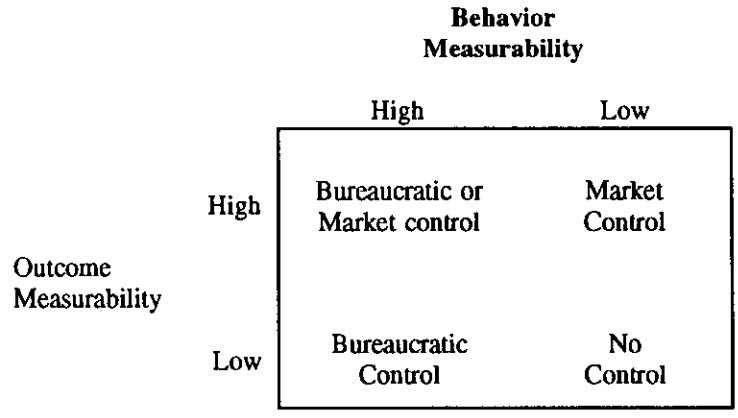

Figure 2a. Effort-Averse Agent

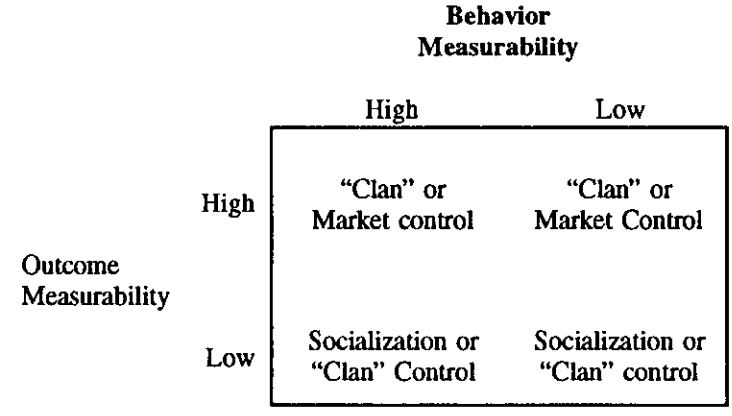

Figure 2b. Goal-Congruent Agent

4. WORKING WITHOUT CONTROL

We may expect that few job descriptions would carry the control difficulties of having low outcome measurability, low programmability, and effort-averse agents. We may also expect that organizations would "design away" those particular tasks as often as possible. However, such organizational tasks, perhaps because of their necessity, do exist.

One example of a task having these three characteristics is environmental scanning (Aguilar 1967). First, the environment is often turbulent, resulting in outcome measurement difficulty. Second, evaluating the behavior of individuals tasked with scanning is difficult because of the interdisciplinary nature of the work. Third, apprenticeship programs don't exist for these individuals — nor are environmental scanners of US firms the beneficiaries of a long term socialization process.

Ad hoc administrative responses to this problematic scenario have been similar to those suggested by Isenberg (1984) and Chandler (1962). These include using volunteers or partial duty people (Lenz and Engledow 1986) and seeking outside consultants for financial and economic information. In other instances, the scanners have had to depend on the continued support of a working champion — often necessary to keep the scanning process from being set aside for more easily justified concerns (Engledow and Lenz 1985).

Not surprisingly, the loss of a champion for the scanning effort, together with the lack of available control methods, often results in the group being disbanded (Lenz and Engledow 1986). In fact, the absence of control over either behaviors or outcomes in this function has produced a variety of difficulties. For example, although recommendations from individuals having formal responsibility for scanning results in many more action-responses than informal group recommendations (Roy and Cheung 1982), empirical studies have shown that, much of the time, scanning is an unassigned and voluntary activity (Hambrick 1981). Furthermore, Hambrick noted that, while executives did scan, they did not scan in their area of expertise. Still another study showed that most divisions paid little attention to information sent from the corporate level — having no control over that function and preferring to develop their own. This has resulted in incongruous sets of assumptions across divisions such as inflation rate estimates varying from 2% to 22% (Stubbart 1982).

Given that organizational tasks such as environmental scanning fall into the category of "no control," and given that *ad hoc* administrative solutions are not satisfactory, an organization is left with two choices concerning the "no control" status of the activities it wishes to execute:

1) don't perform or "design away" the activity

2) Redesign the task to develop desired[4] principal agent goal congruence in the absence of available social control.

This second alternative, task redesign, is the subject of interest for the present and is meant to be considered in at least those instances where the first alternative is considered to be untenable.

5. AGENT GENERATED CONTROL

In the absence of behavior and outcome measurement, a principal must do one of the following: 1) *trust* the agent to fulfill his responsibilities or 2) avoid entering into a contract with the agent. While Ouchi's description of social control satisfies the first of these conditions by tacitly assuming the principal's trust for the socialized agent, social control is not always a viable alternative. Nevertheless, building principal trust in the agent remains a primary consideration or contingency in redesigning the agent's task for "no control" environments.

Trust has been described in the academic literature as "an expectancy held by an individual or a group that the word, promise, verbal or written statement of another individual or group can be relied upon" (Rotter 1967). Furthermore, trust has been studied as a condition in which a person is willing to rely on another to achieve a desired objective in a risky situation (Giffin 1967), as well as embodying the hope that a person with whom one must work will perform in a competent manner (Barber 1983).

A benefit of trust is that it establishes a sense, on the part of the principal, that the agent is acting in his interest. To this extent, it acts in place of social control. Therefore, when presented with tasks that have low programmability, low outcome measurability, and effort-averse agents, we may pursue an agenda of building trust in the principal-agent relationship.

Trust is *the outcome of observations leading to the belief that the actions of another may be relied upon, without explicit guarantee, to achieve a goal in a risky situation.*[5] Promoting trust[6] in the agency relationship requires that the principal believe the agent is acting in his interest and that the agent can be relied upon to achieve the principal's objectives in a competent manner. Furthermore, Arrow (1964) noted that "top management will always have to have some information about the internal workings of the individual activity" (pp. 408). Thus, the central approach in utilizing information technology to this end, to increase trust in an agent and provide information about agent

activities, is to focus on delegation technologies[7] *as they provide the principal with a history of an agent's decision-making heuristics, and allow for necessary trust-building observations, without the noxious intrusion of a monitor.*

To capture the agent's decision heuristics and form an institutional memory, a number of software engineering innovations have been made. The architecture and prototype of the delegation technology used in this study acquires knowledge rapidly and incrementally; learns to improve its search strategy; succeeds through a large number of small knowledge bases instead of one large, monolithic one; and quickly adapts to the changing agenda of the organization.

This approach provides an active channel of communication between analysts and managers, where their tasks are structured as separate sequential interleaved processes. This delegation technology approach makes use of a collection of electronic messengers. Here, the messengers act as "apprentices" to a manager, caching his decision heuristics as he monitors the environment. The messenger's orientation is problem specific. For example, one messenger would be concerned only with political violence problems while another would be concerned only with new technology threats. Instead of using electronic mail messages to communicate questions to an analyst, a manager will use a messenger. The messengers make themselves available to all other managers, improve their search strategy over time, and explain their conclusions.

6. EVALUATION OF TRUST

By re-designing a task with the aid of a delegation technology, the event of an agent acting in the principal's interest coincides with the agent acting in his own interest. This allows for the preservation of the agency premise that an agent's goals are different from the principal's, while satisfying the principal's requirement for some guarantee of agent performance. Fundamentally, an effort-averse agent has an incentive to use a delegation technology because in doing so he creates slack for himself by off-loading some of his responsibilities to machines. He is, in effect, designing his own control system. Furthermore, a delegation technology *should* manifest principal trust in the agent because it allows the principal to see what an agent is doing and thinking. The reapportionment of cognitive tasks to machine actors — actors that can report to the principal — permits this evaluation.

To evaluate whether a delegation technology has a positive affect on principal trust, several exploratory studies were conducted. Each experiment was conducted in the same fashion. Subjects were given a description of a business objective, together with an explanation that they would be receiving the written assistance of two managers in achieving that objective. The managers' responsibilities were to provide them with relevant decision-making information. They were shown the briefs that were done by each of the managers reporting to them. For one of the manager's reports, and only one, additional information generated by an electronic messenger was included. For each of the two managers, the subjects were asked to answer a series of Likert-type questions (the McCroskey Trust Scale[8]: McCroskey 1966) that gave an indication of their level of trust in the manager that had given the report.

The experiments were conducted within the same group because individuals have widely differing baseline levels of trust (Anderson and Clevenger 1963), and the experiment was focused on examining the effects of a delegation technology on trust in a particular individual. Also, to avoid the possibility of semantic/presentation effects, the evaluations presented by the two managers under scrutiny were randomized.

The answers to the two sets of 22 McCroskey trust scale questions were analyzed as a paired t-test. Means for each of the responses regarding the two managers, A and B, together with p-values for the two-tailed test, are reported. Also, four additional Likert-type questions were asked of the subjects, evaluating their direct preference for both hiring and trusting one manager over the other. The first pair of these questions, regarding trusting A or B, as well as the second pair, regarding hiring A or B, were evaluated as unpaired t-tests. The means for these values, as well as the p-values for the two-tailed tests, are also reported here.

Test 1

Twenty-three students from a graduate level business course were instructed to read a brief statement informing them of their need to have relevant environmental scanning information as part of their business responsibilities.

> You have the responsibility of developing Eagle Corp's overseas business and one of its concerns is in negotiating and winning a contract with the Buhmar Company, Poland's largest manufacturer of tractors. The negotiation is over a contract of several million dollars to supply parts for Buhmar's new line of tractors. You have the responsibility for closing contract negotiations with Buhmar. Moreover, you improve your company's position the longer the negotiations take. But, if political violence breaks out in Poland, you stand to lose income.

Analyst B: Rationales used for Political Evaluation

Condition 1: Highly Likely Political Turmoil

IF the Pro-Regime Actors' Belief in Violence is Strong
and the Anti-Regime Actors' Belief in Violence is Somewhat Strong
and the Institutional Support for Pro-Regime Actors is Moderate
and the Institutional Support for Anti-Regime Actors is Strong

Then a condition of political turmoil being highly likely is indicated.

To support this conclusion, the following must be verified:

Pro-Regime Actor's Relative Deprivation is Low
Anti-Regime Actor's Relative Deprivation is High
Coercive Force Available to Pro-Regime Actors is Strong
Coercive Force Available to Anti-Regime Actors is Not Strong

Condition 2: Likely Political Turmoil

IF Pro-Regime Actors' Belief in Violence is Moderate
and Institutional Support for Pro-Regime Actors is Low
and Institutional Support for Anti-Regime Actors is Strong

then a condition of political turmoil being Likely is indicated.

to support this conclusion, the following must be verified:

Pro-Regime Actors' Relative Deprivation is Low
Anti-Regime Actors' Relative Deprivation is High
Anti-Regime Actors' Belief in Violence is Moderate
Coercive Force Available to Pro-Regime Actors is Strong
Coercive Force Available to Anti-Regime Actors is Not Strong

Condition 3: Political Turmoil only Somewhat Likely

IF Pro-Regime Actors' Belief in Violence is Moderate
and Pro-Regime Actors' Institutional Support is Low

then a condition of political turmoil being somewhat likely is indicated.

to support this conclusion, the following must be verified:

Coercive Force Available to Anti-Regime Actors is Not Strong
Pro-Regime Actors' Relative Deprivation is Low
Anti-Regime Actors' Relative Deprivation is High
Anti-Regime Actors' Belief in Violence is High
Coercive Force Available to Pro-Regime Actors is Strong

Figure 3. Messenger Generated Heuristics Provided for Subjects

You have two political analysts working for you (A and B). They are located in different divisions within Eagle Corp. and have recently sent this week's update to you about political tensions in Poland. Please read them and fill out the accompanying questionnaire.

The students were told that two environmental scanning professionals would be providing them with the needed information. Next, they were then given an environmental assessment by the first professional:

Manager A's conclusion:

Given the current political tensions in Poland and the growing division between the government and the citizens, I believe that political turmoil is highly likely — and that further destabilizing activities could result in an outbreak of violence. The fact that economic conditions have lately deteriorated for the workers, who are faced with the military power controlled by the Central Committee, makes the problem worse.

They were then asked to answer a series of Likert-type questions (the McCroskey Trust Scale) about their trust in that individual's work (A = 5 = Strongly Agree, B = 4 = Agree, C = 3 = Neutral, D = 2 = Disagree, E = 1 = Strongly Disagree). Next, the students were given a very similar assessment by the second professional, along with the heuristics generated by a messenger used in this scanning activity (Figure 3):

Manager B's Conclusion:

Political Turmoil is Highly Likely at this time. The increase in tensions between the workers and government could quickly lead to an outbreak of violence unless the worker's current grievances are quickly heard and acted on by the government. This problem is being exacerbated by the Polish army and Police remaining very loyal to the Central Committee.

Finally, they were given four questions regarding their trust and willingness to hire either one or the other professional (questions 3 and 4, however, may have been unclear — read as though the subjects were being asked if they could choose A or B over any analyst in the world):

1. I trust the results given by analyst A more than analyst B:
   A B C D E

2. I trust the results given by analyst B more than analyst A:
   A B C D E

3. If I could have only one analyst working for me, I would choose analyst A:
   A B C D E

4. If I could have only one analyst working for me, I would choose analyst B:
   A B C D E

Results

Figure 4 represents the data of the test run with this set of subjects. Here, the evidence suggests that the effects of the delegation technology generated information had a significant positive impact on trust. Greater statistical significance was found when measuring trust in the analyst's intelligence and ability to provide an analysis of the current problem. Less significance was detected concerning the *a priori* characteristics of the analyst (i.e.. questions 13, 14, 16, 18 through 22).

Overall, the results of the final set of questions regarding trust and hiring preferences showed the effects of the delegation technology to be strongly significant (Figure 5). The number of respondents for the trust preference was 19, and the hiring preference was 20, as not all of the subjects filled out this part of the questionnaire.

Test 2

A second test was conducted to determine the presence of any order effects in the presentation of the managers' findings. Fourteen students from a graduate level business course participated in the experiment. The conditions of the experiment were identical to test 1, except that the manager's opinion that was accompanied by the messenger generated information was presented first.

Results

The results of subject's responses are shown in Figure 6. The evidence suggests that, when the order of presentation was reversed, the effects of the data generated by the delegation technology still had a significant impact on the trust the subjects had in A over B, to roughly the same degree (and slightly weaker) as for the subjects in test 1.

Overall, the summary questions at the end of the experiment provided strong evidence that the subjects trusted and preferred to hire the analyst whose information was accompanied by the messenger generated information (Figure 7).

Item	A Mean Score	B Mean Score	p-value
1. I respect the analyst's opinion on the topic	3.34	4.00	.024
2. This analyst is not of very high intelligence	2.87	2.30	.001
3. This analyst is a reliable source of information on the topic	3.00	3.52	.014
4. I have confidence in this analyst	2.91	3.47	.001
5. This analyst lacks information on the subject	3.39	2.26	.001
6. This analyst has a high status in our society	3.08	3.21	.450
7. I would consider this analyst to be an expert on the topic	2.87	3.34	.070
8. This analyst's opinion on the topic is of little value	2.95	2.13	.002
9. I believe that this analyst is quite intelligent	2.91	3.52	.002
10. The analyst is an unreliable source of information on the topic	2.82	2.34	.045
11. I have little confidence in this analyst	2.87	2.26	.009
12. The analyst is well informed on this subject	2.95	3.47	.042
13. The analyst has low status in our society	2.73	2.43	.148
14. I would not consider this analyst to be an expert on this topic	2.91	2.65	.354
15. This analyst is an authority on this topic	2.82	3.21	.058
16. This analyst has had very little experience with this subject	2.69	2.47	.285
17. This analyst has considerable knowledge of the factors involved	3.08	3.82	.002
18. Few people are as qualified to speak on this topic as the analyst	2.69	2.87	.426
19. This analyst is not an authority on the topic	2.69	2.65	.814
20. This analyst has very little knowledge of the factors involved with the subject	2.73	2.27	.168
21. This analyst has had substantial experience with this subject	3.00	3.43	.066
22. Many people are much more qualified to speak on this topic than the analyst	2.82	3.13	.183

Figure 4. Results from Test 1

	A	B	p-value
Trust Preference	2.158	3.474	.0006
Hiring Preference	2.450	3.900	<.0001

Figure 5. Trust and Hiring Preferences from Test 1

Item	A Mean Score	B Mean Score	p-value
1. I respect the analyst's opinion on the topic	3.85	3.57	.301
2. This analyst is not of very high intelligence	2.50	2.71	.189
3. This analyst is a reliable source of information on the topic	3.42	2.92	.130
4. I have confidence in this analyst	3.07	2.78	.364
5. This analyst lacks information on the subject	2.57	3.14	.014
6. This analyst has a high status in our society	3.07	3.00	.335
7. I would consider this analyst to be an expert on the topic	3.14	2.71	.138
8. This analyst's opinion on the topic is of little value	2.28	2.78	.110
9. I believe that this analyst is quite intelligent	3.42	3.14	.040
10. The analyst is an unreliable source of information on the topic	2.21	3.00	.009
11. I have little confidence in this analyst	2.63	3.14	.110
12. The analyst is well informed on this subject	3.57	2.92	.013
13. The analyst has low status in our society	2.71	2.92	.189
14. I would not consider this analyst to be an expert on this topic	2.64	3.35	.044
15. This analyst is an authority on this topic	3.14	2.78	.238
16. This analyst has had very little experience with this subject	2.28	3.14	.004
17. This analyst has considerable knowledge of the factors involved	3.71	2.78	.004
18. Few people are as qualified to speak on this topic as the analyst	3.00	2.71	.263
19. This analyst is not an authority on the topic	2.90	3.00	.634
20. This analyst has very little knowledge of the factors involved with the subject	2.30	3.00	.069
21. This analyst has had substantial experience with this subject	3.50	2.85	.022
22. Many people are much more qualified to speak on this topic than the analyst	2.71	3.14	.053

Figure 6. Results from Test 2

	A	B	p-value
Trust Preference	3.714	2.357	.0009
Hiring Preference	3.929	2.429	<.0011

Figure 7. Trust and Hiring Preferences from Test 2

Test 3

A third test was run to determine whether an information "placebo" effect could be found. Because the effects of the messenger generated information were positively related to trust in the previous experiments, the possibility of this effect being related to just "any extra information" was investigated.

Seventeen students from a graduate business course served as subjects for this test. The test was conducted in the same order and with the same information as test 2, except that the messenger generated information was replaced by the following information:

> A recent newspaper article summarized Poland's past changes by reporting that, originally, Communist rule was opposed by most Poles. But the Communists used police power and other methods to crush resistance. Communist controlled elections in 1947 gave them a large majority in the new legislature. By 1948, Communist rule was firmly established.
>
> During the late 1940's, the USSR gained increasing influence over the Polish government. In 1949, a USSR military officer, Konstantin Rokossovsky, was made Poland's defense minister. And, Polish Communists suspected of disloyalty to the USSR were removed from power.
>
> In 1970, strikes and riots broke out in Gdansk and other cities. Thousands of Poles demanded better living conditions and economic and political reforms. After several days of riots, Gomulka resigned and Edward Gierek became the Communist Party leader.

Results

The results of the test are shown in Figure 8. These results show that the arguably irrelevant information not only had no positive impact on trust, but rather on several dimensions (questions 5, 11, 15, 16, 21) detracted from trust.

Overall, based on the responses to the final four summary questions (Figure 9), it was concluded that the placebo information had no impact on either trust preferences or hiring preferences.

Test 4

The final test was run to determine whether trust was still increased when the delegation technology generated information was presented to executives. Thirty-five executives participated in this test. They were given the same description of responsibilities as were the students in the first test. First, they reviewed the analysis by the manager without additional messenger generated information. Second, they reviewed the second manager's analysis with the messenger generated information.

As with the other tests, the written opinions of the two experts were randomized, so that the written opinion of A on one executive's report appeared as the written opinion of B on another's.

Results

Figure 10 represents the data of the test run with the executives. Here, the evidence suggests that the effects of the delegation technology generated information had a significant positive impact on trust. Like the previous test of this kind, the measures that had the least significance corresponded to *a priori* opinions the subjects had of the managers' status, experience, and expertise (questions 6, 14, 16, 18, 19 and 22).

Concerning the direct questions of hiring and trusting preference (Figure 11), the executives clearly trusted the manager whose opinion was accompanied by the messenger generated information over the other manager. Also, the executives clearly preferred hiring the manager whose opinion had the accompanying heuristics over the other.

7. DISCUSSION

March (1987) noted that "interest in designing cost-effective incentives that induce rational, self-interested agents to be honest in their reports is a major theme of contemporary theories of agency." Given this, it may be said that providing cost-effective incentives when there are no control alternatives is equally, if not more, compelling.

The preceding tests have focused on establishing the validity of such a goal in situations characterized by "no control." The measure of validity has been based on the principal's trust in the agent. Overall, these tests lend support to the hypothesis that a delegation technology enhances trust in an agent's performance. Whether the results of the 22 McCroskey trust-scale questions showing significance bears meaningfully on the question of trust is answered directly with the second measure (trust preference and hiring preference). These two measures showed a clear preference for trusting and hiring the agent whose reports were accompanied by the delegation technology generated information.

	Item	A Mean Score	B Mean Score	p-value
1.	I respect the analyst's opinion on the topic	3.23	3.64	.095
2.	This analyst is not of very high intelligence	2.88	2.70	.330
3.	This analyst is a reliable source of information on the topic	3.23	3.00	.300
4.	I have confidence in this analyst	3.00	3.00	1.000
5.	This analyst lacks information on the subject	3.64	2.76	.014
6.	This analyst has a high status in our society	2.88	3.17	.024
7.	I would consider this analyst to be an expert on the topic	2.82	3.00	.337
8.	This analyst's opinion on the topic is of little value	2.88	2.52	.274
9.	I believe that this analyst is quite intelligent	3.05	3.23	.193
10.	The analyst is an unreliable source of information on the topic	2.82	2.58	.410
11.	I have little confidence in this analyst	3.11	2.58	.039
12.	The analyst is well informed on this subject	2.82	3.11	.355
13.	The analyst has low status in our society	3.05	2.70	.088
14.	I would not consider this analyst to be an expert on this topic	3.23	3.17	.774
15.	This analyst is an authority on this topic	2.58	3.17	.024
16.	This analyst has had very little experience with this subject	3.11	2.58	.028
17.	This analyst has considerable knowledge of the factors involved	3.00	3.23	.434
18.	Few people are as qualified to speak on this topic as the analyst	2.64	3.00	.060
19.	This analyst is not an authority on the topic	3.23	3.11	.610
20.	This analyst has very little knowledge of the factors involved with the subject	3.11	2.64	.062
21.	This analyst has had substantial experience with this subject	2.70	3.23	.039
22.	Many people are much more qualified to speak on this topic than the analyst	3.11	3.05	.774

Figure 8. Results from Test 3

	A	B	p-value
Trust Preference	3.000	2.938	.8584
Hiring Preference	3.125	3.062	.8578

Figure 9. Trust and Hiring Preferences from Test 3

	Item	A Mean Score	B Mean Score	p-value
1.	I respect the analyst's opinion on the topic	3.31	3.89	.007
2.	This analyst is not of very high intelligence	2.91	2.29	<.001
3.	This analyst is a reliable source of information on the topic	3.03	3.51	.006
4.	I have confidence in this analyst	2.86	3.49	<.001
5.	This analyst lacks information on the subject	3.40	2.20	<.001
6.	This analyst has a high status in our society	3.06	3.23	.210
7.	I would consider this analyst to be an expert on the topic	2.777	3.34	.010
8.	This analyst's opinion on the topic is of little value	3.03	2.09	<.001
9.	I believe that this analyst is quite intelligent	2.83	3.51	<.001
10.	The analyst is an unreliable source of information on the topic	2.83	2.26	.003
11.	I have little confidence in this analyst	2.89	2.20	<.001
12.	The analyst is well informed on this subject	2.97	3.49	.012
13.	The analyst has low status in our society	2.74	2.34	.025
14.	I would not consider this analyst to be an expert on this topic	2.97	2.57	.075
15.	This analyst is an authority on this topic	2.74	3.17	.005
16.	This analyst has had very little experience with this subject	2.66	2.43	.132
17.	This analyst has considerable knowledge of the factors involved	3.03	3.94	<.001
18.	Few people are as qualified to speak on this topic as the analyst	2.63	2.86	.186
19.	This analyst is not an authority on the topic	2.69	2.63	.700
20.	This analyst has very little knowledge of the factors involved with the subject	2.77	2.09	.006
21.	This analyst has had substantial experience with this subject	3.00	3.49	.009
22.	Many people are much more qualified to speak on this topic than the analyst	2.83	3.20	.068

Figure 10. Executives' Responses to Trust Test

	A	B	p-value
Trust Preference	2.065	3.484	<.0001
Hiring Preference	2.452	3.710	<.0001

Figure 11. Executives' Trust and Hiring Preferences

The implications of these findings are several. First, the opportunity for redesigning tasks to include a delegation technology is made more plausible by these findings. Rather than seek *ad hoc* solutions, or abandon a given activity, a trust-promoting delegation technology may be considered. Second, it has been shown that information about the manager's problem solving heuristics, and not simply information about the problem, itself, increases trust in that manager. This is distinct from a decision theoretic viewpoint where value is placed on additional information about a given problem.

These results also suggest that principals, having the advantage of trusting their agents, benefit from receiving useful information that they are more likely to believe. The importance of this is given by Feldman and March (1981): "Decision-makers discount much of the information that is generated. Not all information is ignored, however, and inferences are made. Decision-makers learn not to trust overly clever people, and smart people learn not to be overly clever."

Furthermore, that the delegation technology is directly under the influence of the agent performing a particular task may serve to ameliorate the typically undesirable side-effects of control systems. For example, Argyris (1964) noted that control is often accompanied by noxious by-products such as a perceived sense of unfairness that accents failures without showing why the failures were necessary. He suggested that

> a third alternative might be to place the responsibility for the design and use of the managerial controls under the control of the people who are to be controlled by these instruments....One might wonder if employees might not misuse the privilege. Some available research leads one to doubt it. [pg. 247]

8. CONCLUSION: CHANGING ORGANIZATIONAL FORMS

Corporate forms change to adapt to the environment in which they find themselves (Daft and Weick 1984), so it is conceivable that many tasks that fall into the "no control" category might not be done at all by an organization. This is not to say that these tasks are unnecessary or useless, but rather that they cannot be done feasibly — the cost incurred in controlling the activity is prohibitive. For example, it is only in Korean firms that environmental scanning is done to the full extent prescribed by many researchers in the area (Ghoshal 1988). If we were to look only to US firms for the activity, we would conclude that reasonable scanning consisted of only the practices found there.

Identifying those tasks that fall into the "no control" category is, therefore, an arduous task. Comparing the task characteristics of a company goal-congruent agent (high social control) with those characteristics of another company in the same industry, of similar size, that has high effort aversion may or may not reveal the relevant differences, notwithstanding issues of culture, etc.

Nevertheless, researchers are continuing to develop a variety of delegation technologies. Although this effort typically finds its motivation in simplifying tasks for an agent, it offers both agents and principals advantages in control decisions. Measuring these effects on trust will require greater precision and a greater variety of methods. As these technologies find their way into organizations and are used for control as well as increased span of control and decision-support, longitudinal studies and field studies will allow greater precision and understanding than is now feasible.

Finally, delegation technologies differ sharply from monitoring technologies (Harris and Raviv 1978) in the rewards they offer the agent. While a monitoring technology is not an integral part of work being done, a delegation technology is. Both reveal agent activity. According to Eisenhardt (1989), this information will cause the agent to act in the interests of the principal. Unlike a monitoring technology, the delegation technology will be gathering information about agent activity that is typically expertise oriented, at a low stage of knowledge (Leonard-Barton 1988), by definition difficult to program, without the noxious effects of typical control systems. Last, a delegation technology also differs strongly from other "knowledge technologies" (i.e.. expert systems) in both cost and flexibility. While expert systems are both expensive and time-consuming to build — and also difficult to change — delegation technologies are created in the course of an agent performing his or her duties and quickly reduce the workload of an agent.

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11. ENDNOTES

1. This assumes that the agent can establish what is in the best interest of the firm, an issue brought out in Jennergren (1980).

2. In the spirit of Williamson (1967).

3. The assumption is that the agent in question, because it is socially controlled, would not need to be monitored. If, however, there was a measurable cost associated with social control that exceeded the cost of behavioral control, the matrix would have to be changed accordingly.

4. Atkinson (1978), among others, suggests that goal congruence is highly desirable in agency relationships.

5. See Appendix B for the development of this definition.

6. Investigations into how to promote trust have already taken place. For example, at a personal level, Butler (1983) suggests that trust may be promoted simply through the display of trusting behavior. At an organizational level, Zucker (1986) describes three central modes of trust production: 1) process-based, where trust is tied to past or expected exchange such as reputation or gift-exchange, 2) characteristic-based, where trust is tied to a person, depending on characteristics such as family background or ethnicity, and 3) institutional-based, where trust is tied to formal societal structures, depending on individual or firm-specific attributes (i.e., certification as an accountant) or on intermediary mechanisms (e.g., use of escrow accounts).

7. See Appendix A for further description of delegation technologies.

8. The McCroskey Trust Scale was chosen as the experimental design used by its developer was nearly identical to the experimental design in this paper and the other scales identified were primarily focused on interpersonal relationships, not professional assessments.

APPENDIX A

DELEGATION TECHNOLOGIES

A delegation technology permits the reapportionment of cognitive tasks to machine actors, allowing agents to dynamically share tasks with these same actors. Although still relatively new, delegation technologies have been shown to be useful in such disparate areas as synthetic aperture radar interpretation, software troubleshooting, environmental scanning (Elofson 1994, 1995; Elofson and Konsynski 1991), e-mail filtering (Malone et al. 1987), and organizational learning (Elofson and Konsynski 1993).

An example of a particular delegation technology is the Knowledge Cache (Elofson and Konsynski 1991). The Knowledge Cache is designed for scanning scenarios involving three task descriptions:

1) a senior manager (*the principal*) that uses information regarding threats and opportunities to the environment,
2) a scanning manager (*the agent*) with expertise in a particular area, whose responsibility it is to provide expert interpretation of external events to the senior manager, and
3) an analyst whose responsibility it is to retrieve information at the request of the scanning manager.

The Knowledge Cache makes use of a collection of electronic messengers,[1] programs that induce, through example training sets, the heuristics scanning managers use in environmental scanning. These electronic messengers provide an active channel of communication between the analysts and the managers, where their respective tasks are structured as separate sequential interleaved processes.

While providing a communication channel, the electronic messengers acquire and record the heuristics the scanning manager uses as he/she monitors the environment. Instead of using electronic mail messages to communicate questions to an analyst, a scanning manager uses an electronic messenger — the equivalent of a structured message — to communicate a request for information. The figure below illustrates the typical activities that are involved in a scanning cycle, mediated by a messenger, with the shaded parts representing those acts that are delegated to an electronic messenger.

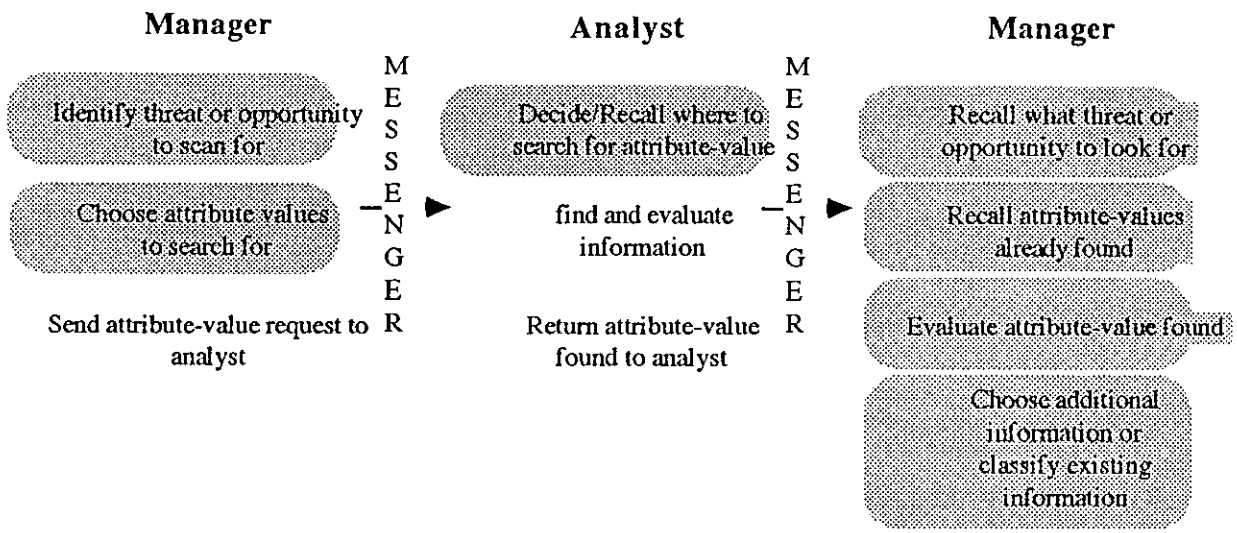

Figure A-1. Messenger Mediated Scanning Activities

[1]The term "messenger" is used in place of the more accepted term, "intelligent agent," to avoid any confusion with the agency theory "agent." Architecturally, the three-layered messenger uses a similarity based learning algorithm to generate a knowledge base combining search heuristics with rules, which in turn is used by a knowledge-scheduling, opportunistically searching inference engine.

Based on the threat or opportunity to be investigated, an electronic messenger will, over time, acquire the questions (attribute-values) a scanning manager asks of an analyst. The messenger's record of an analyst's past attempts at locating information assists in the acquisition of that information. Further, the electronic messenger will attempt to evaluate all attribute-values found and continue asking questions of the analyst until it has either classified the attribute-values it has received or exhausted its problem solving knowledge, in which case it returns to the scanning manager with the attribute-values and asks for a classification.

For the senior manager (*principal*) who uses the interpretations provided by the scanning manager (*agent*), a record of that scanning manager's decision processes is always available via the information stored in the electronic messenger. Having access to these electronic messengers gives the senior manager a history of both the scanning manager's activities and conclusions. What this delegation technology offers is 1) the tacit ability of the scanning managers to design their own control mechanisms, 2) an incentive for agents to be more honest in their reporting — due to the fact that delegating work to machine actors is only effective when done in earnest and this effectiveness results in the agent improving his or her productivity, and 3) a record of activity that may be given to the senior manager to enhance that principal's belief that the agent is acting in his or her interest.

APPENDIX B

DEFINING TRUST

The academic literature on trust provides a variety of meanings and perspectives. For example, Garfinkel (1964) characterizes trust as a necessary taken-for-granted condition for social interaction: there must always be an "et cetera" assumption where every agreement has unspoken but understood qualifications, assumptions, and provisions for future actions (pp. 247-248). Here, trust provides a foundation for understanding and interpretation, but it appears to have cultural bounds, inasmuch as the nature of the unspoken may vary across individuals of different backgrounds. Trust, for Garfinkel, is essential but brittle, easily broken by misunderstandings that naturally arise in the growing number of exchanges between individuals of different cultures.

Luhmann (1979) notes that trust begins where knowledge ends: trust provides a basis for dealing with uncertain, complex, and threatening images of the future. The implications here are several. Trust becomes a solution to cognitive dissonance, faintly coerced through an inability to sort out uncertainty. Trust, here, is a reliance on some number of certainties in turbulent conditions: despite conditions largely unknown, other individuals, whose actions affect one's own welfare, can be counted on to act in a predictable and presumably benevolent fashion.

Barber (1983) is somewhat less circumspect in defining trust, characterizing it as the expectations involving a general moral order and specific norms of competence and responsibility. For Barber, in the act of trusting, we make the belief that an associate will act in accordance with a well understood conduct of behavior and we are capable of saying just what that behavior entails. The implication is that the "et cetera" assumptions described by Garfinkel are, perhaps, better understood — but no less brittle.

Lewis and Weigert (1985) define trust as "observations that indicate that members of a system act according to and are secure in the expected futures constituted by the presence of each other for their symbolic representations." They, too, characterize trust in terms of actions that conform to expectations. They also implicitly address the developmental nature of trust, noting that it is the outcome of observations.

Some definitions of trust, however, are without an explicit set of expectations. Rempel and Holmes (1985), suggest that trust is simply "the degree of confidence that you feel when you think about a relationship." This concept of trust has a strongly subjective bent that eludes substantiation through any process of matching expectations to outcomes.

Like many other definitions of trust, Zaltman and Moorman (1988) define trust through prediction that is value free: "an interpersonal or inter organizational state that reflects the extent to which the parties can predict one another's behavior; can depend on one another when it counts; and have faith that the other will continue to act in a responsive manner despite an uncertain future." This definition does not address what we often assume to be characteristic of trust: that those expectations are largely about outcomes that are in common with our own interests.

Giffin (1967) includes trust's implicit goal directed characteristic in providing an alternative definition: "reliance upon the characteristics of an object, or the occurrence of an event, or the behavior of a person in order to achieve a desired but uncertain objective in a risky situation." Further, she cited the following elements as essential to describing a trusting person:

1. A person is relying on something.
2. This something relied upon may be an object, an event, or a person.
3. Something is risked by the trusting person.
4. The trusting person hopes to achieve some goal by taking this risk.
5. The desired goal is not perceived as certain.
6. The trusting person has some degree of confidence in the object of his trust.

Using these definitions, a composite definition of trust is suggested: *trust is the outcome of observations leading to the belief that the actions of another may be relied upon, without explicit guarantee, to achieve a goal in a risky situation.* Whether or not the exact nature of those actions can be enumerated is unspecified in this definition of trust. The expected actions may be known or unknown.