Abstract: A particular challenge for management when working with short-term virtual teams is to facilitate the timely organization and function of the team. A key element of virtual team organization and internal function is trust [9]. Usually, short-term virtual teams work in a "swift trust" environment [13]. Information Systems researchers often assume that self-directed teams will perform better and achieve higher levels of satisfaction [14]. In this laboratory experiment we compare internal process of self-directed short-term virtual teams and management-directed short-term virtual teams. We find that team trust and sense of belonging were enhanced by a directive sentence in the script of the thinkLet. We suggest that instead of self-direction, limited directive management control, aimed at internal process, is in order when dealing with short-term virtual teams.

Key-Words: Virtual Teams, Swift Trust, Management Control, thinkLets, Computer Socialization

1 Introduction

For any company operating in today's world economy, the use of computer mediated virtual teams is a matter of necessity. A primary challenge faced by management is how to enhance the effectiveness of a virtual team without unduly interfering with the team internal process. There is empirical evidence supporting the proposition that self-directed teams are very effective[3]. Further, Wheelan and Kaeser [17] suggest that there is no need to appoint a designated leader when an outside party is forming a small group. They found that group development for face-to-face teams took about the same time and went through the same processes whether a leader was designated at the beginning or not. Townsend, et al. [16] mention that managerial direction and control are important for effective use of virtual teams. They discuss the necessity of setting deadlines for team reports and defining the virtual team's specific role(s) but lean toward a hands off self-directed approach when it comes to internal team functions. Piccoli and Ives [14] indicate that much of the research on virtual teams seems to assume that virtual teams should be left to develop their own internal process(es). However, in
spite of the foregoing discussion, the empirical evidence from this study indicates that total self-direction does not always result in the best internal process. It is proposed that management direction of certain aspects of internal virtual team process is in order.

Jarvenpaa, et al. [10] propose that 'trust' is one of the most important variables related to the effectiveness of global virtual teams. This is because the normal socialization process afforded by face-to-face meetings is not available. Jarvenpaa and Leidner [9] suggest that virtual teams may operate in the context of a frail type of "swift trust." The concept of "swift trust" was first developed by Meyerson, et al. [13]. They hypothesize that face-to-face teams formed to complete short-term, time intensive, projects often bring trust expectations, that were formed in other settings, with them. For these types of teams there is no time to work through a normal team socialization process. As a result, support of individual team members and maintenance of overall team welfare is secondary to project completion. Jarvenpaa and Leidner suggest that virtual team members bring the same "swift trust" expectations with them. However, they go on to point out that once a virtual team begins work, communication from other members can easily modify those expectations (up or down). This means that management has a vested interest in maintaining internal trust for virtual teams operating under "swift trust" conditions. If trust is not maintained a team can quickly become dysfunctional. From a management perspective, a dysfunctional virtual team that has a tight project completion timeline can quickly become a liability.

The question that arises is: What kind of management control or direction might be appropriate for the internal structuring of virtual teams working under "swift trust" conditions? This study is designed to address that question.

2 Research Design

Virtual teams and Group Support Systems (GSS) go hand in hand. Briggs, et al. [1] voice their concern that GSS research has sometimes been dubious with inconsonant results. They attribute much of this to the traditional research focus that considers the entire GSS. They argue that it is more appropriate to focus on 'thinkLets'. The term thinklet is defined in their paper as "...the smallest unit of intellectual capital required to create one repeatable, predictable pattern of thinking among people working toward a goal." They describe a thinkLet as having three components: 1) specific hardware and software, 2) the specific configuration of the specific hardware and software, and 3) the procedures and instructions given to the group. The third part of a thinklet is called a 'script'. In this laboratory experiment, parts one and two of the thinkLet are exactly the same for all subjects. The between group treatment is a slightly different 'script' for different types of groups. This is more fully described below.

2.1 Task, Subjects, and Data Collection

Seventy third year undergraduate students were used as experimental subjects. Subjects were randomly assigned into fourteen five member teams. The experiment was conducted in an Information Technology laboratory. All team members used the exact same type of computer configured with exactly the same software. The sole means of team communication was through a windows 'access' based chat room designed specifically for the lab. All subjects were trained in the use of the chat room before the experiment.

Each team was asked to perform a simple information gathering and communication network structuring task. The task required the group to find a common color that each member shared from among different sets of randomly generated colors that had previously been sent to each member. The experiment was conducted in one session and consisted of seven rounds of the same task. After each round the colors were randomly reset for each member of each group. Also after each round, each group, using the chat room only, was given an opportunity to discuss how to organize themselves before beginning the next task round. After rounds one, four, and seven each individual subject completed a questionnaire. The questionnaire was designed to solicit various aspects of group internal process. This task was adopted from Leavitt [12] and was later used by Guetzkow and Simon [7]. It has been described by Freeman, et al. [5] as "simple and elegant" in its ability to permit observation of group processes without removing the essence of group interaction.

2.2 The Script

For this experiment the first two parts of the thinkLet are exactly the same (e.g. hardware and software types and configurations). Recall that the third part of a thinkLet is the script. Briggs, et al. [1]
define a script as "...the sequence of events and prompts given to a group as they use the GSS tool." Previous GSS research has shown that scripts can be used to modify thought patterns among group members. Shepard, et al. [15] discovered, in a GSS brainstorming experiment, that changing one phrase in a lengthy script resulted in significant increased productivity. Jessup, et al. [11] found that words which changed the tone of an evaluative script had a large impact on team productivity. These studies show that a slight difference in a script can make a large difference in a virtual team's internal process.

For this experiment, the fourteen groups were divided into two categories: self-directed and management-directed. The only difference between the groups is one sentence in the instructions that appeared on each computer screen at the beginning of each task round. At the beginning of each round each individual team member was randomly assigned a name using a list of five different fruits (i.e. apple, pear, plum, orange, grape). Then, each individual team member was sent a random list of five colors using a six color list (i.e. blue, purple, yellow, pink, green, red). Individuals were told that there were a total of six possible colors. The following common instructions were displayed on all computer screens for both self-directed and management-directed groups:

1. Determine as a group which one of the six colors that all members of your group have on their list. This can be accomplished by sending and receiving messages with other members of the group. Messages can tell another group member what your colors are, give the correct answer for the round, or ask what colors they have. You may use a piece of paper to keep track of the colors that each member has.

2. Indicate the correct common color as soon as you have determined which color that is. All five group members must indicate the correct color in order to move on to the next round.

In addition, the management directed groups received the following instructions:

3. You should accomplish the task by sending the colors to apple and have them find the answer and send it to other members.

### 2.3 Research Variables

Each subject completed questionnaires after rounds one, four, and seven. The questionnaires were designed to elicit values for the following variables:

- **Trust in Peers (TP)**
- **Goal Commitment (GC)**
- **Sense of Belonging (SB)**

The foregoing variables measure internal team process. In addition, after round seven, each individual completed other questionnaires that elicited values used to compile the following variables:

- **Solution Satisfaction (SS)**
- **Decision Scheme Satisfaction (DSS)**

These variables measure overall satisfaction at the end of the project.

The questions used on all questionnaires have been used in prior research. The underlying constructs have previously been tested for reliability and validity. Cook, et al. [4] define 'Trust in Peers' as "...confidence in the abilities of others, yielding ascriptions of capability and reliability." This definition corresponds to the definition of 'trust' offered by Jarvenpaa, et al. [10]. Hollenbeck [8] defines 'Goal Commitment' as "...the person is psychologically bound to the goal." This concept is closely tied to 'trust'. Chin, et al. [2] define 'Sense of Belonging' as "...an individual's sense of belonging to a particular group." This concept is also closely linked to 'trust'. The satisfaction variables SS and DSS, that were measured at the end of round seven are defined by Green and Taber [6]. 'Solution Satisfaction' indicates '...member satisfaction with the decision.' 'Decision Scheme Satisfaction' means "...member satisfaction with ...the group decision scheme."

### 2.4 Statistical Methodology

Three separate multivariate analyses of variance (MANOVAs) were conducted for the internal process variables obtained after rounds one, four, and seven. The dependent variables for each MANOVA were: Trust in Peers (TP), Sense of Belonging (SB), and Goal Commitment (GC). The independent variable was group type (i.e. self-directed groups or management-directed groups). A separate fourth MANOVA, examining the satisfaction variables, was also conducted. The dependent variables for this MANOVA were Solution Satisfaction (SS) and Decision Scheme Satisfaction (DSS). The independent variable was also group type. The results of the round one and round four internal process MANOVAs are reported in Tables 1 and 2. The results of the round seven internal process MANOVA and the satisfaction MANOVA are not reported because there is no statistically significant result. That is, at the end of the experiment, both self-directed and management-
directed groups were equally satisfied with the solution and decision schemes. In addition, for round seven, both types of groups exhibited no difference in Trust in Peers (TP), Sense of Belonging (SB), and Goal Commitment (GC).

3 Statistical Results
After round one, both types of groups exhibited similar levels of Trust in Peers. However, the management-directed groups showed higher Sense of Belonging but lower Goal Commitment. The results are shown in Table 1.

<table>
<thead>
<tr>
<th>Source</th>
<th>Dependent Variable</th>
<th>F</th>
<th>Significance</th>
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<tbody>
<tr>
<td>Group Type</td>
<td>Trust in Peers</td>
<td>.373</td>
<td>.543</td>
</tr>
<tr>
<td></td>
<td>Sense of belonging</td>
<td>5.416</td>
<td>.023*</td>
</tr>
<tr>
<td></td>
<td>Goal Commitment</td>
<td>5.606</td>
<td>.021*</td>
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* significant at $\alpha = .05$

After round four both types of groups showed similar levels of Goal Commitment. However, the management-directed groups showed a higher level of Trust in Peers than did the self-directed groups. For round four, the management-directed groups continued to exhibit higher levels of Sense of Belonging. The round four results are reported in Table 2.

<table>
<thead>
<tr>
<th>Source</th>
<th>Dependent Variable</th>
<th>F</th>
<th>Significance</th>
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</thead>
<tbody>
<tr>
<td>Group Type</td>
<td>Trust in Peers</td>
<td>4.007</td>
<td>.049*</td>
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<tr>
<td></td>
<td>Sense of belonging</td>
<td>4.472</td>
<td>.038*</td>
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<tr>
<td></td>
<td>Goal Commitment</td>
<td>2.180</td>
<td>.144</td>
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* significance at $\alpha = .05$

At the end of the experiment it was expected that both group types would have had time to work through most of their individual group internal process issues. As previously mentioned, this was the case. There is no statistically significant difference in all five variables at the end of the experiment. However, in order to better understand the relationship between the internal process variables after each round, separate profile plots for the variables TP, SB, and GC are presented in figures 1, 2, and 3.
4 Discussion and Conclusion

After round one, both types of groups exhibited a similar moderate level of trust. This is in accord with the "swift trust" theory which says that in the beginning, group members assume a certain level of trust based on prior small group encounters. However, after round four the self-directed groups trust level dropped considerably. Remember that it is thought that virtual teams have a fragile type of "swift trust" that can be directly impacted, positively or negatively, by initial communication. The management-directed teams, in effect, had a leader/coordinator appointed at the beginning of round one. The self-directed teams were left to their own devices to figure out how to proceed toward a problem solution. This led to initial confusion as self-directed team members tried to sort out their group role. This start-up confusion and frustration is manifested by a sharp initial drop in trust. The self-directed teams did not recover their trust levels until well after round four. On the other hand, the management-directed teams never faltered in their trust. They show a continuous increase in trust level throughout the experiment.

Interestingly, the management-directed groups had a higher sense of belonging after rounds one and four. This sense of belonging did not change very much over the entire experiment. Contrary to this pattern, the self-directed teams started with a low sense of belonging but showed a steady increase over the entire experiment. These different patterns are likely due to the difficulty that the self-directed teams experienced with initial organization problems. But, by the end of the experiment the self-directed teams had overcome internal process difficulties. The management-directed teams never had to deal with these type of problems and were left to focus more on the problem solution.

As might be expected, the initial goal commitment was low for the management-directed groups. This can be attributed to the fact that the appointed leader/coordinator was the only one with a clearly defined role at the beginning of the experiment. On the other hand, the self-directed groups showed very high levels of initial goal commitment. This can be attributed to the idea that self-direction potentially means that each member has a chance to have his or her ideas about internal process heard, whereas, the management-directed groups were already structured. However, goal commitment for the self-directed groups quickly dissipated as the reality of self organizing a virtual team set in.

The foregoing behavior exhibited in this experiment has certain potential implications for management. When faced with the need to organize and facilitate a short-term virtual team, management must carefully consider, and seek to balance the level of directive management control against, the potential benefits and need for self-direction. Research has shown that self-directed teams function very well. And, in this study, the self-directed and management-directed teams showed little difference in the end. But, getting to the end was much more difficult for the self-directed teams. This indicates that management needs to take steps to reduce early confusion and lack of coordination for short-term virtual teams. The initial appointment of a leader/coordinator, as was the case here, can be accomplished as easily as putting one sentence in the script. A directive sentence in the script can have a significant impact on the early internal process of a virtual team.

Finally, it must be pointed out that this experiment was conducted in a controlled laboratory setting using students. This sometimes limits the generalizability of the findings. However, this experiment used proven constructs and methods that have wide applicability to group process in a virtual setting. It is believed that the findings from this study have application for the 'real world' of global virtual teams.
References:


