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Team development and virtual social networking

Abstract

With the rapid establishment and steadfast popularity of virtual social networks like Facebook, many organizations are replacing traditional methods of communicating within their establishments with business-oriented social networking sites. Virtual social networking allows network members to broadcast information quickly and to a wide audience and, through a push-based, full-distribution protocol, message content is received passively by all network members. By connecting to far-reaching links through this kind of web-based collaborative tool, individuals could be exposed to novel information that might otherwise have been missed. One possible outcome of such a widespread broadcast is that team members learn supplementary information about each other that they might not be privy to through more traditional, direct forms of communication. Since the amount of information known about an individual is positively correlated with feelings of trust and camaraderie toward that individual, interacting using virtual social networking might, in fact, support team building when teams are distributed and lack face-to-face contact. As part of a project examining the impact of web-based social networking on military interoperability, this paper reports on a study conducted to investigate social networking and the development of trust between team members. Results are discussed in the context of experimental design distributed teams and military interoperability.

Introduction

Background

Canadian Forces missions today are typically diverse and distributed, often involving joint operations, multi-national coalition forces, and/or inter-agency organizations, working together within a networked environment. Sharing and managing information from multiple sources, and developing integrated teams across time and space, brings unique challenges to interoperability. Furthermore, it is not unusual in theatre, for component members to be required to come together quickly, often in an adhoc fashion, resulting in teams who are unfamiliar with their counterparts or the role of other organizations.

Military and multi-agency operations are often high intensity and complex, where being able to share and find information in a timely manner is critical. A variety of web-based tools are available to support distributed collaboration and information exchange and many of these are used routinely in the recreational and business worlds. However, the military domain is a unique one, where implementation and adoption costs of new technology can be extremely high. In the military environment particularly, the implications and requirements of advanced technologies need to be understood prior to implementation. Technology to support distributed communication and collaboration continues to develop and mature at an alarming rate, and, as any owner of a personal computer knows, hardware and software become outdated very quickly.

One relatively new mechanism for sharing information and collaborating in the distributed realm, is web-based social networking, using sites like Facebook, LinkedIn, and Orkut (for a taxonomy of existing web-based social communities see Pronovost and Lai, 2009). This kind of virtual communication tool has increased in popularity so rapidly in a few short years that the success rate has led to it being adopted in many businesses as the primary means of communication, replacing more traditional channels such as email. Introducing this kind of technology into an already firmly established culture and networking structure is a huge undertaking, especially in the military domain where a number of exclusive challenges and risks exist. Consequently, understanding the role this kind of technology might play with respect to serving and supporting collaboration between distributed teams in the netcentric operational environment is essential.

Virtual social networking

In the world of information sharing, web-based social networking represents evolutionary progress in disseminating information via the internet. In some businesses and academic communities connecting via social internet sites has almost completely superseded email, a long-established traditional channel. The success and popularity of this kind of tool is evident in usage statistics. Facebook, for example, has grown in 4 short years from a college student network to a world-wide general population

community of over 350 million, with over half of those users logging on to the site every day (*http://www.facebook.com/press/info.php?statistic*).

Social networking of any kind involves connecting with individuals and forming communities, or networks, based on those connections. One of the strengths, and differences, of virtual networking is the almost limitless accessibility to potential connections through the internet, and the ease with which those connections can be made and subsequently linked together. Furthermore, this new approach to networking and communicating overcomes many of the boundaries of existing web-based communication tools, like email, because of the way information is disseminated and received throughout the entire network. On social networking sites, such as Facebook and LinkedIn, information sent out by a user is received by all network members, and displayed on each member's home page. The end result, and perhaps a primary reason behind the success of these kinds of site, is that little or no action is required on the part of the user in order to stay connected and informed about a wide pool of contacts.

Team building

When teams are distributed, and possibly diverse in many ways, integrating team members into a single cohesive unit with a common goal can be challenging. There is much we do not know about building the team in distributed environments, but, since trust is fundamental to any relationship, it comes as no surprise that it is an equally critical component in team development (Jones, 1998). Trust influences how well a team's group members work together; how cooperative, cohesive and coordinated they are; and ultimately how likely they are to share and commit to ideas (Dirks, 1999). Low trust between team members results in an individualistic work approach, whereas high trust finds members working toward a collective effort (Dirks, 1999).

Whether it be on an individual or group level, trust is gained through communication, familiarity, and experience with the other party. However, teams that rely on technology to communicate are likely to talk less than those interacting face to face, and the quality of the exchange is typically poorer and less informative (Martins, Gilson, & Maynardet, 2004; Salas, 2005). Relying on technology as a means of connecting tends to lead to ambiguity and artificiality – or team opacity (Fiore, et al., 2003), and relationships are likely to be more shallow than those built face to face. In the absence of face to face exchanges, interactions lack the rich information contained within visual, auditory, and paralinguistic cues, such as facial expression or tone of voice, and other sorts of contextual information supporting memory formation are also lost. These kinds of cues are enormously informative and they play a large role in interpreting behaviour and in overall impression formation. Without them, impressions may be inaccurate, or may be anticipatory, based on past experience with similar, or associated groups or individuals (Levine and Thompson, 1996). Inaccurate impression forming is not unusual in high risk

environments where team members depend on each other and are unfamiliar with each other, and where teams are distributed, never having met face to face. This state is frequently prevalent in military operations where forces are working with other forces, nations, or organizations, and where the outcome of a mission depends on a high level of performance from all parties involved.

Familiarity is a significant factor in developing relationships. Familiarity stimulates communication, which subsequently provides the opportunity and climate for developing trust between individuals. Trust, and being able to rely on a team member, are attributes of strong successful teams. Research has shown that face-to-face interaction leads to greater levels of trust than distributed technology-mediated interaction (Jones, 1998). In the distributed environment, where team members are unable to experience each other face-to-face, a collaborative communication tool that provides the opportunity to increase familiarity and facilitate trust may be beneficial to team building, and consequently to optimizing interoperability. Due to its nature, virtual social networking may be just that tool. The study presented here is an initial effort toward investigating that proposition.

Supporting team building through virtual social networking

In any social network, relationships vary in intimacy and closeness. A close, strong, relationship that is continually supported and strengthened by sustained interaction might be based on familial ties, history, common values or interests. Linkages that are formed through more distant, shallow connections (e.g., friends of friends), on the other hand, tend to be weaker and less likely to promote as much interaction. These weaker links are less prominent and, without being stimulated through communication, are likely to drift further into the network periphery. In the real world, if there is nothing to motivate sustaining the connection, this kind of relationship might disappear from an individual's network all together.

However, in contrast to the real world, a distinctive feature of virtual social networking is that interactions between all network relationships, regardless of their strength, are 'visible' to all members. Although weaker links may not interact directly, content sent from a network member is distributed throughout the entire network and received by all members. Consequently, direct interaction between members is not a pre-requisite for sustaining a relationship, or, as we hypothesize, for strengthening one. Through the widespread broadcast, and passive reception of shared content, web-based social networks enable knowledge acquisition, and subsequently familiarity between members, even the most distant, weakest links. As information is received and added to base knowledge, familiarity with an individual can grow over the course of time with very little action on the part of either network member. Thus, impression formation, stimulating growth and development of a relationship can progress in the absence of direct interaction.

Virtual social networking sites are used to share a variety of different kinds of information. These include text messages, photos, videos, file sharing, and blogging. Content from all the available media can be used to build on impression formation, and since all content is shared between all members there are many ways knowledge about an individual can be gathered and built up through virtual social networking sites. Some websites, such as Facebook and Twitter, contain a feature that typifies the passive dissemination underlying much of the information exchange through virtual social networking sites, by allowing members to communicate through a short text message box. On Facebook this feature is called 'status update'. The kind of information distributed through this means is diverse because it typically contains statements that are relatively succinct, personal, individualistic statements related to a person's current state or activity. Simple examples of content using this feature might be: "[name of member] is hungry"; "….is tired"; "….is going out tonight". Because of the personalized nature of the content, this feature might be useful when it comes to learning about another individual and consequently it might aid in becoming familiar with them. The objective of the study reported here is to investigate this concept further by examining whether providing simple text information about an individual impacts the level of trust that develops for that individual.

Method

Participants were engaged in a multi-player video game as a backdrop task, while receiving non-task related information through messages, or 'status updates', from another player, their team mate. Inter-personal trust was measured before and after the game. The focus of interest was the effect of the message information (non-task related, personal snippets of information) on trust when team members are distributed and face-to-face interaction is absent. Comparisons to be made were:

Trust in teammate - when status updates were received from the teammate compared to when status updates were not received from the teammate.

The participant played on a two-person team against an opposing two-person team. Players other than the participant were automated computer players. The participant was told that the opposing team was made up of automated players but they were led to believe that their team mate was a real person playing the game in another location. The strategy of using automated players was chosen to reduce individual variation in game-playing expertise, since skill level of other players could possibly bias subjective performance measures.

Participants

Forty four participants, 30 male 14 female, with correct or corrected to normal vision volunteered for the study, recruited from several populations, including employees of DRDC, military personnel, university students, and general public. Participants were reimbursed for their time according to DRDC guidelines (Keefe, 2009).

Apparatus

A multi-player video game called Company of Heroes™ was used as a team-based task in this study. The game was presented on an LCD display with the participant seated directly in front of the display at a comfortable viewing distance. Game play was controlled by a mouse on the desk.

Messages in the form of text were delivered at 1 minute intervals throughout game play via PowerPoint slide presentation on a laptop computer adjacent to the gaming computer.

All questionnaires were delivered on-line using SurveyMonkey.

Task

Company of Heroes™ is a war-based video game (mature rated) simulating military operations during World War II. The game provides the team-oriented basis required for this study, is relatively simple to learn and play, and allows for the generation of computer simulated automated players.

The participant was instructed that they were a member of a two-person team playing against an opposing two-person team. The participant was informed that the opposing team players were simulated computer players, but they were led to believe that their team mate was a real person playing in another location to ensure anonymity. In reality, the team mate was also an automated computer player.

In one condition, messages, supposedly from the team mate, were presented during the video game in text form on a computer monitor. The messages were pre-generated by the experimenters so that they were consistent across participants. None of the information in the messages was related to the game, but participants were told that the messages were important to the experiment and they should read the messages. They were also informed that they would be asked to complete a memory recall questionnaire with respect to message content at the end of the game. The participant played the video game twice, receiving messages during one game but not the other. Order of message condition was counterbalanced across participants.

Procedure

Participants read and signed a consent form and completed a Demographics questionnaire, and a Propensity to Trust Scale (Brown et al., 2008; Blais and Thompson, 2009) which were delivered on-line. The procedure was then described and they were subsequently asked to generate and document a list of

15 personal information statements that, they were told, would be used as messages to be sent to their team mate throughout one of the games, as, in like fashion, they would be receiving messages from their team mate.

Following this assignment a 10 minute instructional practice session was provided in which participants learnt how to play and control the game. Following the tutorial participants were introduced to their team mate through a short text summary (i. e., “is a DRDC employee who has played video games but is not an expert player, and has played Company of Heroes a few times”).

A Pre-mission Trust in Team mate questionnaire (Brown et al., 2008; Blais and Thompson, 2009) was then completed, followed by playing Game 1. If the game was one in which messages from their team mate were delivered, participants were reminded to read the messages and remember as much as possible. Upon completion of Game 1, post-game Trust in Team mate, and Willingness to Risk questionnaires were administered (Brown et al., 2008; Blais and Thompson, 2009). In the message condition a Memory Recall questionnaire was administered prior to any other questionnaires.

At this time, the participant was instructed that their team mate had changed and that they would be playing with a different person in Game 2. As for Game 1, a pre-mission Trust in Team questionnaire was administered, after which Game 2 began – with or without messages depending on the condition. Once Game 2 was complete post-game Trust in Team, and Willingness to Risk questionnaires were again completed. Each game was terminated after 15 minutes to ensure delivery of an equal number of messages between conditions and across participants.

Performance measures

Measures of trust were collected through questionnaires delivered before and after game playing. These included assessments of propensity to trust, and interpersonal trust (Brown et al, 2008; Blais & Thompson, 2009).

As an indication of whether the messages were read a memory recall task was conducted at the end of the game-playing session.

Results

Trust in team mate

Cell means for scores on team mate trust for each participant were entered into a repeated measures analysis of variance for (ANOVA), with Time (Pregame/Postgame), and Message (Present/Absent) as variables.

No effects of Time [$F(1,37) = 2.90$, $p > .096$, $MS_e = .656$] or Message [$F(1,37) = .352$, p .556, $MS_e = .473$] were evident indicating that participants rated trust in their team mate similarly before and after game playing and independent of whether messages were received or not.

Willingness to risk

In addition, cell means for Willingness to Risk scores for each participant when messages were presented and when they were not were analyzed. Paired comparison t-test revealed no difference between the scores as a function of messages being present or absent [$t(37) = -.165$, $p > .865$].

Memory recall

As a means of assessing whether the messages from a team mate were read, the quantity of message content reported by each participant was calculated. On average participants reported 48% of the messages delivered from their team mate.

Observations

Although it is not possible to ascertain with full confidence, the experimenters agreed that participants who played the video game were convinced that their team mate was a real person. That being said, game playing interaction with the team mate was minimal and undoubtedly not consistent between players, as discussed below (see Discussion section).

Discussion

The objective of this study was to examine the impact of knowledge of personal information on the development of trust between individuals working in collaboration, yet having never met face to face. The study was the first conducted in our lab in this field and to that end it was somewhat of a discovery exercise. As such, the exercise was put together quite quickly with the aim of taking an initial look at the mechanisms underlying virtual social networking sites, like Facebook.

The video game was chosen as a task primarily because it contained a team component, was relatively easy to learn and control, included an option for automated players, and was easy to acquire and set up. The measures of trust were chosen because of ease of access, having been developed at a sister lab (DRDC Toronto), and were readily modifiable to fit with the needs of this study.

Although it is possible that small amounts of personal information associated with an individual have little or no impact on relationship-building, as results from this study suggest, it is also feasible that there are other reasons why effects failed to show up in this experiment. In that light, listed below are a number of suggestions as to why effects on the variables of interest were absent:

1. Insufficient evidence of team mate: In order to attribute personal information to an individual, and begin to form a picture, or impression, of that individual, it must surely be clear that the individual exists. Although players were categorized as team mates, with similar goals, there was no prospect in this game for individuals to communicate or directly work together. Thus, there was little opportunity for substantiation of the team mate's existence, and particularly with respect to collaborative effort. Furthermore, skill level of individual players may have affected the amount of time players had to pay attention to moves and motives of their team mate. More skilled players may have been able to focus more effectively on their team mate's actions and behaviour. In contrast, players new to video gaming may have been less focused on their team mate.
2. The measures of interpersonal trust and willingness to risk measures were derived from surveys typically administered to personnel with experience in military operations, many of whom have recently returned from theatre. Thus, it is likely that these measures, and the construct of trust they are designed to tap into, are too powerful, in a sense, for the attribute we were attempting to assess in this study, which is perhaps more closely related to familiarity than to trust.
3. The lack of game-play involvement with the team mate, and the depth of allegiance and camaraderie implicit in the trust-related survey questions (e.g., "in a high risk task would I expect this person to watch my back?"), was likely difficult for participants to reconcile.
4. The total number of messages possible in a game was 15, distributed over 15 minutes. It is possible that the time to assimilate information and to associate that information with building an impression of a person is too short.
5. Messages were deliberately designed to be void of information that associated with a social or personal category to which a participant might naturally align. As an example, "…is going to their son's hockey game tonight" might provide fertile ground for a natural allegiance for certain participants, perhaps those who had children or played hockey, but not others. One of the problems with delivering this kind of content is that of consistency, since not all participants would affiliate similarly. Thus, feelings toward team mates, and scores on post-game trust measures might be influenced very differently. Although it is perhaps exactly this kind of information that is most useful and important in impression forming, and consequently in the process of developing a relationship, we preferred at this early stage of the research, to keep to

Despite the outcome from this specific study, the lessons learned, including the pros and cons of using off the shelf technology were invaluable. We continue to hypothesize that the mechanism underlying virtual social network, with respect to the distribution of information, may promote relationship development. Future work will address experimental design issues, primarily by incorporating a more team-oriented task that employs members in a cohesive, interactive relationship, and designing appropriate measures to assess the constructs of interest in relationship development in this context.

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