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Investigating Virtual Social Networking in the Military Domain

Abstract

In joint, coalition, and multi-agency operations, where component members are physically dispersed and culturally and operationally diverse, it is not uncommon to find that members are not familiar with the roles, expertise, and expectations of partnering units or organizations. Developing shared awareness and a high degree of interoperability in this distributed, anonymous environment necessitates appropriate tools to assist teams in collaboration and information sharing, and in localizing resources and expertise. In the corporate and public worlds a new class of communication called virtual social networking (e.g., Facebook, LinkedIn) is quickly taking over more traditional information sharing methods, such as email and chat. Virtual social networking represents evolutionary progress in disseminating information via the internet and its dynamic basis provides a rich forum for sharing information, for uncovering sources of expertise, and for developing extensive virtual connections between individuals and between groups. A research program has been initiated to investigate the requirements and feasibility of implementing web-based social networking with the Canadian Forces. This paper describes results from the first phase of the project, wherein social networking applications currently used by public and private organizations were explored.

Introduction

Background

The nature of Canadian Forces operations is fast becoming one that involves joint operations, multi-national coalition forces, and 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. Within the military domain there is much we do not know, nor can anticipate, about the ways in which networking distributed multi-cultured teams together affects individual and organizational behaviour and performance. As such, it is essential to understand the issues surrounding the human dimension of networking groups in high intensity and unstable environments like those experienced by the Canadian Forces and to provide appropriate resources and tools to support operators in their roles.

One of the key questions that arises within a diverse, multi-team operation is 'who knows what?'. An awareness of knowing what other team members know, and how to access the information that makes up a team's collective knowledge base, has been termed transactive memory [1, 2], and research shows it is an essential factor in team performance [3], and consequently in mission outcome. Unlike a shared mental model, whereby team members share common knowledge and information, transactive memory refers to a group-level collective system of knowledge and the awareness and understanding of team members about where to find the source of specific expertise within a team, or team of teams [4]. A distributed knowledge system serves to reduce individual cognitive load, enlarge the collective pool of expertise, and minimize redundancy. Furthermore, since situation awareness is a basic component of good decision making [5], and depends to a large degree on the information available, operational component members need to find sources of expertise quickly so that information can be accessed and delivered in a timely manner.

A variety of web-based tools are available to support virtual collaboration and information exchange and many of these are used routinely in the recreational and business worlds. The Canadian Forces must ensure that those technologies available to the public are not overlooked or prematurely dispensed with as we work towards ensuring a military force that is technologically advanced and network enabled. But the military domain is a unique one and new technologies should not be implemented without appropriately investigating the implications and requirements of advanced technologies, as well as modifications required to fit the military environment. As an example, in the late 90s the advent of chat and email networks hit the Navy with little preparation. While enthusiastically embraced as a major advancement in communications by military personnel on board ship, both within a Canadian Task Group and with Coalition partners, there were unexpected side effects in the management of commands and traceability of actions. Efforts to use chat logs to reconstruct Command and Control flows were found to be nearly impossible. However, in spite of these problems, chat is a valuable communications tool, and it is currently used extensively as a means of communication between Canadian Forces platforms.

Web-based collaborative tools

Following are some of the more common web-based collaborative tools:

- Electronic mail (email) – means of communicating and storing primarily text-based messages
- Chat – asynchronous text-based conversational script
- Blogs – (weB)log – regular entries of commentary
- Wikis (Wikipedia) – multiple editors, create/link websites
- Portals (Yahoo, Orbit, COPlans, DRDC COP21) – web point of access to various services
- Search engines (Google) – information search
- Social bookmarking (delicious) – shareable web page bookmarking
- Social tagging – user-based rating
- On-line forums (runningmania.com) – message board
- RSS feed – publish updated sites
- Twitter – status updates/ blogging

All of the tools in the above list support information exchange in one way or another, and some of them are useful or potentially useful for locating specific resources or sources of expertise. But search engines have limitations, particularly when it comes to sharing information between parties. The limitations of this type of tool become especially apparent in an environment where the complexity and diversity of an operation means a vast amount of, possibly unfamiliar, information must be made available to team members who are physically distributed.

Realistically, in a multi-agency military operation, the diversity of the organizations and the team involved may make defining what is required by specific individuals at a particular time exceedingly difficult. Users may not always know what specific information they need, in that, 'we do not know what we do not know', but search engines require users to have some idea of the information for which they are looking. Once a search is complete, results have to be parsed to extract references that are most likely to be of value, and to discard those that are not.

Subsequently, a selection of who to distribute and share the saved material with must be made. Decisions like these require that the user know, to a fair degree of depth, who they are working with, what their roles are, what their current state is, and whether or not they would find the information useful. In this entire effort, each user is on his own, meaning that an individual's effort is a non-shareable investment - although results can be shared, the intrinsic effort cannot. If

another individual, unknown to the original searcher, needs the results of a similar search he or she must conduct the same series of search steps independently.

Search engines, and many other web-based tools listed, like blogs, wikis, portals, social bookmarking, on-line discussion forums, email, and chat, are limited in that they are pull-based mechanisms for finding and exchanging information – they all require direct action on the part of the user and they require that the user know in advance the type of information required, and/or the source of that information, and/or appropriate recipients.

Virtual social networking

Tools supporting collaboration continue to develop and mature and in the corporate and social worlds many of the more traditional methods for exchanging information have recently been replaced with a new class of communication mechanism called virtual social networking (e.g., LinkedIn, Facebook). Social networking applications were not designed to replace search engines but they do overcome many of the limitations in finding and sharing information.

A social network constitutes connections (ties) between nodes (individuals) that share an incentive to link together, examples of which might be friendship, common values, interests, ideas, expertise. The shape of this network of interpersonal ties can determine its usefulness to members. Small, tight networks are made up of strong close ties. Members move in the same circles (e.g., a group of friends) and are relatively familiar with each other, having similar interests and shared experiences. Thus, knowledge shared within tight networks is usually not novel in nature. In contrast, loose networks, although they may contain a sub-network component of close connections, are generally made up of more distant relationships such as acquaintances, friends of friends, colleagues of colleagues. These relationships constitute weak links and the overall network size is typically larger than tight networks. Because of the basis of loose networks, connections to other social worlds are likely, which in turn gives members access to a wider range of information. In some domains, such as the business world, individual success can benefit from being connected to a variety of networks rather than having many connections within a single network. Similarly, individuals can exercise influence or act as brokers within their social networks by bridging two networks that are not directly linked (called filling structural holes).

On social networking websites individuals create a personal profile with information about themselves and communicate with network members through posting self-generated content in the form of pictures, documents, blogs, videos, etc.. Interactive technology makes it possible for people to connect and build their network from anywhere, at anytime quickly and easily.

Social network analysis

Although this paper will not delve into the details of social network analysis it seems prudent to convey the basis behind this analytical method here because it naturally relates to the underlying foundation of social networks. The social network analysis approach applies network theory to frame information about social systems, focusing on the structure of ties between individuals and groups. The power of social network analysis stems from its difference from traditional social scientific studies, which assume that it is the attributes of individual actors - whether they are friendly or unfriendly, smart or dumb, etc. - that matter. Social network analysis produces an alternate view, where the attributes of individuals are less important than their relationships and ties with other actors within the network. No assumptions are made about behaviours and norms, instead the analysis is strictly pitched at the shape of social networks, and how the shape and extent of the network contribute to individuals and groups. This approach has turned out to be useful for explaining many real-world phenomena, but leaves less room for individual agency, the

ability for individuals to influence their success, because so much of it rests within the structure of their network.

Social network analysis has been used to examine how organizations interact with each other, characterizing the many informal connections that link executives together, as well as associations and connections between individual employees at different organizations. For example, power within organizations often comes more from the degree to which an individual within a network is at the center of many relationships than actual job title. Social networks also play a key role in hiring, in business success, and in job performance. Networks provide ways for companies to gather information, deter competition, and collude in setting prices or policies.

Virtual social networking and the military

In some businesses, and in the university community, the traditional form of communication, email, has been almost completely superseded by virtual social networking. Facebook, for example, has grown in 3 short years from a college student network to a world-wide general population community of over 67 million [6]. This new approach to information exchange has a large push-based component and it overcomes many of the boundaries of existing web-based collaborative tools that are primarily pull-based. It is the passive receiving aspect inherent in virtual social networking that makes this sort of information-sharing technique significantly different from other approaches that rely on active request or distinct search terms. Through passive exchange, a wide range of information is received by the user that might otherwise remain unknown. Although not actively requested, this information can often be deemed highly relevant once received. Thus, through virtual social networking, the boundaries of a user's awareness of knowledge available are extended. In the world of information sharing social networking represents evolutionary progress in disseminating information via the internet. Not only are these applications effective for information sharing and finding individuals with specific expertise, but one of their greatest strengths is that areas previously unknown to the user become familiar, and sources of expertise, resources, and information that the user might otherwise have been unaware of are brought to light and are easily tapped into.

The dynamic mechanism of social networking provides a rich forum for sharing and finding information and for developing extensive connections that not only facilitate practical information exchange but may also promote team cohesion. A well integrated, communicative team is fundamental to developing shared awareness - an essential team component [7, 8]. Yet when team members are distributed and possibly diverse, integrating team members into a unit with a common goal can be a challenging process. Research shows that face-to-face interaction leads to greater levels of trust than distributed interaction, and trust is fundamental to team development [9]. Because of its push-based nature, the networking capability of virtual social networking may facilitate aspects related to team formation and overall team performance, such as communication, trust, cooperation and collaboration [8, 10, 11].

In order to stay abreast of modern technology and practice the Canadian Forces must understand the implications and requirements for web-based applications commonly used by industry and the public as they apply to military and multi-agency/unit domains [12]. The popularity and success of virtual social networking in the business and recreational worlds strongly implies that this type of collaborative application could play an important role within the large, netcentric world of the CF, where working with, and understanding other national and multi-national organizations is critical.

Defence Research and Development Canada is taking a proactive approach to investigating virtual social networking and other web-based collaborative tools, with the goal of determining their relevance and impact on the Canadian Forces, particularly in operations where teams are physically separated and unfamiliar with the expertise and knowledge of other component

members. The project as a whole involves several work areas that include researching existing virtual social networking applications; defining requirements for the CF; assessing the use of social networking and the web-based tools in a user testing environment, and conducting empirical research on human performance using virtual social networking applications. This paper reports on findings from the first phase of the project, which is to gain an understanding of the kinds of virtual social networking tools that already exist and to acquire knowledge with respect to how they are being used, by whom, and for what purpose. In conjunction, the work also identifies other communication and collaborative web-based tools that might be used as modules to enhance the overall capability of the social networking applications in the military domain (e.g., email, chat, wikis, etc.).

Method

Information about virtual social networks was acquired via exploration of web content using the following specific means:

- Social tagging – user-based rating
- Digital journals, such as the CNET.com and Wired.com which are specialized in providing information about the high technology sector, including information technology, science, etc.;
- The Wikipedia online encyclopedia, which is a consensus-based editorial process often criticized by credentials-based supporters, but is nevertheless a source of the most up-to-date information on novel trends and products regarding information technology;
- Primary references acquired by searching virtual communities, social networks, and collaborative “Web 2.0” sites, where biased yet specific information can be acquired on demographics, users, traffic, functionalities, etc.;
- Web and traffic analytics data from sources such as Google Analytics and Alexa Internet;
- Directed web searches via the Google search engine for coverage of virtual social network use in corporate and business environments, which converges with digital journal editorials.

A taxonomy of virtual social networks was established by cross-referencing indexation of social networking sites from primary sources, information technology reviews online, and pre-existing taxonomies available from Wikipedia articles. The resulting classification and review is purely qualitative at this point beyond traffic and usage analyses, as well as case-based academic research on issues such as communications, socialization, and abuse relative to social internet media.

A methodological factor of interest in the next phase of this work will be surveying virtual social network users in corporate and business environments, to yield insights on best practices, personal benefits and limitations, as well as organizational factors that affect social networking. Since such subjective measures might underdetermine the usefulness of a complex, yet immature, system, social networking analysis, which is not commonly used in information technology research, will be used to attempt to yield more objective and robust insights.

Results

The people, interactions, and information that constitute a virtual social network are also called collectively a *virtual community*. The concept of virtual community can be a super-ordinal category of virtual social networks, because of the looser ties of other types of non network-centric communities such as Web 2.0 interactions at large, massive multiplayer online role-playing games” (MMORPG), authoritative and closed wikis, blogs, etc. The following taxonomy was created to firstly overview types and contexts of virtual social networking and secondly, to

narrow down the type of desirable framework for the potential implementation of net-centric, interoperable tools for the Canadian Forces. The emphasis is centered on professional and military virtual social networks, which follow the broader types of social networking platforms.

A taxonomy of virtual social networks

Academic or applied research knowledge bases

This type of virtual community revolves around an endeavour to disseminate research data and ideas, as well as providing multiple external opinions on critical judgments such as prognostics and diagnostics, querying other experts at large on anything from simple and technical to life-threatening issues. *Medical* virtual social networks such as biomed experts, MyMedwork, Research Crossroads, and Sermo aim to provide health care professionals with support from their peers on critical judgments and decision-making processes. Other virtual communities focus on the *social cataloguing of resources*, such as Academia.edu and ResearchGATE, which have the potential to facilitate the communication and exchange of ideas between researchers, in the hope of increasing their efficacy and generate novel approaches and ideas. Yet another set of research knowledge bases are *technology-specific*, such as INmobile.org, aimed at wireless industry professionals who attempt to solve technological challenges and problems via virtual interactions, and News Reuters, a social network for employees whose companies are Reuters customers, or AdGabbler.com, which caters to the advertisement professionals [13].

Commercial social networks

Commercial social networks are designed to support business transactions and to build a trust between an individual and a brand, by relying on user opinions about the product, querying ideas to make the product better, and enabling customers to participate with the brands in promoting development, service delivery, and a better customer experience. An example of this type of network is Dell IdeaStorm.

Friendship-based (generic) social networks

This is the type of virtual social network that most people are likely to be acquainted with. The most popular friendship-based virtual social networks in North America are Facebook and MySpace, with demographics in the millions of users. Other popular virtual social hubs are Bebo, Friendster, Hi5, Orkut and Plaxo. The pioneer website in the genre was SixDegrees.com, inspired by the popular quote to the effect that most people can be related to someone else through six degrees of separation.

Users on friendship-based virtual social networks can join sub-networks organized by city, workplace, school, and area. Once a user is registered, he or she can connect and interact with other people, starting with people whom they know more directly, and outward to friends of friends, etc. Such technologies have been found to be primarily used to reinforce existing relationships rather than forging new ones [14]. Much of the input on this type of social networking application is passive in nature as members are automatically fed news on information and actions performed on-site by other members. Some of the friendship-based virtual social networks are slowly gaining usage in the corporate sector, either by sheer numbers of users, or by encouraging workplace exchanges via collaborative online applications, such as Facebook and Plaxo.

Media-type based social networks

Flickr, YouTube, DeviantArt, Vimeo, etc. are all sites that encourage casual and serious individuals to contribute multimedia in a large community, where some people are content providers while the overwhelming majority will satisfy itself with content appreciation and criticism. The proportions and traffic generated by sites like YouTube are undeniable, being covered in the media as pioneers of Web 2.0 technology, and as such they should not be ignored in the plurality of virtual communities.

Recommender systems

Some websites and accompanying search engines are geared towards recommending products and services, in a collaborative effort to quickly narrow in on information by interests, habits, etc. This exercise in semantic data mining creates shopping guides, social guides, social bookmarking and tagging, travel guides, and even “trust-based” and ranked systems such as Epinions.com.

Support-based networks

Many websites are simply interactive virtual social networks geared towards specific topics where socialization is encouraged or even solicited, such as communities of people suffering common ailments and illnesses, while some others engage in cooperative economics, support deliberative social networks, or are driven by ethics issues or religious advocacy. Non-profit organizations now have the means to reach out to many orders of magnitude more people than with pre-internet and pre-Web 2.0 technologies, at very low costs, with this type of network.

Video game networks

By far the most frequented genre of virtual community, the video game community has time and again been qualified as the engine of the economy and innovation for information technology and electronics. Video gaming has evolved into online virtual societies and infrastructures, from “first-person shooter” (FPS) hubs for games such as Halo, Crysis, and Call of Duty, to “real-time strategy” (RTS) online gaming, such as in StarCraft, Age of Empires, and Command and Conquer, where gamers raise armies and engage in military strategy. But the most impressive virtual social networking in this category is achieved via “massive multiplayer online role-playing games”, or MMORPGs, and in recent years there has been a phenomenal rise in games such as EverQuest, Ultima, and World of Warcraft. World of Warcraft, by Blizzard Entertainment, for example, has a community of more than 11 million users, who are actively engaged in an immersive 3-D environment where they endeavour to achieve a mixture of individual or group-based challenges. It is no surprise that a cross between video game entertainment, a persistent virtual world, and the capability for encouraged socialization has generated such popularity [15].

Virtual worlds

While so-called virtual worlds share many similarities with the aforementioned MMORPG games, they are generally labelled as such by virtue of being more generic in function than video game entertainment. Virtual worlds such as Active Worlds, DotSoul, Second Life, and the prototype web.live by Nortel, are socialization networks where users meet and congregate either by pure curiosity and a desire for socialization (such as the very popular Second Life), or, because

some have been designed to enhance the networking capabilities of the workplace, in the case of web.alive. Second Life has been very successful in establishing a virtual economy linked to real-world finances by allowing users to create virtual goods and sell them, or, in other words, providing a virtual space for e-commerce. Second Life even offers the means for the non-lucrative distribution of information and services, for various institutional and academic purposes, and distance-learning education [16].

Professional social networking

Many virtual social networks have been designed with a focus on interactions and relationships concerning professional endeavours and business opportunities, beyond general social interactions. In this context virtual social networking is proving to be an efficient way for individuals to build professional connections without face to face meetings. Such networks allow professionals to find like-minded individuals by looking online through filters such as title, industry types, business interests, etc.. This type of professional network service enables members of the business community to build a huge network of connections based on title, industry, or business interests so that they can discuss interests, stay informed and share knowledge and experiences. Such interactive meeting places therefore constitute enhanced business to business marketplaces. As with friendship-based applications, the push-based component of professional social networking brings information to the user passively. Members are informed this way about such aspects as, who other members have recently connected with since connections made by a colleague might be of interest. Through the professional network database users are provided with the ability to locate sources of expertise and to connect quickly and easily with new, previously unfamiliar, contacts. Professional networking in this context is frequently used for researching sources of employment and scouting for potential employees. According to the Institute for Corporate Productivity [17] in 2007, up to 65% of business professionals were already using virtual social networks, the most popular being LinkedIn, Yahoo360, and MySpace. Usage was primarily in the following areas:

- 52% to keep internal staff and remote employees connected,
- 47% to connect with potential clients and to showcase their skills,
- and 35% to assist them in finding jobs.

There is already a plethora of professional virtual social networks, the most popular being Etheryl, Harris Connect, LinkedIn, Nethooks, Ryze, Spoke, tribe.net, XING, Yahoo!, and Kickstart, but the potential for using generic virtual social networks such as Facebook and Plaxo is currently being investigated from all interested parties (the social networks themselves, some enterprises, and information technology journal reviews).

Do-it-yourself networks

Yet another interesting capability is the possibility to create or host an entirely customized virtual social network tending to very specific requirements or desires of existing or prospective communities and groups. Web-based services and businesses such as Elgg, IGLOO, Lotus Collaborative software, Ning, and the aforementioned web.alive from Nortel, allow customers to choose what they want out of a virtual social network from a set of functions, layouts, services, and interoperability with third-party software and web-based applications.

A very interesting feature of customizable networks (which is nevertheless available in preset networks such as Xing and Second Life) is the possibility of creating a *closed* virtual social network, *i.e.* limit the network to memberships within the organization or group of interest, or

allowing partial or total access to the external world. This might be desirable for communities wanting to avoid the threat of spam, spyware, undesirable members, as it provides increased security.

Military professional and social networks

- Generic social networks

Some virtual social networks have proven to be quite successful in maintaining and strengthening the bonds between military personnel, and between personnel and families. "military.com" is such a network, with a membership of 10 million from the US armed forces and veterans. The network serves as an infrastructure to facilitate access to services and benefits bestowed to military personnel, families, and veterans. It also serves as a hub for prospective members, as well as keeping people informed on career and educational opportunities. Some other military social networks are based on more conventional and pre-established virtual social networks, such as the Indian Army, which has a virtual community on Orkut, the Google owned virtual social network. Support groups also have their own virtual social networks, such as SpouzeBUZZ, and the Family Readiness Group.

- Simulations and virtual reality

Canadian and American military research concerned with Web 2.0 is growing and, a few virtual reality technology projects are already in development. Simulation technology, while not being as cost-effective as virtual social networks and certainly not geared towards identical objectives, is nevertheless of relevance in the discussion about online virtual communities and social networking. As an example of interest, the American military is developing a virtual world called Sentient Worldwide Simulation, which aims to mirror real-world events and places, a persistent world akin to MMPORG video games. Sentient Worldwide Simulation would be an attempt to simulate and follow major world events in real-time, and initially aims to be a training platform for professional development and military training exercises. With the help of a 3-D environment populated by avatars, some autonomous or semi-autonomous, critical scenarios such as catastrophes and mass casualties events could be modeled and provide critical insights in personnel development [18].

- Social networking with information dissemination

Some virtual social networking endeavours were created by military personnel during deployments in order to cope with the needs for rapid information exchanges beyond the traditionally slow high security information databases such as SIPRNET and Intellipedia. Senior military personnel have been reluctant to authorize such *ad hoc* products initially, but it became clear that their effectiveness was invaluable for deployed assets. Networks like CAVNet and TiGRNet enable timely information exchange about enemy and peer activity, bypassing information analysts and heavy bureaucracy.

"Company Command" and "Platoonleader", while being more generic virtual social networks, also pursue the aforementioned endeavour of disseminating and finding information on work experience, current activities, and cultural exchanges. Intellipedia, a secured access information dissemination system in the likeness of Wikipedia, constitutes a unique online collaborative tool where data are shared within and between US intelligence agencies. They are not open to the public [19]. Over 3,600 intelligence professionals tap into "Intellipedia" [20].

- AI-assisted social networking

iLink is a support system in the form of machine learning algorithms that models users' and social network content. It aims to enhance the information dissemination capabilities of existing virtual social networks, and is being tested on the aforementioned Platoon Leader and Company Command networks, as well as the Family Readiness Group. By helping users to sort through immense quantities of content, machine learning software enhances the ergonomics of information and resources research [21].

Discussion

Based on the results from this investigation it is clear that virtual social networking has been adopted and successfully implemented in various forms by numerous user groups within the social and business worlds. The explicit design of applications varies, being focussed on addressing the objectives and needs of specific user communities, and although use of social networking is already widespread, the platform continues to develop and become more sophisticated and refined. There is no doubt that this kind of web-based networking tool has enjoyed unequivocal success to date, no matter what the context, and progress in the field has occurred at a remarkable rate and continues to do so. Although some virtual applications, such as Second Life and iLink, are being used in the military domain, to our knowledge virtual social networking itself has not been officially implemented in the Canadian Forces.

Some users have made the transition from using a successful and familiar communication tool for personal use, to adapting it to the working environment. Individuals who have made this connection are making a point - that their work domain is lacking in tools required to perform necessary duties, tools that are readily available and consistently used in recreational worlds. However, there are serious considerations associated with this self-adaptive approach, especially in domains that are alert to issues revolving around security and time sensitive responsiveness. The military domain is a prime example of such a domain where the dissemination of information must be carefully observed and where means of streamlining decision making and responding must be optimal. As such, appropriate research into the requirements of this specialized domain must be conducted to ensure that the most beneficial and useful application of virtual social networking makes its way into the operator's toolbox.

Based on the above taxonomy, of most interest to future work under the DRDC project are the forms of virtual social networking that model on the basis of friend or professional network building (e.g., Facebook and LinkedIn). As discussed previously, one of the unique components of applications like these is the passive nature by which information is received by network members. This particular aspect and the connectivity formed through establishing networks could well serve the sharing of information in the distributed netcentric domain in which military operations are typically conducted. In this dynamic environment the CF are often working with joint and coalition partners and other government and non-government organizations. Units, component members, and individual personnel can change quickly and frequently and being able to keep up to date with positional changes and activities, and having access to identity information attached to incoming players is essential. In recent discussions, Joint Fires Support (JFS) subject matter experts (SME) suggested that building a virtual network within the JFS operational community could help alleviate some of the challenges they face in team member changeover [22]. The passive push of information, intrinsic to virtual networking applications, would be an asset in notifying community members of changes in personnel or in a personal profile, without active request. Thus, a dedicated community network would be particularly useful for staying informed about positional changes and activities of component members,

particularly on those who belong to different operational units or organizations or who do not necessarily impact on an operator, or officer's, daily routine. Moreover, through the active search aspect, a virtual network would allow for quick reference to identity information attached to incoming players, such as areas of expertise. Similarly, the application of virtual social networking could augment the integration of new personnel by providing an instant visual of the global composition of the community network, and quick identity of network links used by a predecessor.

Some of this information might be available through other sources through active searching, but it is important to recognize the strength of the passive component of virtual networking, whereby information is fed to network members. Through push-based dissemination, the receiver is made aware of information that might otherwise have gone unnoticed, but that might in fact be useful.

An additional problem in an ever-changing multi-player environment is the ability to find sources of expertise quickly, and the social networking tool could be used as a mechanism to quickly and efficiently access information related to who knows what, and where expertise resides.

The demonstrated success of social networking in building relationships in so many different environments points to a potential mechanism that could be pivotal in the development of relationships between coalition and other organizations participating collaboratively in operations. Trust is an essential component to establishing good working relationships in any context, but in the military domain, where the stakes are high for component members, it is of particular importance. However, in environments where component members are not familiar with each other building trust is difficult, if not impossible. The effectiveness and durability of virtual teamwork depends largely on commitment and personal trust, which is not only exceptionally difficult to build in long-distance relationships but, even if established, is likely to gradually dissipate over time when teams are not collocated and have no face to face contact [25]. A social networking application could serve to promote the building of trust between unfamiliar multi-national partners. In a related context it has been identified that a military social networking tool could be extended to include other non-government organizations which would increase the potential for collaboration [22], and would also provide a means of sharing information between parties that might otherwise have difficulty collaborating and communicating due to public perception.

The intention of this paper is to share the findings to date with respect to our investigation of existing virtual collaborative tools. It is recognized that the development and implementation of a virtual social networking application into the military domain will be accompanied by an inventory of complications, limitations, and unique difficulties associated with working within that domain. For example, any Canadian Forces social network would have to be supported by a robust security framework to ensure that the sharing of sensitive information is controlled. It is not the intention of this paper to make light of these issues and it is hoped that future work will lend itself to identifying more specifically what the primary areas of concern are and perhaps supply recommendations of ways to address them.

The results from the work presented here will be used as the first step of our investigation of requirements and impact of implementing virtual social networking in the Canadian Forces. Future work includes, conducting a requirements analysis in the maritime domain, setting up a test user community to explore the use of a web-based collaborative tool set that includes social networking, and conducting empirical investigations to examine some of the issues in human performance associated with using social networking as a means of sharing information, identifying sources of expertise, and building trust between distributed teams in a military netcentric domain.

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