Remote Leadership

E. Kevin Kelloway, Ph.D.

Elizabeth Kelley, MLS, MBA

LCol Terrance Weatherbee, MBA

Saint Mary's University, Halifax Nova Scotia

Executive Summary

Technology has permeated the operations and structure of almost every organization in the world and has transformed the way we work in organizations. In this paper we review the impact of technological change in leadership and, more specifically, leadership in the CF. Our review proceeds in three major sections. First, we review the strategic environment with specific reference to the implications of emergent technology for forces operating in this environment. Second, we review the behavioral science literature focusing on the implications of technology for organizational behavior and, more specifically, organizational leadership. Finally, we integrate both reviews by making a series of recommendations for consideration by the CF as to how to deal with issues of remote leadership.

The Strategic Environment

The future security environment will be significantly more complex, fluid and dynamic than previously expected. It will consist of potential and emergent threats from both state and non-state belligerent groups. These groups will have access to similar types of communication and computing technologies that modern western militaries do, or they will have access to the equivalent civilian counterparts. This will enable them to have parity or near-parity for some elements of their command and control, reconnaissance and intelligence capabilities – although these will probably be fragmented in nature as opposed to the coherency of these systems within conventional modern militaries they may be in conflict with. Consequently, they will probably adopt asymmetric strategies and tactics as 'means-and-ends' in order to offset a lack of conventional symmetric capability.

In response to the potentials of modern computing and communications technology, and spurred by the general levels of reduction in conventional force sizes and structures, most militaries have moved to a greater reliance on technological capability for force projection. This movement is being lead by the United States as it navigates the latest RMA and attempts to evolve towards the Network-Centric Battlespace. It is recognized that this concept will impact classic or conventional military organizational structures and processes and elements of this are being realized now. However, the scope

and extent of the full impact has not been fully recognized in many ways as the conceptualization of this mode of warfare, and the technologies that will permit its' evolution, are relatively young or are still emerging.

The employment of forces in a Network-Centric environment needed to counter future security asymmetries will be distinctly different than in the past. Organizational structures will be deployed over greater and greater geographies increasingly separated in space as networked digital mass replaces or augments physical mass and force projection. This will be driven in response to the asymmetric tactics of belligerents or the necessity of meeting operational requirements for belligerent activities that are classed as less-than-war. Conversely the use of technology will bring these deployed forces closer together as information connectivity and communications processes become scalable in real-time. The complexity of this environment will force changes to the current doctrinal, operational and leadership concepts that will be necessary to operate successfully under these new conditions.

The employment of forces will occur in environments where there will be a tendency towards interest and influence from increasingly distant elements connected to the network as the number of belligerents, and associated stakeholders, within any conflict increase. This will result from the technological capability for any individual or group within the network to observe activities in real time across all levels from the strategic to the tactical. Compression of the levels of warfare will thus force a re-conceptualization of force structure and employment. The very nature of the Network-Centric Battlespace has implications that span from national 'grand strategy' through to the tactical actions used by the individual soldier. This is particularly critical in light of the capabilities for real-time information broadcast by media, or across the Internet, which enables almost anyone including friendly militaries, belligerent groups, individuals and national populations to receive information on these activities anywhere at anytime.

In future there is the potential to realize the concept of a soldier *Avatar*. Many of the technological capabilities needed to deploy *avatars* exist now. However, an *avatar* must operate in a more cognitively complex space than conventionally trained soldiers or leaders do, existing at the nexus of information, physical and cognitive domains. The personal characteristics, educational and training for these types of individuals may need

to be significantly different as the technological mediating effects on network enabled soldiers, leaders and organizations are investigated.

Remote Leadership

The remote environment is very different from the traditional environment; traditional leader behaviors are necessary but not sufficient, to manage effectively in a remote environment and there is little direction from empirical research about what else is required; leadership is even more important in the remote context than in the traditional one, where substitutes for leadership may be available

Trust is pivotal to effective leadership, and even more so in uncertain environments, which characterizes remote leadership; little is known about how to develop and maintain trust in the absence of face-to-face interaction, with its associated wealth of nonverbal cues. A synthesis of the preliminary findings with different areas of focus (transformational leadership style, facilitative style, higher level LMX behaviors, coaching behaviors, etc.) suggests that some combination of remote transformational leader behaviors may result in improved outcomes, such as both individual follower and group satisfaction and performance.

Recommendations for research and practice

Based on our review we make several recommendations for future research and practice: Specifically:

1. Research into the characteristics and traits necessary to operate successfully in this new technologically mediated environment is needed

2. The increasing complexity of these new operational environments and the increasing expectation of conflict asymmetry in future demand a significant change in leader education and training. This requires a review of current training/development protocols in light of research findings on remote leadership requirements.

3. It is critical to understand which leader behaviors enhance the development of trust in a remote environment and how that trust affects follower outcomes

4. While obviously subject to continued research, the development of protocols for remote leadership is strongly recommended

Remote Leadership

Technology has permeated the operations and structure of almost every organization in the world (Coovert & Foster-Thompson, 2001). Spearheaded by the development of the personal computer – which made computing technology available to the non-specialists (Craiger, 1997' Scrivener, 1994; Van der Speigel, 1995) - and accelerated by advances in inter-connectivity (Craiger, 1997; Hohansen, 1988) - that changed the personal computer to the inter-personal computer (Coovert & Foster-Thompson, 2001), advances in technology have transformed the way we work in organizations. Moreover, the projections are that the pace and rate of change will continue to accelerate (Coovert & Foster-Thompson, 2001).

Advances in technological capability have led to the need to reconsider, and perhaps, reconceptualize the nature of organizational work. For example, it is no longer necessary to have people in one geographic location to hold a meeting, solve problems or conduct training (Gale, 1994; Keates, 1997; Ziegler, 1994). Yet there is considerable ambiguity about whether "virtual" meetings achieve the same outcomes, or demonstrate the same processes as face-to-face interactions. The advent of electronically mediated leadership is a case in point.

Most studies of leadership have focused on leadership in face-to-face interactions (e.g. Barling et.al., 1996; Howell & Avolio, 1993; Koh et.al., 1995) in which the leader is physically present with the followers. Indeed, some authors have suggested that this degree of contact is necessary for leadership to occur (Kerr & Jermier, 1978). However, with the advent of globalization, extended spans of control and advanced communication technology (Avolio, Kahai & Dodge, 2001), organizational leaders are frequently tasked with "leading" employees who work in remote locations, or with leading so many employees that direct face-to-face contact on a regular basis is difficult. As a result, leaders increasingly rely on technologically-based communication with subordinates including the use of electronic mail (email) and video/teleconferencing. Leadership interactions that are characterized by electronically-mediated communication between geographically and physically isolated leaders and followers are what we term "remote" leadership.

Although there is little doubt that organizations are increasingly reliant on remote leadership, there is some concern that these interactions may be less than optimal. For example, as noted above, Kerr and Jermier (1978) suggested that effective leadership would be impossible under conditions that limit close interpersonal contact between leaders and followers. At least two studies have found that the effect of leadership on performance was negatively affected by the geographical distance between the leader and the follower (Howell & Hall-Merenda, 1999; Podsakoff, Todor, Grover, & Huber, 1984). However, there is comparatively little empirical data that identifies potential problems that could be associated with electronically-mediated leadership. The purpose of this manuscript is to consider these issues with specific reference to the Canadian Forces (CF) and, more specifically, the strategic environment faced by the CF.

Accordingly, this paper proceeds in three major sections. First, we review the strategic environment with specific reference to the implications of emergent technology for forces operating in this environment. Second, we review the behavioral science literature focusing on the implications of technology for organizational behavior and, more specifically, organizational leadership. Finally, we integrate both reviews by making a series of recommendations for consideration by the CF as to how to deal with issues of remote leadership.

The Strategic Environment

The Future Security Environment

The political and economic dynamics of the Cold War period served to either constrain or channel the actions of most nations (Berman, 2000) as a result of the 'geopolitical homogeneity' that was extended across states allied with either of the two major superpower spheres (Spanier, 1981). The superpowers attempted to further extend their hegemony through economic, political and military means. Military conflict was, generally speaking, an extension of the bipolar superpower politics and was conducted primarily through surrogate states. While these surrogate conflicts were devastating to life and property in and of themselves, the direct effects remained relatively localized and with few exceptions, from a global perspective, remained minor in nature. As the Cold War status quo was based on four decades of this form of military and political détente, military planning throughout this period concentrated primarily on conventional

superpower force-on-force concepts (US Army, 1993; Director General Strategic Planning, 1999).

With the collapse of the Soviet Bloc, the cohesive nature of the superpower spheres dissolved, and the relative stability of the global geopolitic with its surrogate military conflicts was over. Nation states now found that superpower ideology no longer served as a facilitator or barrier to their activities. With these governors removed, many nation states and peoples experienced an era of renewed self-determinism. In many cases the ideological foundation of the nation states themselves, or of their place in the international community (Gardner, 2003), were challenged by new replacement ideologies based on ethno-centrism, religion, political philosophies or resource-disparities (Spanier, 1981; Directorate Land Strategic Concepts, 1999). A new more dynamic geopolitic arose which saw an increase in local or regionalized military conflicts (NATO RTO, 1999) throughout a now multi-polar world.

As peoples redefined their place in the world new nations and new groups emerged onto an increasingly fragmented and dynamic world stage. These autonomous agents included non-allied rogue states and other non-state actors. While non-state actors are not a new phenomenon (Spanier, 1981) their influence on the relations within and between states has been growing significantly. Non-state agents are seen increasingly as having the potential to be threats to state security. These threats may arise out of the competing economic motivations and political agendas of religious groups, criminal cartels, dislocated and disenfranchised populations, and terrorist organizations. Many of these engage in extra, intra and inter-state conflicts, (Directorate Land Strategic Concepts, 1999; Carment, 2001, Spanier 1981) in the pursuit of their agendas. This fragmentation and multipolarity, is almost hallmark of the new millennium.

The radical changes to world economic conditions including market upheaval, as economies transit from a manufacturing to a knowledge base, the increasing material disparity gap between the developed and developing world, the rising pressures engendered by growing populations and their rapid urbanization (Beckett, 2001), the increasing state failures in the developing world (Carment, 2001); the failing economies of the former Soviet Bloc and Central Asian states (Rumer, 2000); and the looming competition for global natural resources (O'Hanlon, 2001) give further cause to those

who are disenfranchised. Newer economic formations, such as the NAFTA, the European Union, and the development of new free-market economies in Eastern Europe, and other formerly closed Soviet Bloc countries, are further contributing to the acceleration and globalization of national and international economies (Cohen, 1997). This environment has seen the emergence of additional state and non-state groupings and has further increased the potential for ideologic or economic based conflicts.

Nations have attempted to ameliorate the effects of the fragmented nature of the world's economies and shifting political maps. After the collapse of the Cold War increasing numbers of Non Governmental Organizations (NGO), Multinational Corporations (MNC) (Berman, 2000), activist organizations (Don, 1999), and multilateral alliance or coalition member states have either become directly involved in conflicts, the efforts for the amelioration of conflict effects, or conflict prevention and negotiation (Carment, 2001). For these reasons the number of potential individual stake-holding participants within any conflict has grown - often resulted in extremely complex conflict situations with numerous factions or belligerents involved, and with coalition nation states and many other organizations interposing themselves in accordance with their own agendas.

In the heady days of jubilation immediately following the collapse of the Soviet Bloc, there was a generally accepted belief that 'peace had broken out' further complicating these environmental challenges faced by modern nations and their militaries. Societies around the world demanded that military spending be curtailed and those resources be re-invested into other areas to benefit society. This was popularly known as the 'peace dividend' (Knight et. Al., 1996; Rockoff, 1998). While the actual benefits of the peace dividend still remain debatable (Keith, 1997), governmental fiscal re-focus saw defense budgets significantly reduced from Cold War levels (Dhanapala, 1999; Okros, 2001). In reaction to these financial restraints, militaries were reduced in numbers, generally collapsing back to a size necessary to maintain core competencies only. Another common response to manpower reductions was greater reliance on newer technological-based capabilities in attempts to balance reductions in conventional force structures and capabilities. At the very time that there was a manifold increase in threats

to nation state security throughout the world there was also a reduction in conventional response capability.

The future security environment in which nations and their militaries will operate will be increasingly characterized by intra-state conflicts based on ideologies of resurgent nationalism, ethno-centrism, and religion. Economic imperatives for conflict will be exacerbated by competition over natural resources and economic disparities. Belligerent disposition will range the gamut of terrorists and criminal organizations to para-military insurgents and government militaries. These conflicts will not be limited by geography, and may occur anywhere in the world with little or no overt warning. The operating environments will be complex with a multiplicity of participants, including military, non-military, governmental and non-governmental organizations. Most will include public scrutiny through real-time media exposure, or through alternate media exposure such as the Internet (Williams, 2002). This is the potential milieu of conflicts for the near future.

The Conflict Spectrum and Threat Asymmetry

The militaries of the west and other developed nations were caught off guard with the rapidity of the collapse of the former Soviet Bloc. NATO and the other modern Western powers found themselves with military organizations that had, under the auspices of several generations of military and political leadership, been structured, manned, equipped, resourced and deployed in a "come as you are" Cold War scenario. Since the militaries of the NATO states and their allies had operated under the belief that a major conflict would commence with conventional mass warfare, with in-situ Western European forces, alternate operational and tactical doctrines for military employment were not as fully developed as conventional concepts supporting the European scenario.

With the exception of contingent activities and peacekeeping, the majority of the extant doctrine and related operational and tactical concepts for other than war fighting environments was limited primarily to special force concepts (U.S. Army 1986). While there has long been recognition of the spectrum of conflicts, e.g. environments short of total war (Glenn, 1998) and the need for forces trained to operate across this spectrum, these types of conflicts were not the major focus of doctrinal consideration for conventional force employment. In response to the dramatic changes in the international situation, militaries have recently increased their efforts to refocus and redefine the

weight of their doctrinal and operational concepts for application in a fragmented post-superpower conventional mass-on-mass conflict paradigm (DND, 1998c; NATO, 1999) and the last decade of the 20th century saw most militaries placing increased emphasis on the development of doctrine, operational concepts, and tactics for military operations in environments other than war (Sloan, 2002).

This pattern of operational and tactical refocus has occurred in almost every major military in the western world. NATO alliance members with View 1 and View 2 concepts (NATO, 1998); the United States with Military Operations Other Than War or MOOTW (US Army, 1993); as well as parallel activities in the British, French, German and Australian armed forces (Sloan, 2002). The Canadian concept of 'conflict spectrum' and 'revolution in military affairs' (DND, 1998c) represents acknowledgement of the new multi-dimensionality of modern conflict.

Regardless of the terminological differences, the core essence of all of these doctrinal philosophies is that warfare occurs on a continuum with more balanced mass-on-mass conventional concepts at one end of the spectrum (View 1) and more diverse conflicts, short of or other than conventional war (View 2), at the other. The majority of military assessments have concluded that conflicts in the twenty-first century will most likely occur in the centrality of this range suggesting that truly conventional force-on-force symmetrical warfare is a lessening probability.

While conflict asymmetry takes many forms and is multidimensional in nature (DND, 1998c; US Army, 1993) it draws much of its militarily salient characteristics directly from the political, economic, and environmental conditions of an increasingly globalized, technologically-enabled, modern world. In a single superpower world, where the greatest conventional and nuclear military force is possessed by one nation, active threats will increasingly be asymmetric in form (Nichiporuk, 2002) as less capable belligerents seek to avoid a conventional conflict they cannot prevail in.

Asymmetric strategies may include; selective development of niche capabilities such as weapons of mass destruction or weapons of mass effect (WMD/WME) in isolation of conventional force development, the specific targeting of key civilian vulnerabilities, and the use of global world opinion, or activities designed to politically constrain action through the formation of political or media barriers (Nichiporuk, 2002).

Operational strategies include attacks with little or no declaration or warning on deep civilian targets, attempts to break multinational or coalition 'will' through media and diplomatic channels or the threat of the use of WMD/WME. Increasingly, many of these asymmetric strategies will be adopted in parallel or in concert with conventional symmetric ones. Militaries engaged with a foe that is forced or chooses to adopt asymmetric means-and-ends poses a formidable challenge while the employment of conventional forces to prosecute an asymmetric belligerent is problematic at best.

The commoditization of computing and communications technologies means that they are now increasingly inexpensive and freely available throughout the world. The development of the Internet and other associated communications infrastructure on a global basis grants almost any group access to the technology necessary to coordinate actions across large geographies. Many potential belligerents will have the technological potential (Andrew & Conway-Lanz, 1995) to engage, albeit in limited ways, with the same capability for force command, control and projection as possessed by western military powers. The commercialization of global communications systems, such as Low Earth Orbit (LEO) satellites, cellular, Global Positioning Systems and broadband communications will also permit asymmetric forces to garner access to intelligence that enhances their ability to conduct operations (Nichiporuk, 2002) through the development and use of advanced Command, Control, Communications, Computers and Intelligence, Surveillance and Reconnaissance (C4ISR) capabilities (Shelton, 2000). What has become known as the 'CNN Effect' demonstrates that modern communications infrastructure and technology permit media to report from any point on the globe. Wherever western militaries are involved western and other global media are likely to be found and actively reporting. This media presence raises two issues, first, as seen in Somalia (Jukes, 2002) it has the potential to influence domestic political agendas. Second, the very nature of real-time broadcasts, combined with the potential of the Internet to carry information, means that any media reporting is available to a global audience, including current and potential belligerents themselves, which may also be used as an asymmetric tool.

The multi-polarity nature of most asymmetrical conflicts means that they are more complex; involve more belligerents; including non-military, military, para-military

and civilian organizations; and are not constrained to conventional 'fields of battle'. The capabilities of modern communications technology and modes of transportation mean that they may occur almost anywhere and at any time (Jukes, 2002). The very nature of their asymmetry, with little dependency on mass or conventional force projection (Stern, 2001) grants belligerents a first strike capability that is almost unpreventable.

It can therefore be expected that in future operational environments that many belligerents will adopt asymmetric means to further their aims or to balance off a lack of conventional capability. Technology will afford them an increasing ability to plan and coordinate their actions, as well as to counter the actions of deployed forces. Yet the technology that affords potential asymmetric belligerents increased military capability also appears to be a major enabling element in effectively combating them.

Technological trends: Movement towards the Network-Centric Battlespace

Network-Centric warfare is a relatively new conceptualization that has evolved since the mid 1990s and is encapsulated within the latest 'Revolution of Military Affairs' (RMA) (Cebrowski and Garstka, 1998). Network-Centric warfare, as an element of this larger technologically based RMA, is premised on the assumption that the synergistic effect of information superiority, battlespace dominance and technical superiority (McCabe, 1999) requires a completely new mode of warfare (Ibrugger, 1998). This conceptualization is profoundly different than previous classical-warfare concepts. It is based on a composite of networked information systems and the evolution towards new forms of networked organizational systems, with concomitant networked processes supporting them (Alberts, Garstka and Stein, 2000). It is a future where every element, whether individual soldier or mechanistic platform, is connected through information technology to every other soldier or platform (Anonymous, 2002) on a real-time global basis.

The network-centric battlespace has been articulated as having a physical domain, an information domain and a cognitive domain (Alberts et. al., 2000). Elements of the network, both human and machine, exist within the physical domain. The information generated or required for use by these elements is contained in the information domain. The decisions on what information is needed, or provided, to the elements within the network, and what to do with that information is represented, by activity within the

cognitive domain; while the true synergistic effects result from network capability within the information domain. The information domain consists of an 'information grid' which is composed of the information system architecture and infrastructure; the 'sensor grid' which collects information from a multiplicity of sources and transmits it throughout the information grid; and the 'engagement or shooter grid' in physical space where conflict is actually resolved (Cebrowski, 1998). However, it is the cognitive domain, which poses the greatest challenge to leaders at all levels, and draws from all other domain elements.

The combination of modern computer based information systems with connective technology, broadband wire and optical fibre links, satellite, microwave and wireless technologies (Covault & Morring, 2002), has given rise to a networked world with the potential for seamless information integration between people, computers and devices (Tarasewich & Warkentin, 2002). When a multiplicity of elements are connected into a network topology often unexpected and unusual potentials come into existence (Matlis, 2002) – the modern World Wide Web is a prime example. Because networks may interact in non-linear ways, the effects of networking carry vast potential (Singh & Kundu, 2002). This potential has not gone unobserved and many modern militaries, spurred by the lead of the United States (Scott & Hughes, 2003), are attempting to leverage the power of connected information systems and devices. Given the growing potential benefits of evolving network based technologies such as those of peer-to-peer networks (Kini, 2002), smart devices (Anonymous, 2003), grid-computing (Lais, 2002, Mitchell, 2002), and scalable autonic networking (Shaout, Eldos & Zaman, 2003) it can be expected that a network-centric military is achievable and possible in the near future. Most, if not all, of its elements of it exist now.

Information Technology and the Compression of the Art of War

The evolution of the levels of warfare is related to the dimensions of time and space, the ability for an organization to communicate, and the melding of the 'art of politics' and the 'art of war'. While the levels of warfare have never been absolutely distinct (DND, 1998a) and tend to blur and overlap at the boundaries, they have served as the focus of differentiating the structure and activities of militaries throughout history. Levels of warfare may be viewed analytically from two dimensions. The first, and

perhaps foremost, is control. The second is effect related or outcome. At each level there is a distinct change in the boundary conditions of these dimensions.

At the 'grand' level military strategy is normally associated with national level strategy in pursuit of goals of national interest. Military control is usually subsumed by civilian state control and the effects desired are those outcomes that will further the national objectives through either the actual or the potential application of force. The strategic level is usually, in conventional warfare, characterized by large spans in time and space. They may be global in nature and take place over the course of months or years.

At the operational level of war, control is vested primarily in military commanders. The outcome or desired effects are those activities or objectives necessary to achieve the strategic or national goals. While the operational level may be characterized by large spans of time and space, they are normally less so than the strategic level. They may be limited to the sub-geography of a continental mass and take place over weeks or months. There may be many 'operational theatres' within the 'grand strategy' of a conflict.

The tactical level is essentially the point where most of the detailed work is accomplished. The control of tactical level elements is vested in a hierarchical military command structure or chain of command. In conventional View One conflicts there is no direct non-military control, and the tactical action(s) take place in limited geographies and within limited time spans. Tactical actions may be limited to geography of metres or kilometres and take place within a time span ranging from minutes to hours. There may be many tactical actions within an operational theatre.

The very characteristics of a networked battlespace, the global presence of networked elements capable of communicating in real-time, have the potential to paradigmatically shift the control and outcome relationships that define levels of war (Alberts, Garstka and Stein, 2000) in effect compressing or collapsing these levels such that the classic distinction disappears. This has given rise to the concepts such as the 'Strategic Corporal' (Krulak, 1999) where the actions of an individual at the tactical level can have strategic influence because of the capability of the strategic and operational decision makers observing the actions in real time (Alberts et al, 2000).

Within the network-centric battlespace the obverse is also true and individuals at the strategic or operational levels have the potential capability to influence or control tactical elements. While militaries have adapted their organizational structure and processes to accommodate or integrate both the positive and negative capabilities of new technologies, the novel information characteristics of a network-centric battlespace will have two negative potentials for current military structures, procedural, doctrinal and operational concepts. The first is that networked information systems with the potential to provide real-time information feeds to any level in the military hierarchy may provide opportunities for compression and interference, or micro-management, particularly in operations other than conventional conflict (Frantzen, 2001). Second, as the network provides multi source information feeds from all types of connected elements the information feeds may be too great for cognitive assimilations and information fusion at specific levels (Peach, 2002). For example, the requirement to manage personal risk at the tactical level simultaneous with cognitive tasks required for objective achievement is distinctly different than the demands on a superior commander who, with less immediate physical and psychological stresses, and more perceptual decision making time, may have a greater potential for assimilation and fusion. This being the case, cognitive 'second-guessing' may occur and there will be an imperative to intervene, in essence, producing both compression across time and space and compression across the levels of warfare (Frantzen, 2001).

The potential for intervention through this compression mechanism may also affect the strategic and operational levels as a function of their extension into politics. Modern media and communications technologies permit broadcast to wider and wider global audiences. These technologies have reached audiences who have then reacted by influencing the domestic political agenda which in turn has influenced the military domain including: the dismantling of the Berlin Wall, economic changes in China, and conflicts in the Balkans (Don, 1999).

Summary: The Future Security Environment

In summary the end of the 20th century saw an increase in the number of regionalized conflicts as the old bipolar political and ideological groupings were replaced with more numerous inter-state coalition or alliance mechanisms. These relationships

were often based on ideology, security or shared economic interests. In addition to these conflict-facilitating imperatives, the very complexity of relationships between state and non-state actors involved in ongoing or potential conflicts continues to increase.

The continuing trend towards economic 'globalism', and the increasing competition for world markets and resources means that almost all nations will be, either directly or indirectly, affected by events and conditions in other nations throughout the world. Therefore, it is in the interest of these nations, including Canada, to maintain some form of presence in global events abroad. One mechanism Canada has used for this is the deployment of the Canadian Forces. Many of these force deployments have been and continue to be under the auspice of the United Nations, or other multinational or coalition based arrangements. These force deployments will take place in an environment where belligerents will use the computing and communications capability of modern technology to adopt or execute asymmetric means-and-ends. While technology may permit increased capability to combat asymmetric strategies it poses unique challenges to the tactical, operational and strategic conventional doctrines. The rapid evolution and change found within the FSE has, in many ways, outstripped the development of suitable response mechanisms.

Force Employment in a Network-Centric Battlespace

In any future security environment consisting of asymmetric conflicts, their very nature will prevent or preclude the employment of conventional militaries in a stereotypical force-on-force manner. It is much more likely that these forces are required to interpose themselves between belligerents, support humanitarian efforts of non-government organizations (NGO), provide protection to civilian populations, or for observation of belligerents. The operational environment may require deployment across greater geographies than in a conventional warfare sense, resulting in the requirement for a significant change to force structure and employment.

Force Composition: The Substitution of Mass with Technology

The ability to coordinate and concentrate a multiplicity of elements at a single point in space and time is changing one of the fundamental relationships upon which modern militaries have been structured and employed – the relationship between mass and economy of effort. Despite ongoing debate concerning the principles of war and

their applicability to other than war conflicts (Glenn, 1998) throughout the history of conflict, two fundamental principles have consistently been the constructs of 'mass' and 'economy of force'. These principles deal with the employment, disposition and use of forces engaged in conflict (DND, 1998a; Leonhard, 1998; Murdock, 2002). The concept of mass has evolved through the major phases of warfare from the 'massing of men' through to the concentration of firepower or 'fires' (US Army, 1986). The essence of the principle of mass is to bring sufficient weights of men, material or firepower so as to overwhelm an opponent. The related principle of 'economy' posits that the mass should be only what is sufficient to overwhelm a belligerent at any particular time and place, so as to garner the maximum utility of all mass everywhere throughout a theatre of conflict. It is the combination of these two principles of application of force that allows all combat power to be used to greatest effect at all times.

The evolution of concepts for the employment of mass and the necessity for economy resulted in the modern warfare concept of a maneuverist approach (Keithly and Ferris, 1999). The maneuver concept is based upon a modern armies' ability to rapidly mass platform-based firepower at critical junctures in time and space so as to defeat an enemy in any particular action. This concept was given particular emphasis during the Cold War as both superpowers maintained Weapons of Mass Destruction and Weapons of Mass Effect. The intent was to avoid presenting a physical mass of platforms as targets for weapons of mass destruction, yet to be able to mass sufficient firepower through rapid maneuver for any single engagement.

However, as the range or stand-off distance of modern weapons system has increased, and as communications technology developed greater capacity and range, the necessity of physically massing platforms or men has decreased. Communications, long-range fires and rapid maneuver in combination would provide the same resulting yield of force projection while avoiding the presentation of desirable target arrays to weapons of mass destruction. As was effected during the first Gulf War, modern precision munitions increase the efficiency of the mass concept through pinpoint targeting and engagement from ever-greater distances (Hallion, 1992). Modern technology has, in effect, removed almost any requirement to physically bring men, platforms or material into proximity in order to achieve mass effects. Network-centric warfare permits the dispersion of mass

(theoretically to the limits of force projection capability) across extremely wide geographies (Murdock, 2002) while retaining the ability to concentrate force when and where it is needed in order to decisively overwhelm an opponent.

The Use and Application of Force: Segmentation

In the network-centric battlespace, this ability fundamentally alters the relationship between the principles of mass and economy in the physical dimension. Each element within the network has the potential capability to synchronize (Alberts et al, 2000), across time and space, with every other - therefore, the same effect of mass may be achieved without the necessity for physical co-location. The implication is that the structure of the warfighting components will become smaller. Network-Centric technology will enable smaller and lighter force packages, as the technology permits greater coordination, with greater numbers of discrete elements or platforms. The trend will be to minimize physical mass and to rely on greater levels of digital mass and mass of effect through the deployment and coordination of fires (Fraser, 2000). A single soldier, armed with a link into the network of deployed elements, has the potential to be the focal point for the entire network – an *avatar* representing the cumulative physical and digital domains of the entire network at a given point in space and time.

Classic force deployment may be all but impossible in the types of operations that will be taking place within future security environments. The consolidation of mass in physical proximity will not be possible as the operating geography of 'less than conventional' conflicts expands. Force deployment will see continuously smaller force packages deployed over wider geographies in all environments. Once unified forces will be increasingly dispersed or segmented from one another in time and space.

The Expansion of Space and Compression of Time

Command and control methodologies, which rely on conventional hierarchies, will have to evolve to account for the greater temporal and physical dispersion of forces. The 'temporal ladder' through which information is processed in conventional command structures will have to give way to network oriented information processing that has both hierarchical and lateral flows. Consequently, there will have to be a greater reliance on technology to manage the application of force when required in accordance with the principles of mass and economy of effort. The necessity to rely on technology to

facilitate network oriented information processing, and for the command and control of elements, will serve as a positive feedback mechanism, as it is the technology itself that permits this increased dispersion and coordination or self-synchronization of forces.

Military Leadership in an Information Centric Environment

Due to the unique characteristics of information flows within laterally and hierarchical connected networks, information management within a Network-centric Battlespace will require significantly different levels of processing and fusion involving both human and machine processing. The compression of time and space, the collapse of levels of warfare, and the geographical dispersion of network connected elements cannot be managed in the temporal laddering of conventional hierarchical systems of authority and control. Leadership methods and processes must be developed to operate effectively in this new environment so as to effectively utilize the potential advantage of networked forces, capabilities and capacities.

Summary: Force employment in a Network-Centric Battlespace

In summary the organizational and process impacts of the network-centric paradigm have three major characteristics that will force change to military organizations, structures and processes. These include the ability to concentrate a vast array of human and mechanistic force projection onto a single point of space in time despite deployment across 'global' geographies; the ability within the network for any single element to scale, to greater or lesser degrees, its information connectivity with any other elements(s) in real time; and the ability for any element in the organization to connect directly to any other. Forces will increasingly be segmented across greater distances, and their structures will be smaller as physical mass is replaced with digital mass. Information flows may be point-to-point from anywhere to anywhere within the network in real time increasing the challenge of effective information management. Command and control methodologies currently effected by conventional leadership will have to adapt to accommodate the collapse of information management in a temporal sense; to meet the requirement for greater levels of integration and fusion of diverse information feeds in real or near-real time from both human and mechanistic sources, and to adjust command and control relationships to harness network synergies that arise.

The characteristics of leaders and their modes of leadership will have to evolve to operate in an environment where geographically segmented forces are deployed over broad terrains, physical separate and connected through a multiplicity of technological systems. They must adapt to the fluid nature characteristic of networked environments.

Emerging Tensions in Command and Control Doctrine.

The ability for any one element (or sets or combination of elements) to connect to, either directly or through information feeds, to any other has serious implications for organizational processes, particularly in the realm of command and control. One of the implications of the real-time communications capability for coordinating the actions of many divergent systems across extremely wide geographies is that classic boundaries of levels of warfare (strategic, operational and tactical) which were largely based on the limitations imposed by geography and logistics are being blurred so that there is little distinction between them. This trend has been further compounded by the ability of communications and surveillance systems to report in real-time with increasingly finer levels of detail or resolution.

Situational Awareness and Force Employment in the FSE.

Modern command and control approaches may be classified into major types depending on the level of "Directive specificity" and "C2 Philosophy" (DISA, 1983) they reflect. The levels of directive specificity ranges along a continuum where at one extreme direction is issued with an extremely high level of detail and at the other extremely general. This continuity of direction also reflects modern concepts of 'task order' command and 'directive or mission specific' command. Many modern militaries are attempting to increase the flexibility of their command approach (O'Neill and O'Brien, 2001) in order to permit increased effectiveness of action on the part of subordinate elements. This will be a critical requirement for successful operations in the likely future security environments.

Mission Specific concepts attempt to provide subordinates with the greatest range of freedom of action. This will inevitably conflict with intervention as a result of strategic telescoping or oversight. Additional confliction may occur as a result of the assignment of decision making responsibility to computer based information systems, as

human decision making may not be able to cognitively process the necessary amount of information, or are unable to manage the complexity of information, overwhelming their cognitive ability.

Military leadership and decision making in the future security environment

Decision making under the compression of time and space, across the strategic, operational and tactical levels, will be the greatest challenge facing leaders and decision makers in the future security environment. The normal hierarchical functioning of 'classic' military structures and organizations, with their inherent delays as information is processed through numerous hierarchical layers of authority, may not be sufficient for effective operations in an environment where events are recorded or monitored over global geographies in real-time.

Decision-making may not be limited to a unidimensional situation, such as found in conventional force-on-force actions, but may be required in a multidimensional near-conflict or conflict matrix. The reality of the 'three block war' will ensure that decision making, at any level, will occur in a much richer information environment, with contrasting and contending decisions required. The potential for information or cognitive overload is much greater in a networked environment (McAfee and Oliveau, 2002).

Summary: Emerging Tensions in Command and Control Doctrine

In summary application of the network-centric concept will see the dispersion of smaller and smaller force packages over greater and greater distances. This will increase physical isolation and leader-follower remoteness. While connective and network technology will serve to bring leaders and followers 'closer' together, in a communicative sense in time and space within the information domain, it will not do so in the cognitive domain where leaders and followers must deal with disparate elements of the physical domain.

Given the greater dispersal, segmentation and multi-roled nature of deployed forces, decision making authorities may have to be devolved to lower and lower levels - further increasing the compression effects of levels of command and control. Mission command concepts may not be sufficient to fully prepare 'front-line' decision makers and leaders for all contingencies, particularly given the complex nature of operations other than war and the asymmetric threat expectation. Additionally, the potential for

intervention from higher levels of command, up to and including the politico-strategic level, will remain. These characteristics imply that current concepts of leadership, command and control, levels of authority and freedom of action and how they are applied will have to change - and possibly substantially.

The Information-Centric Warrior and Soldier Avatar

In the future, a network-centric decision maker has the potential to be the ultimate instrumentality for action within the physical domain. From the strategic through tactical levels this soldier may function as an *avatar* for the entire network centricity of systems that are connected to him or her. This *avatar* then becomes the physical projection or representation, in time and space, of the digital (information and sensor) domains associated with the network-centric battle space. The *avatar* becomes the physical embodiment of the network-centric collectivity existing at the nexus of all the domains of interest.

This potential can only be achieved if that soldier, or *avatar*, has the ability to scale 'information push' and 'information pull' to and from the network. This capability is technologically feasible now. The Internet is a representative case in point. Anyone, located anywhere, with an Internet connection is capable of feeding or 'pushing' information out to a particular node or set of elements on the Internet. The same individual is also capable of reaching out and 'pulling' information from other nodes or elements. Given this capability any single element of the network, our a*vatar* for example, may seek information from multiple net connected sources as required. The a*vatar* will also be feeding the network with information simultaneously. The synergy of this information exchange, across multiple networked elements, is what differentiates the network-centric battlespace from classic concepts of warfare. This is Metcalfe's Law at work.

Metcalfe's law states that the usefulness of a network is not a linear one and is a power function of the number of elements within the network (Fishburne and Malone, 2000, Narduzzi, 2002). What is critical is not the associated math of network topology, but rather the acknowledgement that the relationship between elements within a network is not a linear combination. This means that the synergistic interaction of network elements, whether the interaction occurs in either the physical or digital domains, is

capable of extreme effects that are greater than the individual sum-of-parts. The dramatic results of these types of non-linear relationships were observed during the first Gulf War (Biddle, 1996). The network enables *avatars* to produce effects that are magnitudes greater than an equivalent mass of conventionally deployed forces. Whether the *avatar* is employed in direct conventional conflict, a 'three-block' war, or otherwise employed in a theatre of operations the *avatar's* net connectivity will bestow immense potential.

New Organizational Forms

However, whether an *avatar* is ever actually employed as described should not be a primary concern at this juncture. What is critical is that technologically enabled militaries are now capable of deploying personnel and mechanistic platforms that have avatar-like characteristics. It remains obvious that technology will continue to bring increasingly avatar-like potentials as the network-centric concept is deployed. The major implications are that militaries must adapt to survive in these new technologically enabled future security environments and to maximize the potential advantages of the human-technology mix.

To deal with the characteristics of the Network-Centric Battlespace new organizational forms will have to be developed (Fukuyama and Shulsky, 1999; O'Neill & O'Brien, 2001). This will be necessary in order to manage the extremely complex environments within which they will have to operate including; coalition or multinational forces, to permit increased flexibility of response across the conflict continuum (Krulack, 1998); and to be capable of managing strategic, operational and tactical information and action choices. The classic hierarchical systems will no longer function effectively in the fluid, dynamic and technologically enabled operating environment of the future (Adams, 2000; Alberts et al., 2000). While militaries are still experimenting with the organizational forms needed to operate effectively in this new conceptual and physical space (Joint Vision 2020) much development and experimentation remains and can be expected to continue for the immediate and near future.

Summary: The Information Centric Warrior

The complexities of operations in the Network-Centric Battlespace in an asymmetric conflict are significantly more challenging than conventional concepts. The challenges associated with being an *avatar* for the management, direction and

employment of digital and physical mass, and force projection are significant. While the physical demands may be equivalent to conventional requirements the cognitive demands are much greater. The intellectual task requirements for effective information management, information fusion and decision making are more fluid and border on the chaotic. The ability to synthesize multiple information feeds, to garner useful meaning from them, and to translate this into appropriate direction for net element action represents a significant change in the basic characteristics, traits, and capabilities demanded of conventional soldiers and leaders.

Summary: The Strategic Environment

The strategic environment will be characterized by complexity bordering on chaos (Adams, 2000), ambiguity of belligerents, multipolarity, multi-organizational, collapsing of the strategic, operational and tactical domains, will suffer from force segmentation and isolationism. Military operations will increasingly take place within United Nations, multinational, alliance, or coalition contexts (Gardner, 2003) and will have complex structures composed of many organizations with different stakeholder perspectives. Organizational involvement will include, conventional military forces, non-governmental organizations, media, and humanitarian organizations. (Hornburg, 1997). The presence of refugees or other internally displaced civilians is likely. Due to the increased urban nature of the world's developing demography, operations are increasingly likely to be in urban settings.

To operate in this environment, leaders at all levels will have to transform themselves (Johnson, 2000). Leaders and decision makers will have to be situationally aware of not only the tactical conditions, but also the operational and relevant strategic considerations. They will have to be well educated, technologically capable (Sayles, 2000), able to think in multiple dimensions, capable of rapid decision making in uncertain and ambiguous environments, cognitively capable of managing massive amounts of information, capable of synthesis and fusion, and operate in increasingly demanding cognitive domains while under severe time pressures. Leaders will have to develop skill sets that go beyond war-fighting and will have to be skilled and knowledgeable in a highly diverse range of capabilities including; negotiation,

information management, cultural knowledge, and technology management (DND, 1998a).

In these complex operations aggressors will use asymmetric means and will probably place priority of political objectives over military ones – using the same network centric capabilities. There will be a multiplicity of organizational involvement, an absence of law and order, within a fluid environment of ill-defined areas of responsibility (Hornburg, 1997). The very definition of military success is likely to change due to the increased political constraints under which militaries will operate, the increased presence of media, and the asymmetry of the opponent and their actions (Matsumura et al., 2002). In order to achieve success, militaries will have to understand the impact that these new technologies, and the challenges that the new operating environments will have on leaders and decision makers. As digital technologies change how a military force communicates and operates; as it changes the very structure and organizational processes; there will have to be a concomitant understanding of these effects within the leader-follower domains.

Challenges of the Remote Leadership Environment:

Advanced information technology is increasingly used by leaders and followers and organizations are implementing technological changes without knowledge of the full extent of their impact on human dynamics in organizations. In some cases, failure rates for implementation are hovering around 70% (Avolio and Kahai 2003); (Zigurs 2003) . Existing studies of groups that interact largely by means of computer mediated communication systems suggest that leadership in these settings is vitally important and linked to effectiveness (Fjermestad and Hiltz 1998). The underlying premise in much of the extant literature on remote leadership is that this environment is fundamentally different and more complex than the traditional one. However, according to Kayworth and Leidner (2000) there is little empirical research available to confirm this assumption, or to identify and explain the factors that contribute to its increased complexity.

Communication

Loss of nonverbal cues

One of the more obvious factors in a remote leadership environment is the loss of nonverbal cues because of nonexistent or reduced face-to-face interaction (Weisband and

Atwater 1999). It has been estimated that nonverbal cues convey as much as two-thirds of the content of a message (McShane 1998). Loss of this valuable information can impact both leader and team performance and satisfaction, through, for example, misinterpretation of facts, greater role ambiguity, lack of trust, cue substitution, inaccurate perceptions of self and others, lowered leader influence and underdeveloped group cohesiveness (Jarvenpaa and Leidner 1998; Moon 1999; Avolio, Kahai et al. 2000; Shamir, Zakay et al. 2000; Avolio, Kahai et al. 2001; Antonakisa and Atwaterb 2002; Hart and McLeod 2002; Kayworth and Leidner 2002). Shamir (2000) noted that it is unclear whether individuals can identify with and trust virtual leaders due to the cold, deemphasized social and human context of interaction in such situations. Specifically, he observed that it would be very difficult for geographically distant leaders to inspire confidence in followers through the display of exemplary acts, role modeling, or other symbolic gestures. Sosik, Avolio, and Kahai (1997) stated that the restriction of nonverbal cues in a remote or virtual environment would hinder the performance of charismatic leadership. Also, the lack of nonverbal cues is hypothesized to reduce the degree to which interpersonal relations may develop between individuals (Weisband and Atwater 1999; Kayworth and Leidner 2002).

People will rely on whatever peripheral cues are available to them to make judgments about message quality and source credibility, particularly when their motivation and ability to engage in extensive message processing is low (Moon 1999). Moon found a negative correlation between perceived physical distance and leader persuasiveness. Both source credibility and information quality were perceived to be higher in the near condition. In many virtual environments, this is one of the only cues available. Physical proximity has been shown to facilitate attraction through increased accessibility and familiarity (Moon 1999). Also, proximity offers perceived likelihood of future interaction, which makes people more responsive to individuals who are nearer geographically (Latane, Liu, Nowak, Bonevento & Zheng, 1995).

Also, the reduction in nonverbal cues limits the feedback individuals receive about their own behavior, contributing to lower self-awareness (Weisband and Atwater 1999). With a greater sense of anonymity and fewer indications about the individuality

of others, the virtual environment may result in inaccurate perceptions of the contributions of self and others. (Weisband and Atwater 1999).

However, there is some preliminary evidence that loss of nonverbal cues may have some benefit. Virtual communication may eliminate bias toward others because individuals tend to be substantially influenced by source cues unrelated to content, such as physical attractiveness, age or speaking style. In the virtual environment, these elements are not accessible. Further, in the presence of nonverbal cues, cognitive overload may result and it may be more difficult to evaluate others' contributions accurately in a rich medium (e.g., face to face) than it would be in a less rich medium (e.g. email.) (Weisband and Atwater 1999) .

Information load and flow

Research suggests that groups that primarily use some form of computer mediated communication achieve lower communication efficiency than face-to-face groups, take longer to complete tasks, and find it more difficult to give feedback and to establish the meaning of information (Tyran, Tyran et al. 2003). Several studies suggest that, in a virtual environment, higher volumes of messages, through multiple channels, are required to reduce the opportunity for misinterpretation (Jarvenpaa and Leidner 1998; Kayworth and Leidner 2002). As well, in an asynchronous environment, individuals have more opportunity to construct longer, more careful messages. Both of these factors increase the burden on leaders and team members in terms of pure information overload. This factor is exacerbated when the team consists of members with diverse ethnic, national and organizational backgrounds (Kayworth and Leidner 2002).

An advantage of asynchronous communication systems, however, in such applications as electronic brainstorming, is that they free participants from the social rules typically associated with face-to-face communication (such as waiting for someone to finish speaking before you speak), as well as cognitive constraints (thinking along narrow lines), and can preserve anonymity, mitigating evaluation apprehension (Kayworth and Leidner 2002). This advantage may be diluted by the resulting nonlinear, multi-threaded topics, which may produce further information overload, disjointed and nonsequential messages, in which the points of reference are reduced so that context is obscured.

Access to information and media

Since remote leadership relies upon the flow of information by means of electronic media, access to information itself constitutes major challenges for leaders. In this environment, followers can now obtain the same information to which leaders had exclusive access in the past, and often before the leader does (the "avatar" effect). This constitutes significant pressure for a leader to be prepared to justify decisions more quickly. Information technology is thus challenging leaders to be more responsive to followers; for example, with greater access to alternative and conflicting information, military leaders must ensure their soldiers are confident they have the latest information. Now there are too many channels to allow leader to "release" important information in a planned and controlled manner. What soldiers are told may be contradicted by news sources on the Web, for example. This "CNN effect" creates doubt that places a burden on the military leadership system to disseminate accurate information as soon as possible and to verify that the disseminated information has been received and is understood. This requires changing the traditional military command and control system to one based more on conveying the leader's intent, as opposed to a purely directive system. Knowing the leader's intent and acting on it, offers greater flexibility to soldiers in field, who can make more effective choices as the stream of information they receive changes.

Widespread access to organization intranets and IT systems creates the ability for employees to have far wider reach than before; for example, employees can now easily complain to senior managers, contact the press, or the complete employee body, through email distribution lists, list servs, or their own websites. Support groups and networks can spring up spontaneously; for example, the website http://www.companycommand.com created by US Army officers who felt they needed additional support as they assumed new command positions, was one such unofficial site, which was recently adopted by the Army (Avolio and Kahai 2003).

In addition to the reach and easy access to information, the nature of communication itself has changed. It is more indelible than before – emails and chat sessions leave virtual trails that can be followed. "Conversations" are preserved. If used incorrectly or in error, these messages can damage trust; for example, what may previously have been spoken as an unofficial communication in hushed tones, can now be mistakenly disseminated to an

entire organization or list serv by an erroneous click of a mouse. Most of the literature relating to the impact of these changes is anecdotal (Avolio and Kahai 2003).

A more pragmatic challenge in the remote environment is ensuring all members have physical access to appropriate media for performing their respective roles. Media has been characterized as existing along a continuum of "richness" which refers to its capacity for rapid feedback, language variety, personalization, and multiple cues (Daft and Lengel 1984). The appropriate medium for a message depends on the message content and other contextual factors. Richer media are considered more appropriate for conveying more complex or sensitive information. If members are geographically distant, the richness of the media to which they have easy access will influence their performance, the development of trust in their leader, their cohesiveness as a group, and their satisfaction. Ensuring easy and quick access to appropriate communication technology for members could, in some environments, pose a daunting challenge for leaders.

Summary: Communication

Leading in a virtual environment is more complex than in the traditional face-to-face setting, and preliminary research suggests that it is even more vital to follower effectiveness. Specific challenges arise from the loss of nonverbal cues, which may inhibit the growth of trust, result in lowered leader influence, misinterpretation of facts, and reduced accuracy of evaluation of self and others, as well as judgments based on perceived physical distance. To counteract some of these effects, greater communication volume is recommended, leading to information overload and potential loss of context. A more strategically significant problem arises from the ubiquitous access to real time information, which complicates its controlled release, places an onus on leaders to ensure their own information is accurate and timely, and enables distributed input to decisions formerly the exclusive preserve of the leader.

Cultural/Social Challenges Posed by Distance

Research suggests that the legitimacy of a leader is moderated by leader distance (Fulk 1993; Napier and Ferris 1993; Jarvenpaa and Leidner 1998; Howell and Hall-Merenda 1999; Moon 1999; Antonakisa and Atwaterb 2002; Kayworth and Leidner 2002; Avolio and Kahai 2003). Furthermore, how followers come to identify with their

leader or the collective is a function of leader distance (Kayworth and Leidner 2002). Many leadership scholars have based their theories of leadership on an assumption that some sort of distance, or lack thereof, is prevalent in leader–follower relationships. Some researchers (Napier and Ferris 1993) have argued that less functional distance should be associated with higher performance and follower satisfaction, and less subordinate withdrawal, which suggests that physical distance between followers and their leader should be minimized. Others have gone so far as to observe that distance renders much of leadership impossible (Kerr and Jermier 1978; Howell and Hall-Merenda 1999). Clearly, the physical distance that is, by definition, a requisite part of remote leadership, impacts the cultural/social elements of the leader-follower relationship in significant ways.

Loss of social context

Leader legitimacy, expertise, and status are conveyed, in part, by social context, deduced from elements in the face-to-face interaction. Interaction at a distance, and the resulting loss of nonverbal cues may cause loss or distortion of important social/contextual information, impacting perceived expert or referent power, and thus leader influence. This lack of social context may also hinder the development of relationships and ultimately, trust (Kayworth and Leidner 2002).

Difficulty in developing trust

The significance of trust in leadership has been recognized by researchers for at least four decades. For instance, it is a key concept in several leadership theories: transformational leadership, leader-member exchange, and the consideration dimension of leader behavior (Dirks and Ferrin 2002). Trust has been defined in various ways, with differing components (Kramer and Tyler 1996). Trust allows people to take part in risky activities that they can not control or monitor and yet where they may be disappointed by the actions of others (Jarvenpaa, Knoll et al. 1998); it implies a vulnerability. Often, trust is depicted as interaction of values, attitudes, moods, and emotions. Specific attitudes involved in the formation of trust are: perceptions of others'ability (group of skills enabling individual to be trusted to be competent), benevolence (positive orientation of trustee to trustor – interpersonal care and concern), and integrity (trustee's adherence to set of principles that trustor finds acceptable). Emotions (intense, tied to certain events or circumstances) and moods (less intense, but pervasive, not linked to particular

circumstance) refer to feelings of individuals as they go about daily activities. Leadership contributes to the formation of trust by influencing initial perceptions of ability, benevolence, and integrity, as well as the emotions and moods expressed by the group – all components of trust (Avolio, Kahai et al. 2001).

However defined, it appears that the dimensions of trust may not arise in the same manner in the case of a distant leader. Specifically, a leader's competence and integrity is evident to followers when they have direct information on the leader's performance and behavior and are "close" to the leader. However, if followers are distant from the leader, they do not have access to this information. Therefore, the ways in which a leader is legitimized and trusted appears to be a function of leader distance (Kayworth and Leidner 2002). Some preliminary research into the role of trust in remote leadership has been conducted (Sosik, Avolio et al. 1997; Warkentin, Sayeed et al. 1997; Jarvenpaa, Knoll et al. 1998; Jarvenpaa and Leidner 1998; Avolio, Kahai et al. 2000; Kayworth and Leidner 2002), but most of the research on virtual teams, although referencing trust, does not explore its specific role in leader effectiveness. A meta-analysis has shown that, in traditional settings, trust in leadership is most strongly related to work attitudes, followed by most of the citizenship behaviors, and finally job performance. The magnitude of the effect of trust on work outcomes is equivalent to or slightly larger than the effect of other frequently studied attitudinal variables, such as job satisfaction and organizational commitment (Dirks and Ferrin 2002). In a remote situation, hypothetically trust may become even more significant, and mediate the leader-outcome relationship through different processes. There have been no studies to date that examine the role of trust in a remote environment, from this perspective.

Difficulty in fostering cohesiveness

A significant body of research on traditional groups has shown significant relationships between cohesiveness and performance (Mullen and Copper 1994; Cohen and Bailey 1997; Carless and de Paola 2000). Cohesiveness is defined as a group-level multidimensional construct, comprised of interpersonal attraction and commitment to task (Mullen and Copper 1994). Findings by Weisband & Atwater (1999) suggest that group members liked each other more (i.e., exhibited higher levels of interpersonal attraction) when communicating face-to-face than electronically. There are a number of

contexts where team members must interact electronically and where trust and loyalty among members is critical (e.g., software development teams, the military cohort of the future). If team members do not have the opportunity to interact face-to-face, it may impede the development of liking and thus cohesiveness and trust among team members (Weisband and Atwater 1999).

Cohesiveness is enhanced when members identify with the group or dyad. Social identification is the perception of oneness with or belongingness to some human aggregate. A person who identifies with the group sees himself as psychologically intertwined with the fate of the group and experiences the successes and failures of the group as personal successes and failures. This identification increases the importance of team outcomes for the individual, increasing his/her motivation to make a contribution toward their achievement. Social identification is thus an important control mechanism, which enables and coordinates collective action. Some research findings suggest a positive correlation between soldiers' identification with the army and their evaluation of platoon leadership cohesiveness; this same study found that identification with the Army predicted subsequent attrition among new US Army recruits (Shamir, Zakay et al. 2000).

Lowered levels of cohesiveness impact group and individual performance and satisfaction. Generally, lack of attention to building the interpersonal processes associated with effective team development leads to less effective interactions and exchanges of information. Leaders can increase social identification by an emphasis on shared values and inclusive behaviors (Shamir, Zakay et al. 2000). However, there is a cascading effect of leadership in hierarchical organizations. Leaders' behaviors do not always have the same effects on different levels of followers. For example, an emphasis on shared values by the leader may be interpreted differently by soldiers and staff members. There may be a discrepancy between perceived enacted and espoused values (Shamir, Zakay et al. 2000). This is particularly challenging when there is geographic distance between leaders and followers, face-to-face interaction is minimal, and the majority of information exchanges are electronic (Warkentin, Sayeed et al. 1997; Avolio, Kahai et al. 2001). Apart from being more approachable, a leader that is physically close to followers has the opportunity to consistently role model effective behaviors. Furthermore, proximity may

make the leader appear more human and fallible, thus, strengthening the identification effect (Yagil 1998).

Emergent leaders

Groups that function in a remote or virtual environment often have no formal leader, or have a nonactive/ineffective formal leader. There is some evidence that emergent leadership is more common and plays a more important role in virtual teams than in face-to-face teams (Zigurs 2003). Such leaders may emerge in response to characteristics of the team, such as a need for guidance and facilitation. An emergent leader exists when a team as a whole reaches a consensus that they perceive the emergent leader to be their leader. Studies of emergent leadership in remote teams are preliminary but suggest that emergent leadership occurs when one member is perceived to be effective in taking initiative, assigning tasks, coordinating member efforts and setting performance standards. Of the different attitudes that compose trust, the perception of ability, or role performance trust, is most strongly correlated with a high emergent leadership ranking (Tyran, Tyran et al. 2003). As well, the characteristics of electronic media in remote leadership settings may influence the type of leader who emerges. For example, in situations where email or text based communication is the primary vehicle, the person who is comfortable with written skills will emerge as leader, rather than the individual with the dominating voice or the striking physical presence. Studies of emergent leaders found that they communicated 13% more on average than teammates. However, quantity was not the primary factor across all groups. Effective emergent leaders were those whose content was considered credible – those who were trusted (Tyran, Tyran et al. 2003). This potential for emergent leaders in remote groups can facilitate group accomplishment, or complicate it. The question of the relationship between emergent leaders and legitimate leaders in remote groups has not yet been empirically explored. The behaviors that determine emergent leaders may be equally influential in determining legitimate leader effectiveness.

Suitability of followers for a virtual environment

The suitability of individuals to participate in remote leadership settings is a factor that has received minimal study. The little research that exists on this topic suggests that the importance of selection of leaders and members should not be underestimated –

virtuality is not equally appropriate for everyone. Such qualities as responsibility, dependability, independence, and self-sufficiency, while desirable in face-to-face settings, are crucial to the viability of remote teamwork (Blackburn, Furst et al. 2003).

One study found that the following KSAs correlated most strongly with successful virtual work (Blackburn, Furst et al. 2003):

♦ Self management. Because remote or virtual work is often serial and simultaneous, performed in a context of relative isolation, individuals must be able to behave proactively and manage themselves. Examples of specific behaviors and skills are:

 - identifying required behaviors,

 - seeking out relevant information,

 - taking the initiative to contact team members,

 - overcoming time and distance barriers and persisting with one's task without requiring managerial intervention

 - effective time management skills

♦ Proficiency with electronic communications. Operating in a virtual environment requires skill in determining the appropriate medium by which to send various types of information, as well as in crafting the message appropriately.

 - seeking feedback: In the absence of nonverbal cues, individuals must rely on other ways to obtain feedback, requiring them to be able to interpret different signals

♦ Cultural sensitivity and awareness. When corresponding electronically, one must be aware of potential cultural issues and send messages, and interpret responses appropriately

♦ Responsiveness and dependability. Trust is created by actions that demonstrate commitment to team goals (Jarvenpaa, Knoll et al. 1998; Jarvenpaa and Leidner 1998).

 - active, frequent, and timely participation contributes to trust formation and perceptions of leader/member performance (Moon 1999)

♦ Technical knowledge. Since frequent and quality use of technology is linked to member/leader effectiveness, a willingness and ability to use existing and

emerging communication technology is required (Staples, Hulland et al. 1999; Blackburn, Furst et al. 2003).

♦ Self-efficacy. Self-efficacy is the judgment an individual makes about his/her ability to perform a particular behavior (Bandura 1978). Since remote workers generally work with minimal supervision and rely heavily on their own abilities, with extensive use of technology for communicating, self-efficacy is particularly relevant. If organizations can increase their employees' self-efficacy judgments about their abilities to successfully accomplish their tasks remotely, using technology as a communication vehicle, it may lead to improved performance, ability to cope, job satisfaction, and reduced stress. (Staples, Hulland et al. 1999)

Individual suitability of members, and required KSAs, is an area of remote leadership research that is particularly understudied. One potentially moderating variable is need for leadership, defined as a function of personality and contextual variables, such as task (Vries, Roeb et al. 2002). Research in a face-to-face setting suggests a strong correlation between need for leadership and member performance and satisfaction. It has not been explored in a remote setting, however. Hypothetically, the link between need for leadership and member performance and satisfaction in a virtual environment would be even stronger and would have significant implications for leadership of individuals. Similarly, the Big Five personality dimensions (Barrick and Mount 1991) have not been explored within a virtual context. Openness to experience and extraversion, in particular, may impact individual's suitability for work in a virtual setting. Knowledge, skills, and abilities of remote leaders themselves have not been the subject of significant research, although there is a large body of anecdotal literature on the subject of virtual leader behaviors.

Increased diversity

Virtual teams, by definition, are physically remote from their leaders, and often members are separated from one another, as well. With globalization, these teams are increasingly composed of members and leaders from different organizations and different countries, introducing significant cultural considerations for the leader of such a team. Leaders of face-to-face teams are also learning to deal with an increasingly diverse

workforce; the remote setting, however, removes much of the common environment experienced by a traditional team, and introduces the complications of electronic communication into an already complex situation. Studies have yet to be conducted that examine the impact of these cross cultural considerations on a virtual team and its members.

Logistics

The logistics of managing a group of people remotely pose a challenge. Depending on the organization, a workgroup can be a global maze of interconnectedness – differing time zones, nations, and cultures. Many virtual teams are fluid, with the composition changing as the goals require. Therefore, members may be on a team at different points in team's life cycle (Avolio and Kahai 2003). This complicates the leadership issue in logistical and social ways. Arranging a videoconference, for example, may be problematic with a 10 hour time difference within the group. Language differences may necessitate a translator, on either end. As delineated above, ensuring physical access to communication technology may prove challenging. From an interpersonal perspective, the implications of the logistics could be an impact on the development of cohesiveness and trust, as membership changes. These issues have not been the subject of extensive empirical investigation, within the remote context.

Summary: Cultural/Social Challenges

The remote environment poses significant cultural and social challenges for leaders, in terms of the situation itself, the suitability of followers for the remote relationship, and the process of leadership within that environment. On a practical level, the virtual environment requires the provision of information technology, and coordination of its use across time zones and language barriers. With the potential increased diversity, cultural considerations take on heightened importance. The remote environment, may require both followers and leaders to possess additional and/or different sets of knowledge, skills and aptitudes. The minimal existing research suggests that the importance of self - management, responsiveness, dependability, and cultural sensitivity are heightened in the remote environment. Knowledge of the technology, willingness to use it, and technological self-efficacy are similarly important attributes of remote followers. Perhaps more significantly, the distance inherent in remote leadership may impede the

development of trust and group cohesiveness, ultimately impacting leader and follower effectiveness.

The Impact of Contextual Factors on Remote Leadership

    Task

There is a large body of research, dating from the mid 20th century that examines the relationship between task and leadership. In traditional groups, the degree of task complexity, routineness and interdependence suggests various approaches to managing group members, depending on moderating factors, such as member characteristics, organizational culture, etc. (Daft 2001). In the virtual environment, however, these variables have been only minimally considered, and largely within the context of their implication for members' choice of media (Daft and Lengel 1984). For example, when tasks are routine, lean media, which convey fewer nonverbal cues and leaner feedback, are appropriate; they are less appropriate for complex and ambiguous tasks (Daft and Lengel 1984). Job pressures will lead an individual to favor media that provide rapid communication capabilities, such as telephone and email. When task interdependence within a group is high, communication frequency should increase, across all media (Fulk 1993). However, this may be too simplistic. Some research suggests that efficiency may not be the only mechanism at work in media selection, offering a possible explanation for the failure of task routineness as a predictor. Although a lean medium is most efficient for a routine task, individuals would find several different media options effective. Thus, individuals may choose to use rich media for lean tasks, as a result, for example, of social norms about how to communicate within a work group. (Fulk 1993).

Since many remote workers are, in fact, knowledge workers, by definition, the majority of their tasks may be nonroutine, complex and interdependent. This research, then, provides little assistance to a remote leader. There appears to be a paucity of research on the relationship between task characteristics and leadership style in the remote environment. When considering this issue, the social roles of a leader should be considered – development of relationships, fostering of trust, building of cohesiveness – at both the individual and group levels. The straightforward prescriptive approaches of matching task characteristic to media choice are perhaps not applicable within the context of remote leadership.

Leader substitutes

Kerr and Jermier (1978) developed the concept that certain organizational factors can act as a substitute for leadership. Research has shown that in traditional organizations, such elements as formalization, degree of professionalism, organizational culture and organizational structure can act as leadership proxies. This has been minimally investigated in the virtual environment. Preliminary research suggests that some features of groupware may substitute for leadership on occasion (Avolio and Kahai 2003), and that certain roles normally ascribed to leaders – motivator, integrator, recorder – can be performed by software (Zigurs 2003). More research is required in this area.

There appears to be only limited research into the relationship between organization or group structure and leadership in the remote environment. Jarvenpaa and Tanriverdi (2003) investigated leadership of virtual network organizations, which differ significantly in nature from a remotely managed group within a single organization. A significant gap in the emerging body of research into remote or virtual organizations appears to exist around the topic of organizational culture. Culture functions as a method of social control, reduces ambiguity, increases cohesiveness and can, on occasion, substitute for leadership (Daft 2001). Although all of these roles are relevant in the virtual environment, there is no significant body of research from which to draw findings.

Connectivity

Richness of media: As previously discussed, media richness focuses on the characteristics of rapid feedback, language variety, personalization, and multiple cues (Daft and Lengel 1984). The medium by which information is transmitted (such as email or telephone) affects the richness of information, so that highly complex problems are best understood by using very rich media (such as face-to-face). Information richness is also affected by how a message is delivered. For example, how a leader delivers his/her vision has a greater impact on follower perceptions than does the actual content of the message and other organizational performance cues. A weak delivery can act like `noise' which undermines the impact of an inspirational message. Thus, communicating at a distance, where followers can neither hear nor see the leader, may make it especially difficult for leaders to be inspirational. Adolf Hitler, for example, disliked using the

telephone because he felt that it "minimized his magnetism" (Kayworth and Leidner 2002).

There is some evidence that the level of media richness associated with the communication platform used may affect the development of trust within virtual environments. The capacity for immediate feedback, the number of cues and channels used for information, the level of personalization, and the language variety influence receivers' perception of the sender's ability, benevolence, and integrity, which contribute to the development of trust (Avolio, Kahai et al. 2001; Kayworth and Leidner 2002).

However, lean media does serve a useful purpose beyond communication of routine messages. It enables initial sorting into task relevant groups. Task relevance is the criterion used because of the absence of irrelevant cues. This promotes the development of conditional trust, based on ability of team members to forego stereotypes and classify attributes of team members that are relevant to performance, while minimizing the cognitive processing required (Avolio, Kahai et al. 2001). With only minimal cues, members focus on their similarities – the group task – enhancing social identification (Avolio, Kahai et al. 2001).

Technological competency: Technological competency levels of virtual workers have implications for group membership, leader roles, and the development of relationships. A high investment may be required on users' part to gain proficiency, depending on the technology employed and the individual users' backgrounds. Individuals have differing predispositions to learn and use new technologies, so group membership may be highly biased toward individuals skilled at learning new technologies and against those who experience technophobia. This may influence diversity of perspectives within the group (Kayworth and Leidner 2002).

Some research has demonstrated that the effectiveness of electronic communication depends on an appropriate match between media richness and message content (Daft and Lengel 1984; Hart and McLeod 2002; Kayworth and Leidner 2002). However, other research suggests that perception of media richness is significantly influenced by expertise in the technology (Fulk 1993). Therefore, attaining the appropriate match between technology and message does not entail the application of universal guidelines. To ensure effectiveness of communication, the leader must

consider other factors in his/her choice of media, such as technological competency of individual followers. There has been only minimal research in this area.

Physical Context

Collocation: Organizations are increasingly being structured as matrices, and/or making substantial use of the task force structure (Daft 2001). In these organizations, members may belong to more than one work group, some of which are virtual. Members may be physically collocated with other workers who are not members of their virtual group, their "ego network" (Fulk 1993). Preliminary research suggests that social influence of these other group members explained unique variance in individual attitudes and behaviors, even after ego-network-based social influence, media expertise, perceived task features, and demographic characteristics were controlled (Fulk 1993). The impact of this finding on leader influence and effectiveness is yet to be explored, but might possibly contribute to a neutralizing effect on leader influence.

Group size: It has long been recognized that optimal span of control and group size in traditional environments are a function of organizational variables, such as degree of employee empowerment, organization structure, extent of formalization, and task type (McShane 1998; Daft 2001). In the virtual environment, these issues have not been explored. For example, leaders are technically capable of interacting with a large number of virtual followers, on an individualized basis; however, message overload becomes a significant constraint. Given the gaps in the research on specific virtual organizational factors, it would be premature to draw conclusions on optimal span of control and group size in the remote environment.

Face-to-face contact: Preliminary empirical studies suggests that some measure of face-to-face contact is associated with superior virtual team performance (Jarvenpaa and Leidner 1998; Maznevski and Chudoba 2000; Avolio, Kahai et al. 2001; Kissler 2001; Hart and McLeod 2002; Zaccaro and Bader 2002; Cascio and Shurygailo 2003). The specific findings are inconsistent: some suggest that initial face-to-face meetings, even for a short duration, can enhance group members' liking for one another and could contribute to the development of trust (Weisband and Atwater 1999). Others suggest that face-to-face contact is most beneficial at crucial times, such as strategy development (Maznevski and Chudoba 2000).

However, other studies have supported the hypothesis that communication is more a function of the context, setting, and timing than the characteristics of the media (Jarvenpaa, Knoll et al. 1998), implying a reduction in the importance of face-to-face interaction. According to Walther's social information processing theory (Walther 1996; 1997), computer-mediated communication transmits as much social information as face-to-face communication, the only difference being a slower rate of transfer. Specifically, Walther found that social discussion, depth, and intimacy were greater in virtual groups than in face-to-face groups, even for groups with geographically dispersed and culturally diverse partners who had never met face-to-face (Walther 1996; 1997). However, these results should be interpreted cautiously, since individuals have a tendency to resort to over-attributions on minimal social cues in virtual groups, as illustrated by Moon (1999).

Summary: Contextual Factors

The minimal extant research on the impact of contextual factors on remote leadership is either inconclusive or contradictory. For example, little is known about the implications of task characteristics, organizational culture or structure. It has been hypothesized that media richness can limit leader influence, and trust development. Technical competency of followers and leaders may influence media choice, and further, may serve as a selection screen for group membership, limiting diversity. Virtually nothing is known about optimal remote group size or span of control in the remote environment. There is only preliminary evidence that physical collocation of remote followers with others may moderate leader influence. The most significant characteristic of the remote environment – lack of face-to-face interaction – has similarly been only minimally researched, with some findings suggesting that such interaction is beneficial initially, or at complex decision points, and other findings suggesting it is unimportant.

Leaders' Roles in a Remote Context

Research on the leader's role in traditional groups has generally concentrated on two areas: relationship and task, at both the individual and the group level. In remote or virtual leadership, the research appears to be following the same course. Preliminary research suggests that all of the behaviors necessary to lead a face-to-face team are necessary but not sufficient for effective leadership of a remote team. For example, the leader plays a major role in defining the group's mission, setting high expectations,

shaping the group's culture, coaching, counseling and motivating, facilitating meetings, mediating conflicts, evaluating performance; and recognizing individual and group achievements. However the virtual environment increases the significance of such as issues as quantity of interaction, and the importance of trust development, as well as introduces questions of media choice and coaching on appropriate use of technology, for example. Effective virtual leaders are those who exhibit multiple roles (Kayworth and Leidner 2002).

Group

Team processes: As in a traditional group, the role of the leader in a virtual environment is to develop and shape team processes to improve team performance. One of the ways leaders do this is by acting as role models. However, because physical distance decreases opportunities for direct influence, leaders must model desired behaviors through electronic media. Some specific aspects of the remote leader's role that affect team process may include: using collaboration software effectively and extensively; exhibiting a willingness to share information openly; choosing an appropriate medium for each communication; adhering to norms around promptness of response. In other words, a major role of the leader in the remote environment is to model special skills for virtual collaboration (Hart and McLeod 2002; Blackburn, Furst et al. 2003).

The remote leader must assist members to maintain focus on the ultimate goal of the group. There is some evidence that distant groups may more easily lose sight of that goal, without the physical presence of the leader or other group members (Kayworth and Leidner 2002). Developing a shared mental model of the task and modeling effective teamwork is an important role for the remote leader. How information about the team, its members' capabilities, and the task itself is exchanged can affect the conditions for trust formation that in turn affect the development of cohesiveness, and ultimately team performance (Avolio, Kahai et al. 2001). By emphasizing shared values of group members and showing how group goals are consistent with members' core values, the remote leader increases social identification, group cohesiveness and commitment to group goals (Blackburn, Furst et al. 2003). In military units, for example, discipline is a correlate of unit effectiveness, enforced by unit commanders, but it is also a reflection of

voluntary commitment to the group and its goals, strengthened by leader behaviors that support this role (Shamir, Zakay et al. 2000).

Extensive research has found that people who interact with one another face-to-face are more likely to be positively disposed toward each other (Weisband and Atwater 1999). In traditional groups, this face-to-face contact may contribute to spontaneous growth of cohesiveness (McShane 1998). In virtual groups, however, electronic group members have reported less attraction to one another than did members of face-to-face groups (Kiesler, Zubrow et al. 1985; Straus 1997). As well, in virtual environments, deprived of validation by nonverbal cues, individuals are less likely to share information about themselves. However, the emergence of some elements of trust is strongly grounded in personal exchanges. Therefore the virtual environment may impede development of team trust, an important element in reducing team process loss (Zaccaro and Bader 2002; Jarvenpaa and Tanriverdi 2003). Furthermore, physical distance in the leader–follower relationship has been found to be positively related to perceptions of group role conflict and negatively related to group altruism (Antonakisa and Atwaterb 2002). These factors may hinder the growth of group cohesiveness. It has been established in extensive research (and referenced above) that group cohesiveness can be a significant influence on group performance. When remote leaders model appropriate virtual behaviors and encourage the identification with group goals and values, emphasizing each member's capabilities, they increase the cohesiveness of the virtual group.

Team performance: Group potency, the collective belief that it can be effective, is an important factor in building group effectiveness (Jung and Avolio 2000). Communication is integral to that belief for any team; in the remote environment, however, with its leaner media, the communication process is less forgiving: the potential for misinterpretation and lowered group potency is significant. Existing research has demonstrated that leader responsiveness is an important mechanism by which group (and individual) sense of efficacy is enhanced. This includes timely response, continuous feedback, and clarity achieved by precise, task oriented messages (Hart and McLeod 2002). In one study, the most effective team leader spent 1.5 hours/week on chat (Kayworth and Leidner 2002). Other studies have shown that more is better; frequent

interactions correlated with increased performance and satisfaction (Jarvenpaa, Knoll et al. 1998; Hart and McLeod 2002; Zaccaro and Bader 2002). The most effective leaders communicate frequently, with short, task-related messages (Hart and McLeod 2002). Higher frequency of interaction is associated with leader closeness, whereas lower frequency of interaction is associated with leader distance (Antonakisa and Atwaterb 2002). Leader closeness enhances group identification and commitment to achieving group goals, directly increasing group performance.

Moon (1999) found evidence that a medium response latency contributed to more positive perceptions of leadership; when leaders respond in a timely fashion to followers' messages, but take what is judged to be an appropriate time to think about the message, reception is more positive. The least positive perception results from nonresponse from the leader. This illustrates the requirement for leaders to manage the communication process and again, to model effective behavior.

These, coupled with other findings (Jung and Avolio 2000) suggest that the leadership style of facilitative support may be more useful for promoting consensus, group potency and group cohesiveness, than a directive style.

Remote leaders should consider using more face-to-face interaction and other group communication technologies, such as on-line computer conferencing to enhance personal connections between team. Leaders need to be aware that virtual team members need everything to be reinforced in a much more structured, formal process. Finding the appropriate balance between increasingly advanced information technology and opportunities to communicate more social information is a significant role for remote leaders (Lurey and Raisinghani 2001), one which may have a substantial impact on group performance.

Summary: Group

Remote leaders play a significant role in creating and maintaining group trust, identification, potency, and cohesiveness, leading to enhanced performance. Modeling appropriate virtual behaviors, such as appropriate use of communication technology, frequent communication, medium response latency, contributes to the development of effective team processes, as does leaders' continued focus on shared values and superordinate goals. These behaviors may possibly substitute for the part played by

nonverbal cues in the teambuilding process. Thus, a facilitative, rather than a directive leadership style, may be more appropriate in a remote environment.

Individual

Individual- leader relationship: A meta-analysis of studies on trust has found a significant correlation between trust in leadership and individual attitudinal, behavioral and performance outcomes (Dirks and Ferrin 2002). Trust in direct leaders (supervisors) has a stronger relationship with individual job satisfaction, organizational citizenship behaviors, and job performance than trust in organizational leadership; trust in organizational leadership has a stronger relationship with organizational commitment (Dirks and Ferrin 2002). Trust in leadership is often associated with, or an outcome of perceived leader integrity and/or perceived leader support (Craig and Gustafson 1998; Lynch, Eisenberger et al. 1999; Dirks and Ferrin 2002; Eisenberger, Stinglhamber et al. 2002; Parry and Proctor-Thomson 2002). These findings suggest that several management practices may be means of increasing individual members' trust in leadership, either directly, or through increased perceptions of integrity or support: ensuring fair procedures, outcomes, and interactional processes; providing organizational support; ensuring expectations are fulfilled; and using transformational and transactional leadership styles. Neither length of relationship nor follower propensity to trust had a significant relationship to the level of trust. Transformational leadership, perceived organizational support, and interactional justice had the largest effects, followed by procedural justice, transactional leadership, distributive justice, and unmet expectations (Dirks and Ferrin 2002).

At an individual level, members' identification with the leader affects both levels of discipline and potency in the group (Shamir, Zakay et al. 2000). Remote leaders can increase the individual's identification with him/herself and the group by engaging in various inclusive behaviors: reducing social distance by rhetorical means (using terminology such as "we"); including individual members in decisions; showing support and consideration for individual members' needs; and attending to the aspects of the relationships that are broader than those directly required by the task. Since the leader is a symbol of the group's identity, this personal identification may spill over, increasing individual identification with the group.

Task direction : Studies have found that leaders can increase individual self-efficacy, which in turn leads to higher performance, by modeling desired behavior (Staples, Hulland et al. 1999). In the remote environment, much of this modeling involves communication behavior. Previous research has shown that followers initiate feedback-seeking behaviors, especially when there is a high level of ambiguity surrounding roles and tasks or if followers are new and/or inexperienced. In a virtual working environment, ambiguity can be particularly high. Studies of message content in a remote environment have found that the most effective leaders engage in a high volume of communication with individuals, primarily about task, often employing multiple channels. This type of frequent task direction enhances role clarity and encourages the individual follower to focus on the group goal. Both of these factors may lead to enhanced follower performance. Frequency of interaction itself, is thus related to the amount of direction and feedback followers will receive and seek (Howell and Hall-Merenda 1999). As well, some findings suggest that the ability to solve task related problems contributes to the development of trust and personal relationships . Thus, encouraging task related communication is an important leader role. Specific measures leaders can take include: engaging in frequent task-related communication, providing opportunities for shared learning; being aware of team member participation; and potentially reversing thinking about traditional team building processes, by focusing on task first (Jarvenpaa, Knoll et al. 1998; Jarvenpaa and Leidner 1998; Hart and McLeod 2002).

Coaching : Coaching has generally been considered a role of leaders in traditional environments. In the virtual environment, it assumes both heightened importance and a different perspective. Various studies have suggested that coaching in the use of communications processes and technology, both process and content, will enhance follower and group performance (Fulk 1993; Staples, Hulland et al. 1999; Avolio, Kahai et al. 2001; Lurey and Raisinghani 2001; Blackburn, Furst et al. 2003). Several factors contribute to this effect. Coaching increases self-efficacy, which in turn leads to increased performance (Bandura 1978).In the remote environment, two types of self-efficacy are involved – remote working self-efficacy and technological self-efficacy (Staples, Hulland et al. 1999). The leader can play a significant role in both of these areas, by directly coaching individuals and by facilitating peer coaching within remote groups.

The use of peer coaching (both formal and informal) invokes the social influence process (Fulk 1993). One study found that although all group members had received formal training in use of the technology, they relied on co-workers for help in using advanced capabilities or features they did not use regularly. Coaching by peers positively affected members' attitudes toward technology use, through the social influence process. A leader can support such informal peer training or can design system training to incorporate formal peer training on the system (Fulk 1993). This is especially beneficial for the remote leader, whose followers are physically collocated.

In summary, the effectiveness of remote leader may be a function of the ability to display these as well as other roles simultaneously in complex virtual settings (Avolio, Kahai et al. 2001).

Summary: Individual

Various remote leader behaviors can encourage the development of trust and group identification, which empirical findings suggest have a significant correlation with individual job satisfaction and performance. Transformational leader behaviors, interactional justice, and perceived organizational support have been found to have the strongest impact on individual trust in leaders. Task direction and coaching are particularly important in enhancing individual self-efficacy, role clarity, and the knowledge component of trust. Specifically, research suggests that engaging in and encouraging frequent task related communication, via multiple channels is a critical remote leader behavior.

Successful Leadership Styles/Behaviors in a Remote Context

Leadership style has been studied extensively over the last half century and has been found to be an important factor in individual and group performance and satisfaction; for example, see Cohen and Bailey (1997) and Bass (1985). Even in traditional settings, however, how organizational context influences the development and effectiveness of differing styles, such as transformational leadership and the LMX model, requires more exploration (Bass 1985; Gerstner and Day 1997; Howell and Hall-Merenda 1999). Generally, it appears that physical distance acts as a negative moderator on leadership outcomes. For example, previous research suggests that physical distance negatively impacts follower performance and satisfaction (Podsakoff, MacKenzie et al. 1990;

Antonakisa and Atwaterb 2002). In the remote environment, research on leadership style is only beginning. Preliminary findings suggest that certain styles of leadership, for example, transformational leadership, can have an impact on followers when their interaction is mediated by technology, and that individuals can perceive differences in leadership styles in technologically mediated interactions (Sosik, Avolio et al. 1997; Avolio, Kahai et al. 2001; Kayworth and Leidner 2002; Kelloway, Barling et al. 2002).

Transformational leadership behaviors

The underlying premise of transformational leadership is that it enables followers to exceed performance expectations by subordinating their own interests to those of the group (Bass 1985). Transformational leaders communicate a compelling vision of the future (charisma); provide symbols and emotional appeals to increase awareness of collective goals (inspirational motivation); encourage followers to question traditional ways of doing things (intellectual stimulation); and treat followers differently but equitably on a one-to-one basis (individualized consideration) (Howell and Hall-Merenda 1999).

The results of studies on transformational leadership behaviors in a remote setting are not consistent. Although distance may affect the leader- follower relationship, some findings suggest that it does not necessarily negate the effect of a transformational leadership style. One study found that distance actually strengthened the relation between idealized influence (charisma) and group performance, suggesting that physical proximity reduces the potency of the leader's visionary message (Antonakisa and Atwaterb 2002). Kelloway, Barling, et al (in press) found that individual motivation and individual performance as well as group performance scores on a decision making task improved as a result of email messages with intellectual stimulating or charismatic characteristics.

However, Yagil (1998) demonstrated that close leaders have a greater impact on individual efficacy because they tailor their behaviors to the needs of individual followers. Followers see leader proximity as beneficial, because it allows the leader to "deliver sensitive and individually tailored confidence-building communications [i.e., individualized consideration and inspirational motivation], which are probably more effective than messages addressed to the group as a whole." (Yagil 1998). This finding was supported by Howell and Hall-Merenda (1999).   However, Yagil also found that

distant leaders are still attributed charisma and have group-level effects as opposed to individual-level effects.

The development of trust in a remote environment, as previously discussed, significantly impacts leader effectiveness. Followers' trust in the leader has been considered one of the most important mediators of the effectiveness of transformational leadership (Yukl 1998; Jung and Avolio 2000; Tyran, Tyran et al. 2003). Transformational leadership behaviors, distant or proximal, are strong levers in the development of trust between leader and members, and among members themselves. There are varying interpretations of the bases on which group members rate their leader, but there appears to be a consensus in the literature that trust in a leader's ability and integrity, as well as some form of individualized consideration are requisite for perceived leader effectiveness (Podsakoff, MacKenzie et al. 1990; Mishra and Mishra 1994; Kramer and Tyler 1996; Craig and Gustafson 1998; Fjermestad and Hiltz 1998; Howell and Hall-Merenda 1999; Lynch, Eisenberger et al. 1999; Moon 1999; Pillai, Schriesheim et al. 1999; Avolio, Kahai et al. 2000; Jung and Avolio 2000; Gomez and Rosen 2001; Antonakisa and Atwaterb 2002; Dirks and Ferrin 2002; Eisenberger, Stinglhamber et al. 2002; Parry and Proctor-Thomson 2002).

In the virtual environment, specific transformational leadership behaviors have been associated with perceptions of higher ability and benevolence among members, leading to a higher level of trust. By engaging in frequent communication and other behaviors, such as coaching, that increase group potency, the remote leader can instill confidence in the members' benevolence to one another (Avolio, Kahai et al. 2001). Anecdotal evidence and preliminary research suggest that, despite the distance, remote leaders can employ individualized consideration, to influence the moods and emotions of the group, a potential component of trust, by showing concern for each member's needs (Jarvenpaa and Leidner 1998; Avolio, Kahai et al. 2001). Also, by promoting comments that encourage team members to consider the each individual's input and to recognize the value it contributes, remote leaders can focus the team on the goals of the collective (Avolio, Kahai et al. 2001).

The intellectual stimulation component of transformational leadership encourages questioning of assumptions and a reframing of traditional thinking. The remote leader can

utilize the communication technology to provide intellectual stimulation, by increasing the level and nature of information exchange. Previous studies in the virtual environment support the importance of task related messages to perceived leader ability and influence (Jarvenpaa, Knoll et al. 1998; Jarvenpaa and Leidner 1998; Avolio, Kahai et al. 2001; Hart and McLeod 2002). At the same time, this increased activity may reveal information about members' ability, benevolence, and integrity, contributing to the development of unconditional trust and higher collective performance (Jarvenpaa and Leidner 1998).

Transactional leadership

In transactional leadership, leader-follower relationships are based on a series of exchanges. Differentiation between the two types of transactional leadership - contingent reward and management-by-exception - is based on the leader's level of engagement with followers and activity level (Bass 1985). In contingent reward leadership, the leader and follower negotiate an agreement, which links achievement of agreed-upon goals to receipt of appropriate levels of recognition and reward. In management-by-exception, leaders focus on mistakes, intervening only after standards have not been met, and delaying decisions. Passive management-by-exception is where the leader does not take action until problems that need correcting emerge; he/she then intervenes with criticism or punishment. Active management-by-exception is when the leader monitors followers' performance to anticipate mistakes before they become a problem. In both cases, criticism and discipline are the likely results. In transactional leadership, the interactions largely involve the clarification of task objectives and expectations.

The empirical evidence to date supports the moderating influence of physical distance on the relationship between contingent reward leadership and follower performance (Howell and Hall-Merenda 1999). Transactional leadership exchanges in a virtual environment can demonstrate that leaders and members are fair with each other and consistent in working toward stated goals. In this way, transactional leader behaviors contribute to initial perceptions of leader integrity and the formation of conditional trust (Howell and Hall-Merenda 1999; Avolio, Kahai et al. 2001; Antonakisa and Atwaterb 2002).

Frequent task-related messages, a transactional leader behavior, help clarify what is acceptable behavior in the team, as well as what goals are, increasing social identification. Higher level transactional leader behaviors provide encouragement to team members, increasing self-efficacy and group potency. Through these exchanges, virtual teams develop knowledge of each other, the first stage in the formation of trust. This knowledge-based trust contributes to a shared set of expectations for interaction, which increases group cohesiveness and ultimately, performance (Jarvenpaa, Knoll et al. 1998; Jarvenpaa and Leidner 1998).

Transactional leadership may be more problematic in the virtual environment because it becomes more difficult for leaders to monitor outcomes and directly observe follower behavior (Yagil 1998). Empirical studies have demonstrated that the more opportunities leaders have to observe follower performance, the higher ratings they assign (Howell and Hall-Merenda 1999). Consequently, the leader's ability to establish contracts specifying performance expectations and rewards, to observe follower performance, and to provide timely rewards on the fulfillment of the contract are undermined with increasing physical distance from followers (Podsakoff, Todor et al. 1984). For example, one study found evidence that the use of noncontingent punishment increased as distance increased and the use of contingent rewards was negatively related to physical distance (Podsakoff, Todor et al. 1984). Lack of leader interaction in a virtual environment may be perceived as passive management-by-exception behaviors, when it fact it results from other factors, such as communication difficulties, etc. Other research found that transactional leadership had only indirect effects on followers' performance mediated through followers' trust and value congruence.(Jung and Avolio 2000)

There are interesting findings relating to what is called a third style of leadership, LMX (leader-member exchange), traditionally classified as a form of transactional leadership. LMX theory proposes that leaders establish different social exchange relationships with each follower; these relationships tend to fall on a continuum from low-quality, (characterized by downward influence, economic exchange behaviors, formal role-defined relations, and loosely coupled goals), and high-quality, (characterized by mutual trust, respect, influence, and obligation). LMX has sometimes been categorized as both transactional and transformational because it begins as one type of

exchange (transactional) and may evolve into another (transformational) (Howell and Hall-Merenda 1999).

Howell and Hall-Merenda (1999) investigated the relationship between follower performance and LMX leadership style in a remote context and found that LMX behaviors positively affect follower performance, regardless of physical distance. These researchers contend that remote leadership is thus, both possible and effective. "The internalization of common goals, as well as the mutual trust, respect, and obligation that characterize high-quality leader—follower exchanges may enable followers to transcend geographic distance in pursuit of the unit's mission and goals." (Howell and Hall-Merenda 1999). By extension, these findings could apply to transformational leadership behaviors, since high quality LMX exchanges have been compared to transformational leadership exchanges.

Summary: Successful leadership behaviors.

Research into leadership style in a remote context is preliminary, and the results are mixed. Transformational leader behaviors appear to influence follower outcomes through an increase in trust and focus on collective goals. This is consistent with findings relating to higher-level LMX behaviors which are similar to transformational leader behaviors. There is some evidence that transactional leader behaviors may be appropriate in a remote environment, through increased social identification and role clarity resulting from frequent task-related messages. Physical distance, however, creates problems in monitoring outcomes and rewarding appropriately.

Integration and Recommendations

The future security environment will be significantly more complex, fluid and dynamic than previously expected. It will consist of potential and emergent threats from both state and non-state belligerent groups. These groups will have access to similar types of communication and computing technologies that modern western militaries do, or they will have access to the equivalent civilian counterparts. This will enable them to have parity or near-parity for some elements of their command and control, reconnaissance and intelligence capabilities – although these will probably fragmented in nature as opposed to the coherency of these systems within conventional modern militaries they may be in conflict with. Consequently, they will probably adopt

asymmetric strategies and tactics as 'means-and-ends' in order to offset a lack of conventional symmetric capability.

The employment of forces in a Network-Centric environment needed to counter future security asymmetries will be distinctly different than in the past. Organizational structures will be deployed over greater and greater geographies increasingly separated in space as networked digital mass replaces or augments physical mass and force projection. This will be driven in response to the asymmetric tactics of belligerents or the necessity of meeting operational requirements for belligerent activities that are classed as less-than-war. Conversely the use of technology will bring these deployed forces closer together as information connectivity and communications processes become scalable in real-time. The complexity of this environment will force changes to the current doctrinal, operational and leadership concepts that will be necessary to operate successfully under these new conditions.

The employment of forces will occur in environments where there will be a tendency towards interest and influence from increasingly distant elements connected to the network as the number of belligerents, and associated stakeholders, within any conflict increase. This will result from the technological capability for any individual or group within the network to observe activities in real time across all levels from the strategic to the tactical. Compression of the levels of warfare will thus force a re-conceptualization of force structure and employment. The very nature of the Network-Centric Battlespace has implications that span from national 'grand strategy' through to the tactical actions used by the individual soldier. This is particularly critical in light of the capabilities for real-time information broadcast by media, or across the Internet, which enables almost anyone including friendly militaries, belligerent groups, individuals and national populations to receive information on these activities anywhere at anytime.

In future there is the potential to realize the concept of a soldier *Avatar*. Many of the technological capabilities needed to deploy *avatars* exist now. However, an *avatar* must operate in a more cognitively complex space than conventionally trained soldiers or leaders do, existing at the nexus of information, physical and cognitive domains. The personal characteristics, educational and training for these types of individuals may need

to be significantly different as the technological mediating effects on network enabled soldiers, leaders and organizations are investigated.

Thus, increasing technological capability has the potential to dramatically alter the future security environment and there is likely to be increased focus on leaders' ability to operate in a technologically-mediated and remote environment. Our review of the behavioral science literature leads to the conclusion that the remote environment is very different from the traditional environment; traditional leader behaviors are necessary but not sufficient, to manage effectively in a remote environment and there is little direction from empirical research about what else is required; leadership is even more important in the remote context than in the traditional one, where substitutes for leadership may be available

Trust is pivotal to effective leadership, and even more so in uncertain environments, which characterizes remote leadership; little is known about how to develop and maintain trust in the absence of face-to-face interaction, with its associated wealth of nonverbal cues. A synthesis of the preliminary findings with different areas of focus (transformational leadership style, facilitative style, higher level LMX behaviors, coaching behaviors, etc.) suggests that some combination of remote transformational leader behaviors may result in improved outcomes, such as both individual follower and group satisfaction and performance.

Recommendations for Research and Practice

The operating conditions of a Network-Centric environment can be seen to be significantly different than current military environments. The cognitive challenges that will face both soldiers and leaders will be much more complex and technologically oriented. Information management, synthesis and fusion will play a much greater role. ***Research into the characteristics and traits necessary to operate successfully in this new technologically mediated environment is needed***. This has implications for the current recruitment and selection processes.

While militaries are incorporating mission specific training to address the uniqueness of the new operating environments current leadership training and education is primarily focused on conventional warfare concepts. ***The increasing complexity of these new operational environments and the increasing expectation of conflict***

asymmetry in future demand a significant change in leader education and training. This requires a review of current training/development protocols in light of research findings on remote leadership requirements.

Our review identifies follower trust in the leader as critical to achieving positive outcomes. ***It is critical to understand which leader behaviors enhance the development of trust and how that trust affects follower outcomes***. While research exists on the development of trust in conventional environments, the extension of these findings to a remote environment is critical.

While obviously subject to continued research, the development of protocols for remote leadership is strongly recommended. To date research exists suggesting that:

- ♦ Remote leaders cannot over-communicate; more communication, using a variety of media, appears to positively affect individual and group attitudes. These messages should be frequent, with a medium response latency.

- ♦ There is not a direct relationship between message content and media choice; moderating contextual factors, such as group norms, should be considered

- ♦ Remote leadership behaviors, which incorporate the transformational leadership style, are likely to be more effective; specifically, leaders should communicate a focus on shared values, the importance of each individual contributor, and the collective goal of the group. Frequent personalized task related messages build trust, by providing intellectual stimulation and individualized consideration.

- ♦ Not every individual is suited to be a remote leader or follower. Selection/promotion decisions should include a consideration of comfort with text, if the majority of communication will be text-based (e.g. email); and technological self-efficacy. (This is not technical knowledge, which can be taught, but relates to willingness to learn and use communication technology.) As well, self-management aptitudes and skills are critical for remote followers to possess, since direct supervision is not possible.

- ♦ Remote leaders should coach followers in the effective and appropriate use of communication process and technology in a remote environment, as well as model that behavior. Selection/promotion decisions should include a

consideration of the individual's ability to provide such coaching and
modeling.

♦ Some face-to-face contact between leader and followers may be beneficial,
especially at the beginning of the assignment, or during times when the task
involves a higher level of complexity, such as a critical decision making
juncture.

It is clear that both the security and organizational environments of the future will
be impacted by rapidly evolving technology. Our review suggests that these changes will
require new skill sets, new models of leadership and new understandings of leader-
follower dynamics. The existing body of literature is beginning to address this topic but
much more research is required for organizations to develop a knowledge base that would
allow maximizing the potential of increased technological capability. This challenge may
be particularly critical for the CF as they face a dramatically altered security environment

References

Adams, T. (2000). The real military revolution. *Parameters*, Autumn 2000, 54-65.

Alberts, D, Garstka, J and Stein, F. (2000). *Network Centric Warfare: Developing and Leveraging Information Superiority, 2nd Edition*. Department of Defense Publication. US Government Printing Office, Washington DC. Available online at http://www. c3i.osd.mil/NCW/. Accessed on 10 February 2003.

Andrew, P. and Conway-Lanz,S. (1995). Desperate measures – Arms producers in a buyers market. *Harvard International Review, 17(1)*, 12-

Anonymous. (2002). Network centric warfare: Exploiting an information edge. *Issues in Defence Science & Technology, Issue 14 (October)*. Available online at http://www.drdc-rddc.gc.ca/publications/publications_e.asp. Accessed on 3 March 2003.

Anonymous. (2003). Appliances that run your life. *Machine Design. 75(1)*, 59 –

Antonakisa, J. and L. Atwaterb (2002). "Leader distance: a review and a proposed theory." *The Leadership Quarterly 13*(6): 673-704.

Avolio, B. J., S. Kahai, et al. (2000). "E-leadership: implications for theory, research and practice." *Leadership Quarterly 11(4)*: 615-668.

Avolio, B. J. and S. S. Kahai (2003). "Adding the "E" to E-leadership: how it may impact your leadership." *Organizational Dynamics 31(4)*: 325-338.

Avolio, B. J., S. S. Kahai, et al. (2001). Virtual teams: implications for E-leadership and team development. *How people evaluate others in organizations*. M. London. Mahwah, N.J., Lawrence Erlbaum Associates.

Bandura, A. (1978). "Reflections on self-efficacy.*" Advances in Behavioral Research and Therapy 1(4)*: 237-269.

Barrick, M. B. and M. K. Mount (1991). "The big five personality dimensions and job performance: a meta-analysis." *Personnel Psychology 4*4: 1-26.

Bass, B. M. (1985). *Leadership and performance beyond expectatio*ns. New York, Free Press.

Blackburn, R., S. Furst, et al. (2003). Building a winning virtual team: KSAs, selection, training, and evaluation. *Virtual teams that work*. C. B. Gibson and S. G. Cohen. San Francisco, Jossey Bass.

Beckett, I. (2001). Forward to the past: Insurgency in our midst. *Harvard International Review, 23(2)*, 59-63.

Berman, J. (2000). Boardrooms and bombs. *Harvard International Review, 22(3),* 28-32.

Biddle, S. (1996). Victory misunderstood: What the gulf war tells us about future conflict. *International Security, 21(2)*. Available online at http://www.comw.org/rma/fulltext/victory.html. Accessed 5 February 2003.

Carless, S. A. and C. de Paola (2000). "The measurement of cohesion in work teams." *Small Group Research 31*(1): 71-89.

Carment, D. (2001). The struggle for peace: Rethinking intervention. *Harvard International Review*; Cambridge. 23(2), 54-58.

Cascio, W. F. and S. Shurygailo (2003). "E-Leadership and virtual teams." *Organizational Dynamics 31*(4): 362-376.

Cebrowski, A and Garstka, J. (1998). Network-centric warfare: Its origin and future. *Naval Institute Proceedings*, January 1988. Available online at http://www.usni.org/Proceedings/Articles98/PROcebrowski.htm. Accessed on 22 February 2003.

Cohen, W. (1997). *Report of the Quadrennial Defense Review*. Available at http://www.defenselink.mil/pubs/qdr/. Accessed on 5 February 2003.

Cohen, S. G. and D. E. Bailey (1997). "What makes teams work: group effectiveness research from the shop floor to the executive suite.*" Journal of Management 23(3)*: 239-291.

Covault, C., & Morring, F. (2002). Military technology likely to propel sitcom rebound WSC policy forum calls for more international collaboration on space technology transfer issues. *Aviation Week & Space Technology 157(17)*, 22 –

Craig, S. B. and S. B. Gustafson (1998). "Perceived leader integrity scale: an instrument for assessing employee perceptions of leader integrity*." Leadership Quarterly 9(2)*: 127-145.

Daft, R. L. (2001). *Organization theory and design*, Southwestern Publishing.

Daft, R. L. and R. H. Lengel (1984). Information richness: a new approach to managerial behavior and organization design. *Research in organizational behavior*. B. M. Staw and L. L. Cummings. Greenwich, JAI Press. **6:** 191-233.

Dhanapal, J. (1999). *Disarmament and Development*. Paper presented at the 1999 United Nations Symposium on Disarmament and Development. Available at http://www.ecaar.org/ECAAR_Papers/Disarm_Develop.PDF. Accessed on 19 February 2003.

Directorate Land Strategic Concepts. (1999). *The Future Security Environment*. Department of National Defence Publication: Fort Frontenac, Kingston, Ontario. Available at http://armyapp.dnd.ca/dlsc-dcsot/docs/FSEI_Column_e2.PDF. Accessed 1 March 2003.

Dirks, K. T. and D. L. Ferrin (2002). "Trust in leadership: meta-analytic findings and implications for research and practice*." Journal of Applied Psychology 87*(4): 611-628.

DND. (1998c). Director General Strategic Planning. (1999). *Canadian Defence Beyond 2010: The Way Ahead: An RMA Concept Paper*. Department of National Defence Publication: Ottawa, Ontario. Available at http://www.vcds.forces.gc.ca/dgsp/dda/rma/wayahead/intro_e.asp. Accessed 1 March 2003.

DISA. (1983). US Defense Communications Agency Report. *Headquarters Effectiveness Program summary Task 002*. McLean, VA: Defense Systems Inc.

DND. (1998a). B-GL-300-001/FP-000 *Operational Level Doctrine for the Canadian Army*. Available at http://armyapp.dnd.ca/ael/publications_ns.asp. Accessed 23 February 2003.

DND. (1998b). B-GL-300-000/FP-000 *Canada's Army: We Stand on Guard For Thee*. Available at http://armyapp.dnd.ca/ael/publications_ns.asp. Accessed 23 February 2003.

Don, B. (1999). Revolutionary Adaptations. *Harvard International Review. 21(3)*, 42-46

Eisenberger, R., F. Stinglhamber, et al. (2002). "Perceived supervisor support: Contributions to perceived organizational support and employee retention." *Journal of Applied Psychology 87*(3): 565-573.

Fishburne, R., and Malone, M. (2000). Laying down the laws. *Forbes*, 96-100.

Fjermestad, J. and S. R. Hiltz (1998). "An assessment of group support systems experiment research: methodology and results*." Journal of Management Information Systems 15(3)*: 7-149.

Fraser, J. (2000). *In Service of the Nation: Canada's Citizen Soldiers for the 21ˢᵗ Century*. Special Commission Report to the Minister of National Defence. Available at http://www.forces.gc.ca/site/reports/fraser/. Accessed on 16 February 2003.

Frantzen, H. (2001). *Military Command: Compression of the levels and diversification of functions*. Paper presented at the 'Command in KFOR Symposium', Oslo: Sweden, May 2001.

Fukuyama, F., and Shulsky, A. (1999). *Military Organization in the Information Age: Lessons form the World of Business*. 327-360, in Khalilzad, Z., White, J., and Marshall, A. (1999). *The Changing role of Information in Warfare*. Santa Monica: Ca, RAND Publication MR-1016-AF.

Fulk, J. (1993). "Social construction of communication technology*." Academy of Management Journal 36(5*): 921-950.

Gagnon, G. (2002). *Network-centric special operations – Exploring new operational paradigms*. Air & Space Power Chronicles. Available at http://www.airpower.maxwell.af.mil/airchronicles/cc/gagnon.html. Accessed on 27 February 2003.

Gardner, H. (2003). Aligning for the future. *Harvard International Review. 24(4)*. 56-61.

Gerstner, C. R. and D. V. Day (1997). "Meta-analytic review of leader—member exchange theory: Correlates and construct issues*." Journal of Applied Psychology 82*: 827-844.

Glenn, R. (1998). No More Principles of War. *Parameters,* Spring 1998, 48-66.

Gomez, C. and B. Rosen (2001). "The leader-member exchange as a link between managerial trust and employee empowerment*." Group & Organization*

Management 26(1): 53-69

Hallion, P. (1992). *Storm over Iraq: Airpower and the Gulf War*. Smithsonian Institution Press: Washington, DC.

Hart, R. K. and P. L. McLeod (2002). "Rethinking team building in geographically dispersed teams: one message at a time*." Organizational Dynamics 31*(4): 352-361.

Hornburg, H. (1997). *Joint Task Force Commander's Handbook for Peace Operations*. Monroe, VA: Joint Warfighting Center. Available at http://carlisle-www.army.mil/usacsl/divisions/pki/Military/Doctrine&Concepts/joint.htm. Accessed on 6 February 2003.

Howell, J. M. and K. E. Hall-Merenda (1999). "The ties that bind the impact of leader—member exchange, transformational and transactional leadership, and distance on predicting follower performance." *Journal of Applied Psychology 84*(5): 680-694.

Ibrugger, L. (1998). *The Revolution in Military Affairs. Committee Reports: Science and Technology Committee – Special Report to the NATO Parliamentary Assembly*. Available at http://www.naa.be/publications/comrep/1998/ar299stc-e.html. Accessed on 15 Febraury 2003.

Jarvenpaa, S. L., K. Knoll, et al. (1998). "Is anybody out there? Antecedents of trust in global virtual teams." *Journal of Management Information Systems 14(2)*: 29-62.

Jarvenpaa, S. L. and D. E. Leidner (1998). "Communication and trust in global virtual teams*." Journal of Computer Mediated Communication 3(4*): 1-40.

Jarvenpaa, S. L. and H. Tanriverdi (2003). "Leading virtual knowledge networks." *Organizational Dynamics 31*(4): 403-412.

Johnson II, D. (2000). *Future Leadership, Old Issues, New Methods*. Carlisle: PA. Strategic Studies Institute Publication.

Jukes, S. (2002). Real-time responsibility. *Harvard International Review. 24(2)*, 14-18.

Jung, D. I. and B. J. Avolio (2000). "Opening the black box: an experimental investigation of the mediating effects of trust and value congruence on transformational and transactional leadership*." Journal of Organizational Behavior 21*: 949-964.

Kayworth, T. R. and D. E. Leidner (2002). "Leadership effectiveness in global virtual teams*." Journal of Management Information Systems 18(3*): 7-40.

Keith, H. (1997). The economics of the peace dividend. *International Journal of Social Economics. 24(1/2/3)*, 28-45.

Keithly, D, & Ferris, S. (1999). Auftragstaktik, or directive control, in joint and combined operations. *Parameters*, Autumn 1999, 118-133. Available online at http://Carlisle-www.army.mil/usawc/parameters/99autumn/keithly.htm. Accessed on 19 February 2003.

Kelloway, E.K., Barling, J., Kelley, E., Comtois, J. & Gatien, B. (in press). Remote transformational leadership. *The Leadership and Organizational Development Journal*

Kerr, S. and J. M. Jermier (1978). "Substitutes for leadership; their meaning and measurement." *Organizational Behavior and Human Performance 22*: 375-403.

Khalilzad, Z., White, J., and Marshall, A. (1999). *The Changing role of Information in Warfare*. Santa Monica: Ca, RAND Publication MR-1016-AF.

Kini, R. (2002). Peer-to-peer technology: A technology reborn. Information Systems *Management. 19(3)*, 74-84.

Kiesler, S., D. Zubrow, et al. (1985). " Affect in computer-mediated communication: An experiment in synchronous terminal-to-terminal discussion." *Human-Computer Interaction 1*(77-1-4).

Kissler, G. D. (2001). "E-leadership." *Organizational Dynamics 30(*2): 121-133.

Knight, M., Norman,L., and Delano, V. (1996). The peace dividend: Military spending cuts and economic growth. I*nternational Monetary Fund. Staff Papers – International Monetary Fund*; Washington; 43(1), 1-

Kramer, R. M. and T. R. Tyler, Eds. (1996). *Trust in organizations*. Thousand Oaks, Sage.

Krulak, C. (1999). The strategic corporal: Leadership in the three block war. *Marines*

Magazine, January 1999.

Lais, S. (2002). Grid computing. *Computerworld*. 36(52), 30 -

Leonhard, R. (1998). T*he Principles of War for the Information Age*. Novato: Presidio Press

Lurey, J. S. and M. S. Raisinghani (2001). "An empirical study of best practices in virtual teams." *Information & Management 38*(8): 523-544.

Lynch, P. D., R. Eisenberger, et al. (1999). "Perceived organizational support: Inferior versus superior performance by wary employees." *Journal of Applied Psychology. 84(4)*: 467-483.

Matlis, J. (2002). Scale-free networks. *Computerworld. 36(45)*, 36 -

Matsumura, J., Steeb, R., Gordon, J., & Steinburg, P. (2002). *Preparing for future warfare with advanced technologies: Prioritizing the next generation of capabilities*. Santa Monica, CA: RAND Publication. Available at http://www.rand.org/publications/IP/IP215/. Accessed 21 February 2003.

Maznevski, M. L. and K. M. Chudoba (2000). "Bridging Space over Time: Global Virtual Team Dynamics and Effectiveness." *Organization Science 11*: 473-492.

McAfee, A., and Oliveau, F. (2002). Confronting the limits of networks. *MIT Sloan Review. 43(4)*, 85-87.

McCabe, T. (1999). The counterrevolution in military affairs. *Air & Space Chronicles*. May 1999. Available online at http://www.iwar.org.uk/rma/resources/airchronicles/mccabe2.htm. Accessed 25 february 2003.

McShane, S. L. (1998). *Canadian organizational behaviour*. Toronto, McGraw-Hill Ryerson.

Metz, S., & Johnson II, D. (2001). *Asymmetry and U.S. military strategy: Definition, background, and strategic concepts*. Strategic Studies Institute, U.S. Army War College, Carlisle PA. Available online at http://www.carlisle.army.mil/ssi/pubs/2001/asymetry/asymetry.pdf. Accessed on 5 February 2003.

Mishra, A. K. and K. E. Mishra (1994). "The role of mutual trust in effective downsizing strategies*." Human Resource Management 33*(2): 261-279.

Mitchell, R. (2002). Facing the grid reality. *Computerworld. 36(52)*, 32 –

Moon, Y. (1999). "The effects of physical distance and response latency on persuasion in computer-mediated communication and human-computer communication." *Journal of Experimental Psychology: Applied 5(4):* 379-392.

Mullen, B. and C. Copper (1994). "The relation between group cohesiveness and performance: an integration*." Psychological Bulletin 115(2*): 210-227.

Murdock, P. (2002). Principles of war on the network-centric battlefield: Mass and economy of force. *Parameters*, Spring 2002, 86-95.

Napier, B. J. and G. R. Ferris (1993). "Distance in organizations*." Human Resource Management Review 3(4*): 321-357.

Nichiporuk, B. (2002). U.S. military opportunities: Information-warfare concepts of operation. In Z. Khalilzad & J. Shapiro (Eds.) *Strategic Appraisal: United States Air and Space Power in the 21st Century*. Santa Monica, CA: RAND Publication MR-1314-AF. Avaialble at http://www.rand.org. Accessed on 4 February 2003.

NATO – RTO. (1999). *Land Operations in the Year 2020 (LO2020)*. NATO Publication. Cedex, France. Available at http://www.rta.nato.int/Rdp.asp?RDP=RTO-TR-008. Accessed 1 March 2003.

Narduzzi, E. (2002). Mobile Internet: Moving beyond e-business. *Business Strategy Review. 13(4)*, 7-

.Okros, A. (2001). *Panel on Canada.* Paper presented at the REDES 2001 Conference, May 22-25, 2001, Washington DC. Available online at   http://www3.ndu.edu/chds/REDES2001/Papers/Block1/Canadian%20Plenary/Okros.Canadian%20Plenary.doc. Accessed on 10 February 2003.

O'Hanlon, M. (2001). Coming conflicts: Interstate war in the new millennium. *Harvard International Review, 23(2)*, 42-46.

O'Neill, J., & O'Brien, F. (2001). *New organizational forms and their relationships to future military capabilities.* Paper presented at The 6th International Command and Control Research and Technology Symposium, United States Naval Academy

Annapolis, Maryland, June 19-21 2001. Available at http://www.dodccrp.org/ 6thICCRTS/Cd/Tracks/Papers/Track5/077_tr5.pdf.

Accessed on 15 February 2003.

Parry, K. W. and S. B. Proctor-Thomson (2002). "Perceived integrity of transformational leaders in organisational settings." *Journal Of Business Ethics 35(*2): 75-96.

Peach, S. (2002). *Emerging Military Capabilities. NATO Publication RTO-MP-77*, Cedrex: France. Paper presented at the RTO HFM Specialists' Meeting on "Human Factors in the 21st Centruy", Paris: France, 11-13 June 2001.

Pillai, R., C. A. Schriesheim, et al. (1999). "Fairness perceptions and trust as mediators for transformational and transactional leadership: a two sample study*." Journal of Management 25(6)*: 897-933.

Podsakoff, P. M., S. B. MacKenzie, et al. (1990). "Transformational leader behaviors and their effects on followers' trust in leader, satisfaction, and organizational citizenship behaviors*." Leadership Quarterly 1(2)*: 107-142.

Podsakoff, P. M., W. D. Todor, et al. (1984). "Situational moderators of leader reward and punishment behaviors: Fact or fiction?" *OrganizationalBehavior and Human Performance 34*: 21-63.

Rockoff, H. (1998). The peace dividend in historical perspective. *The American Economic Review. 88(2)*, 46-50.

Rumer, B. (2000). In serch of stability. *Harvard International Review, 22(1)*, 44-48.

Sayles, A. (2000). Educating Junior Military Officers for The Information Age. In Johnson II, D. (2000). *Future Leadership, Old Issues, New Methods*. Carlisle: PA. Strategic Studies Institute Publication.

Scott, W., & Hughes, D. (2003). Nascent net-centric war gains pentagon toehold. *Aviation Week & Space Technology. 158(4)* 50-53.

Shamir, B., E. Zakay, et al. (2000). "Leadership and social identification in military units: direct and indirect relationships." *Journal of Applied Social Psychology 30(3)*: 612-640.

Shaout, A., Eldos, ., and Zaman, N. (2003). Scalable autonic processing systems. *International Journal of Computer Applications in Technology. 16(1)*, 21-32.

Shelton, H.(2000). *Joint Vision 2020*. Director for Strategic Plans and Policy, J5;

Strategy Division US Government Printing Office, Washington DC. Available at http://www.dtic.mil/jv2020/jvpub2.htm. Accessed on 10 February 2003.

Singh, N., and Kundu, S. (2002). Explaining the growth of E-commerce corporations (ECCs): An extension and application of the eclectic paradigm. *Journal of International Business Studies. 33(4)*, 679-697.

Sloan, E. (2002). *The revolution in military affairs: Implications for Canada and NATO*. McGill-Queen's University.

Sosik, J. J., B. J. Avolio, et al. (1997). "Effects of leadership style and anonymity on group potency and effectiveness in a group decision support system environment." *Journal of Applied Psychology 82(1)*: 89-103.

Spanier, G. (1981). *Games Nations Play: Analyzing International Politics (4ᵗʰ Edition)*. Holt, Rhinehart & Winston: New York.

Staples, D. S., J. S. Hulland, et al. (1999). "A self-efficacy theory explanation for the management of remote workers in virtual organizations*." Organization Science 10(6)*: 758-776.

Stern, J. (2001). End paper: Confronting biological terrorism. *Harvard International Review. 23(1)*, 84-85.

Straus, S. (1997). "Technology, group process, and group outcomes: Testing the connections in computer-mediated and face-to-face groups*." Human-Computer Interaction 12:* 227-266.

Tarasewich, P., & Warkentin, M. (2002). Information everywhere. *Information Systems Management. 19(1)*, 8-13.

Tyran, K. L., C. K. Tyran, et al. (2003). Exploring emerging leadership in virtual teams. *Virtual teams that work*. C. B. Gibson and S. G. Cohen. San Francisco, Jossey Bass.

U.S Army. (1986). *Operations, FM 100-5*. US Government Printing Office, Washington DC.

U.S. Army. (1993)*. FY93 Army Posture Statement.* Available at http://carlisle-www.army.mil/ usamhi/DL/chron.htm#APostColdWar1990. Accessed 10 February 2003.

Vries, R. E. d., R. A. Roeb, et al. (2002). "Need for leadership as a moderator of the relationships between leadership and individual outcomes." *Leadership Quarterly 13(2)*: 121-137.

Walther, J. B. (1996). "Computer-mediated communication: Impersonal, interpersonal, and hyperpersonal interaction." *Communication Research 23(1*): 1-43.

Walther, J. B. (1997). "Group and interpersonal effects in international computer-mediated collaboration*." Human Communication Research, 23*(3): 342-369.

Warkentin, M. E., L. Sayeed, et al. (1997). "Virtual teams versus face-to-face teams: an exploratory study." *Decision Sciences 28*(4): 975-996.

Weisband, S. and L. Atwater (1999). "Evaluating self and others in electronic and face-to-face groups." *Journal of Applied Psychology 84(4*): 632-639.

Williams, R. (2002). The truth, the whole truth or nothing: A media strategy for the military in the information age. *Canadian Military Journal,* Autumn 2002. Available at http://www.journal.dnd.ca/engraph/v3n3_pol2_e.asp. Accessed 22 February 2003.

Yagil, D. (1998). "Charismatic leadership and organizational hierarchy: attribution of charisma to close and distant leaders." *Leadership Quarterly 9(2*): 161-179.

Yukl, G. (1998). Leadership in organizations. Englewood Cliffs, Prentice-Hall.

Zaccaro, S. J. and P. Bader (2002). "E-Leadership and the challenges of leading E-Teams; minimizing the bad and maximizing the good*." Organizational Dynamics 31(4*): 377-387.

Zigurs, I. (2003). "Leadership in virtual teams: oxymoron or opportunity?" *Organizational Dynamics 31(4)*: 339-351.