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OCCASIONAL
P A P E R



Stretching the Network

Using Transformed Forces in
Demanding Contingencies
Other Than War

DAVID C. GOMPERT, HANS PUNG,
KEVIN A. O'BRIEN, JEFFREY PETERSON

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1200 South Hayes Street, Arlington, VA 22202-5050
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Preface

Although the United States and other nations have pursued transformation to a networked force to prevail decisively in major expeditionary war, networking may also contribute to lower-scale nonpermissive contingencies short of war. This occasional paper examines the capabilities of networked forces and evaluates their utility for meeting the challenges of lesser contingencies. It should be of special interest to policymakers within the U.S. Department of Defense and other allied nations who are involved in force transformation and understanding the impact of networking on military operations. It should also interest humanitarian organizations, academics, and others who have an interest in low-intensity conflict, peacekeeping operations, and nation-building to further understand the advantages networked military forces may provide in those environments.

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Introduction

Information technology is revolutionizing military operations. The ideal that now drives U.S.—and other Western—military planning is a seamless force of land, air, and maritime units networked together, with sensors that illuminate the battlefield and a command and control system that enables the units to fight in unison. As this ideal becomes reality, drones and ground troops will alert and guide precision-strike aircraft to elusive targets. Land- and ship-based aircraft and missiles, working in harmony, will accompany amphibious or airborne assault. From front lines to headquarters, commanders will have a complete, common picture of the situation and operation.

But such capabilities are nascent today. Although the basic technologies needed to network forces (e.g., data networking and imaging) have been available for years, their application in the military arena has increased only recently—and is still impeded by a ponderous procurement system and institutional sluggishness. As the U.S. Defense Department itself cautions, network-centric warfare

should not be misconstrued as a fully developed and deployable war-fighting capability. It is not. Far more needs to be done to transform today's platform-centric force into a network-centric one. Far more needs to be done to develop, test, and refine network-centric concepts of operation and co-evolve them with doctrine, organization, command approach, systems, and the other components of a mission capability package.¹

As network-centric capabilities reach the field, it will prove even harder to exploit them in practice than it is to theorize about their wonders today. The difficulties inherent in military operations force us to guard against unrealistic expectations. Unpleasant surprises of the new global security environment or of a given contingency could tax even the latest and best military technologies.

Yet we have already seen some promising results from networking in battle. In Afghanistan, small units of special operations forces, supported by diverse sensors, were able to find and direct air attacks against Taliban and al-Qaeda strongholds. Precision strikes and enhanced awareness enabled relatively light U.S. land forces to move swiftly through Iraq and take Baghdad, disposing of or bypassing opposing forces as they went. New operating concepts are graduating from theory to experimentation to exercise to battle. For the United States, at least, the costs and risks of intervention are declining, and its confidence in decisive combat success is rising. Owing in large part to the heightened sense of global insecurity and

¹ *Department of Defense Report to Congress on Network-Centric Warfare*, July 27, 2001.

increased defense funding since September 2001, the “revolution in military affairs” of the 1990s has given way to this decade’s programmatic “transformation.”

At this formative time, it is important to examine the value of networking—not just for war but also for the many types of military contingencies other than war in which U.S. and other Western forces often find themselves. The question this essay seeks to answer is whether and how networking can enhance effectiveness along a wider spectrum of military operations. The paper looks particularly at *nonpermissive contingencies short of major expeditionary war*, such as peacekeeping that fails, large-scale civilian killing, hostile actions by sub- and transnational groups, and violent civil crises. Recent history tells us that Western forces are increasingly more likely to be used in such circumstances than they are in all-out war.² Only when we understand the relevance of networking to a wider range of contingencies can we have a fuller understanding of its potential in military affairs. Only then can we be sure that networking is fully exploited whenever U.S. and allied troops go into action.

The authors confess to approaching this study with the presumption that networking is bound to help forces conduct all sorts of operations. It would be astonishing if the improved awareness, precision, flexibility, and coherence offered by networking did not—under most conditions—translate into effectiveness greater than can be achieved by forces with fewer of these qualities. Nonetheless, it is important to look objectively and in detail at *how* networking may help along a wider spectrum, not merely to test the presumption but also to determine which networking capabilities matter most in which types of contingencies and which operating concepts and investments may merit greater attention in light of their broad contribution.

The answers are important not only for the United States but also for other countries, mainly U.S. friends and allies, that employ their forces in such contingencies—some more frequently than the United States does. Such countries often regard their participation in demanding international operations short of full-scale war as a key niche, perhaps even a principal reason for them to have advanced forces. This paper has benefited from input of such friends and allies. In turn, any preliminary findings from this analysis should be of value to them in addition to the United States.³

In the pages that follow, the authors present the setting in which this analysis should be seen; the analytic method used; their results and key findings; and suggestions for additional research. If this work motivates and informs deeper study of the contribution of networking across the breadth of military affairs, its chief aim will have been met.

² For our purposes, the Gulf War, the Kosovo campaign, the intervention in Afghanistan, and the invasion of Iraq can be considered “wars”; nonpermissive operations other than war include Somalia, Haiti, Bosnia, and post-conflict operations in Afghanistan, Iraq, and Liberia. Non-U.S. interventions in the latter class include Sierra Leone (United Kingdom); Ivory Coast and Congo (France); and East Timor (Australia).

³ Among the countries whose analysis of networking along the spectrum is advanced are the United Kingdom, Australia, Sweden, and Canada—countries with considerable experience in precisely the sort of nonpermissive operations analyzed here.

Networking Capabilities

In the United States, transformation is being pursued mainly to preserve and bolster the ability of U.S. forces to prevail decisively in major expeditionary war. This sharp focus on major war does not mean that lesser contingencies are considered unimportant—the charge that “the United States only does big wars” is contradicted by both the record and U.S. official policy.¹ Nor has networking been judged to be irrelevant to operations other than war; indeed, as noted, intuition suggests just the opposite. Why, then, has attention been so sharply focused on “network-centric *warfare*” instead of a wider class of operations?

The U.S. emphasis on planning forces to fight major wars is a matter of motivation. As we know from the way the information revolution swept through nonmilitary sectors, it takes a strategic incentive to launch the radical organizational and operational changes needed to exploit the technology and networking fully and see them through, especially in the face of stiff resistance from upholders of the status quo. For the U.S. military establishment, the imperative of preserving the ability to prevail in expeditionary war while limiting U.S. casualties has provided just such an incentive. U.S. vital interests tend to be at issue at this end of the spectrum of military contingencies, where the United States is prepared to commit its unreserved might and credibility and failure is not an acceptable option. Yet improvements in anti-access and other asymmetric capabilities among potential opponents could jeopardize the U.S. ability and will to intervene when its security is threatened. Because not harnessing the power of networking could reduce U.S. confidence in its ability to win wars, transformation is imperative.

Given this motivation, transformation is being propelled by three challenges that expeditionary war presents in today’s international security environment:

- War could occur in places where the United States does not keep large forces.
- War could break out with little warning, giving the adversary the initiative.
- The adversary may be prepared to raise the costs and risks of U.S. intervention with capabilities ranging from thick air defense and mines to missiles and weapons of mass destruction.

¹ The most recent U.S. Defense Department Quadrennial Defense Review, for example, makes clear that U.S. forces must be able to meet a wide range of challenges.

In the face of these challenges, U.S. forces must be able, regardless of distance, to strike early and hard at the enemy's ability to defend itself; to deploy, insert, and engage tactical forces rapidly and support them indefinitely; to dictate the tempo, scope, and course of the hostilities; and to eliminate the enemy's ability to threaten again in the future, perhaps by eliminating the enemy regime.

To accomplish these warfighting tasks, the United States, along with other Western forces such as the United Kingdom (UK), Canada, Sweden, and Australia, is developing and fielding a number of "transformational" capabilities:

- Advanced intelligence, surveillance, and reconnaissance (ISR) sensors to provide accurate and detailed knowledge of the battlefield
- Quantitative and qualitative processes to combine sensed data and information to create useful knowledge
- The ability to strike any targets, fixed or moving, with precision from any distance and direction, thanks to improved target acquisition (TA) and weapon guidance systems (on- and offboard)
- The combination of long-range airlift, rapid sealift, and land-combat forces light enough to deploy rapidly with enough lethality, when networked with "inorganic" precision-strike forces, to defeat large, heavy enemy forces
- The ability to operate regardless of weather, daylight, or terrain
- In-theater mobility by air, land, and water, to outmaneuver enemy forces
- The ability to conduct information operations: network security, psychological warfare, and offensive information warfare
- Human and information command and control (C2) systems to ensure that all parts of the force are working in harmony and can adapt in fluid circumstances.

Tying together these emerging capabilities are information networks that can perform critical functions: fusing, transmitting, and displaying the outputs of disparate sensors in a single picture; enabling commanders to manage fluid operations and maneuver their forces; making every observed enemy capability a target in real time; enhancing the ability to hit targets with precision (and avoid unwanted damage); allowing units to support one another; and reducing logistics burdens.

Improvement in the amount, quality, and speed of dissemination of operational information has been the most talked-about dividend of transformation. Another great improvement is the enabling of smaller, lighter ground units to call for prompt and precise firepower from aircraft, ships, or other ground units also on the network, the better to defeat larger and heavier, but slower and massed, enemy forces. Smaller and lighter forces can get to the theater by air in days; once there, they can reach the area of operations in hours and maneuver with speed and secrecy. Because they are networked, they can operate in a dispersed yet integrated and coherent manner, thus improving their effectiveness and survivability. Both the empowerment of small units and the enhancement of awareness could be particularly significant for nonpermissive operations short of major war.

Operations Short of War

It is increasingly clear from analysis, experimentation, and experience that networking can solve many operational problems of full-scale war.² But can it solve the operational problems of other types of contingencies in which U.S. and other Western forces have been and will likely continue to be used? Despite scattered reservations about types of military engagement—e.g., whether the United States should engage in peacekeeping if others can do it, intervene in humanitarian crises if there is no U.S. strategic interest at stake, or participate in nation-building after combat has ended—U.S. forces have, under presidents of both political parties, been used for wide-ranging purposes: Somalia, Haiti, Bosnia, Kosovo (after the air war), Iraq (before and after the invasion), Afghanistan, and Liberia. There is ample reason to think that this pattern will continue. Africa, the Middle East, and Central Asia have plenty of failing states;³ humanitarian crises are on the rise; peacekeeping does not always succeed; and terrorism may require military force if law enforcement is insufficient.

Although U.S. forces are meant to be versatile, most of them are designed chiefly for large-scale, intense war, as already noted. It is commonly thought that if forces can carry out the most demanding missions, they will also be adequate in lesser ones. Although the defense policy of the Bush administration explicitly recognizes the need for forces to be able to respond along a spectrum of missions,⁴ Department of Defense (DoD) force planners still tend to test the adequacy of current and planned U.S. forces by how well they would perform in highly taxing expeditionary combat. One reason for this tendency is that far more effort has been invested to model, game, and plan for major war than for situations involving the irregular opposition, civil unrest, unstable objectives, and constraints on force that characterize lesser interventions.⁵

There are some fundamental differences between war and most types of lesser contingencies. Generally speaking, the aim of full-scale expeditionary war is to destroy thoroughly and emphatically the enemy's ability and will to fight, thus achieving peace through conquest or at least on lopsided terms. All-out combat puts a premium on forces that can both inflict and endure large-scale violence. In contrast, a common aim of operations elsewhere along the spectrum is to restore order for the sake of averting war or preventing its resumption. Such operations occur in permissive or semipermissive conditions, often with the consent, if not the active cooperation, of one or more parties to a dispute. Although the aim of such operations may be to prevent combat, force might have to be used in self-defense, to

² Two examples of RAND work in this area are Richard Darilek, Walter Perry, Jerome Bracken, John Gordon, and Brian Nichiporuk, *Measures of Effectiveness in the Information-Age Army*, Santa Monica, Calif.: RAND Corporation, MR-1155-A, 2001, and Daniel Gonzales Lou Moore, Chris Pernin, David Matonick, and Paul Dreyer, *Assessing the Value of Information Superiority for Ground Forces—Proof of Concept*, Santa Monica, Calif.: RAND Corporation, DB-339-OSD, 2001.

³ The World Bank identifies 48 “Low Income States Under Stress,” any of which could “fail” (in the sense that Somalia, Afghanistan, Liberia, and the Democratic Republic of Congo have).

⁴ This need is recognized in the force-planning guidance set forth in the third chapter of the U.S. Department of Defense *Quadrennial Defense Review Report*, September 20, 2001. The UK Ministry of Defence explicitly addressed how networked forces could assist with these range of missions in Chapter 2.4, paragraphs 34–41, of *The Strategic Defence Review: A New Chapter*, July 2002.

⁵ U.S. defense planners and analysts are notorious for modeling in exquisite detail what can happen when U.S. forces fight a capable opponent, but they rely largely on anecdote and intuition in relating current and future forces to operations other than war. UK planners tend to stress analytic breadth over depth and detail.

enforce whatever agreement is in place, or to protect civilians. Even then, force is used judiciously and proportionately—not with “shock and awe.”

Many contingencies fall somewhere between combat and noncombat operations or combine elements of both. These contingencies, in addition to having different objectives, vary in the need for deadly force and the wisdom of using it, the degrees of freedom in weapons used and targets attacked, and the tolerance of casualties and collateral damage. Every contingency involves a different mix of these variables. For instance, starting in 1992, intervention in Bosnia has involved, at one time or another, UN humanitarian relief, UN peacekeeping, NATO air strikes, and UN/NATO peace enforcement and nation-building. The Afghanistan campaign that began in 2001 has involved U.S.-led efforts to destroy al-Qaeda and Taliban forces, feed hungry Afghans, and begin building a secure and functioning state. The conflict in Iraq has involved combat to destroy the regime and its tools of power, followed by efforts to create order, build infrastructure, and win popular trust.

Typically, the objective of interventions short of war is not to destroy the enemy’s regime, its forces, or its infrastructure. This is especially true in contingencies aimed at stopping mass slaughter. The strife or killing might occur in a stateless or ungovernable area, and there may be no single enemy, as is the case in the eastern Democratic Republic of Congo. The populace might be in a state of material misery and on the brink of catastrophe if humanitarian relief is delayed or economic activity is disrupted. Unless military intervention can cope with these ambiguities and constraints, world leaders may face a stark choice between destructive war and inaction; if intervention means devastation, the balance of decision could tip toward inaction. Therefore, capabilities to stop large-scale killing must offer not only high effectiveness at low risk but also enough knowledge, finesse, and precision to apply force carefully and with enough flexibility to deal with conditions that are neither clear nor clear-cut.

In nonpermissive operations short of war, “opposing forces” could range from sovereign armies (as in the Balkans) to organized rebels (Liberia), militias (East Timor), and irregulars (the child armies of Africa) acting against or on behalf of the states involved, to terrorist bands (Afghanistan), frenzied civilians (Rwanda), and rioters and looters (Iraq). Their level of sophistication could range from the ability to attack the networks of U.S. forces to the use of machetes. They could be prepared to attack forces that intervene or be inclined to flee at first sight of them. They could be concentrated or dispersed—and if dispersed, they could themselves be networked or not. Examining the value of networking capabilities along a wider spectrum means examining the interaction of networked forces with all sorts of opponents.

Analysis of networking in operations other than war is important for several reasons:

- Operational challenges may be different than those encountered in war, so the capabilities required may also be different. Although the U.S. military is unlikely to build major capabilities that have no utility in large wars, force-planning and investment priorities could be affected if warfighting capabilities are also beneficial for operations lower on the spectrum.
- Designing versatile capabilities requires careful attention. Capabilities designed with only intense warfare in mind could prove clumsy or inflexible in other contingencies. Ensuring that forces will be robust across a wide band of plausible circumstances and uses demands analysis of those circumstances and uses.

- Concepts of operation could differ between war and other segments of the spectrum. As the concepts for using networked forces are being developed, they must not be limited only to the problems and tasks associated with war.
- Examination of networking beyond war is necessary if there is to be a broader theory to guide transformation, development, and restructuring for whatever the long-term future holds.

Using Informed Imagination

There is no substitute for learning from experience. However, we have little experience from which to learn about the use of transformed forces in nonpermissive military operations other than war.¹ To some extent, we can make inferences from a combination of the wartime use of networked forces in Afghanistan and Iraq, on the one hand, and the experience of U.S. and other forces in various operations other than war, on the other—even though those forces were not extensively networked in the way described here.² Of course, such analysis would mostly leave to the imagination how networked forces would have performed missions that nonnetworked ones in fact performed. And because we know they would have performed them quite differently, inferring from partially relevant experience is not only of limited utility but also somewhat risky analytically.

This leads us to the following question: If imagination is such a large component of analysis based on experience, why limit the analysis to experience alone? Why not instead imagine a richer set of hypothetical but specific contingencies short of war from which to consider how networked forces might perform? That is what we have done.

Before looking at those contingencies, however, it is necessary to define more sharply the segment of the spectrum of military operations to be analyzed. Rather than taking the entire spectrum below major war, we examine only “nonpermissive operations.” Such contingencies are characterized by

- actual or potential violence committed by hostile forces—possibly irregular, possibly more than one force
- unstable, ambiguous, or escalatory conditions
- self-imposed limitations on the use of force to destroy a hostile state or its will and ability to fight.

¹ The same could have been said until very recently about using networked forces in war. In the decade between the Gulf War and Operation Enduring Freedom, the exploitation of networking, as defined here, in *any* military operations was largely hypothetical. The so-called Revolution in Military Affairs was widely debated in defense intellectual circles; however, in the absence of experience—i.e., proof of principle—it had relatively little effect on doctrine, investment, and organization.

² Another approach is to apply computer simulation models. But this will require a major development effort, which will have to overcome such challenges as modeling command and control in circumstances more complex than a “blue” force fighting a “red” one.

The British intervention in Sierra Leone, the U.S. interventions in Somalia and Haiti, NATO peace enforcement in Bosnia, and coalition security operations in postwar Afghanistan and Iraq are examples of this segment of the spectrum.³ What that segment excludes, in addition to all-out war, is unopposed or otherwise nonviolent operations, such as ordinary peacekeeping, postconflict stabilization operations, and humanitarian relief delivery, in which avoiding hostilities, except in self-defense, is an objective—as it was in NATO’s postconflict operation in Kosovo.

Within this segment of the spectrum—below war but above permissive operations—it is not hard to imagine a large number of hypothetical contingencies, given the current international security environment. The following ten scenarios were crafted to ensure a wide array of circumstances. We do not imply that any of these contingencies is anticipated or that U.S. or international intervention should be undertaken in the event. Rather, we used the ten scenarios to inform our research.

Scenarios Examined

African Genocide

Background: The Democratic Republic of the Congo has once again begun to slide into bloodshed. Effective government control of the country’s northeast province has vanished, and tribal warfare is engulfing the region. Recently, there have been reports of large-scale killings in the region’s capital. Both of the major tribes have resorted to violence in an attempt to gain control, but neither has gained an advantage. Intelligence sources warn that even greater genocide could occur as the tribes intensify their bid for power. Government forces are helpless to intervene in the region because they are mistrusted and despised by all segments of the population. The United Nations intends to deploy an emergency peacekeeping force as quickly as possible to prevent genocide.

Objective: Prevent large-scale killings and restore order in the region.

Cuban Transition

Background: Castro dies and the heir apparent is having trouble securing power. Several factions—the military, communist sympathizers, and democratic revolutionaries—are seeking power. The result is a three-way battle for power with the military exercising violent control over the other two groups. The military is committing human rights atrocities as they establish control over Havana. Widespread food and water shortages threaten the entire population as infrastructure is destroyed in guerrilla raids against the military power. Thousands of migrants flood the shores of Florida in an attempt to escape the chaos. The United States has set up temporary refugee camps in Guantanamo Bay in an attempt to slow the refugee exodus. However, the refugees are afraid they will be forcibly returned to Cuba and have attempted several mass breakout attempts. The U.S. administration is under increasing pressure from Cuban-Americans in Florida and must take action to avoid a disaster.

Objective: Establish order, create a secure environment for a democratic government, and assist humanitarian agencies as required.

³ In view of the relevance of current operations in both Afghanistan and Iraq, mining them for lessons on networking in operations short of war is a research priority.

Western Hostages in Georgia

Background: Although kidnapping of Western aid and commercial workers in the Republic of Georgia continues, it has dropped off over recent years. However, following a particularly heavy upsurge in violence in Chechnya that has distracted Russian forces, a number of Georgian clans band together to take advantage of the situation and proceed to kidnap hundreds of foreign aid and commercial workers, taking them into the mountainous clan-infested regions of western Georgia. A hostage-rescue force is assembled, supported by a much larger intervention force from Western European and North American militaries. Their intention is (1) to stabilize a large enough area of Georgia to establish bases, and (2) to move out against the clans and effect both a rescue of the hostages and, if necessary, the destruction of the opposing forces.

Objective: Stabilize sufficient area in order to establish base camps and then conduct rescue operation to free hostages and destroy kidnapers.

Unrest in the Gulf

Background: As postwar Iraq begins to rebuild and a provisional government is put in place, Western forces return home. However, new tensions soon arise in the region. Several of the Iraqi ethnic groups, including the Kurds and the Marsh Arabs, renew demands for their own independent territory. Effective government in each of these areas breaks down as those wishing independence refuse to recognize the local authorities. Turkey, feeling threatened by a Kurdish state to its south, threatens to invade to restore order. Iran, supporting the Marsh Arabs, begins to supply them with weapons and other military supplies through the now-porous Iran/Iraq border. Iran also begins construction of a new missile battery on the western edge of the Straits of Hormuz and threatens to deploy its small fleet of gunboats to terrorize oil traffic passing through the Gulf until the international community recognizes the Marsh Arabs' state. Iraq's provisional government requests Western military assistance to regain control of its breakaway regions and restore order in the Gulf.

Objective: Restore Iraqi control of regions and minimize disruption to shipping in the Gulf.

Indonesian Uprising

Background: Indonesia's economy is collapsing because of currency devaluation. Unemployment is widespread and food shortages are becoming acute. Indonesians in Java are revolting against the government, which they perceive as incapable of resolving the problems. The anger of the people turns against the Chinese, who control a significant portion of local businesses. The atrocities against the Chinese in Java are widespread and receive international attention as news of the riots is broadcast throughout the world. Motivated by the large amount of wealth sent to China from the business owners, China has made public statements that it will intervene militarily if the Indonesian government cannot protect its Chinese population. Additionally, Islamic terrorist organizations are capitalizing on the chaos by expanding operations and stepping up recruiting. Increased terrorist activity against government facilities is distracting the government from restoring order. On the verge of collapse, the Indonesian government turns to the United States for assistance in restoring order in Java, preventing a Chinese military intervention, and deterring further terrorist activity.

Objective: Restore order in Java and protect minority Chinese business owners; eliminate localized terror organizations; create conditions for Indonesians to restore a working government in Java.

Failed City

Background: Al-Qaeda forces are increasingly concentrating in Karachi, Pakistan, taking advantage of its low-grade anarchy, radical sympathies, and access to the sea. They are planning and

staging Middle East attacks out of Karachi and undermining confidence in the global shipping container system. Pakistani politicians and security forces are unwilling to undertake a crackdown, not only out of political ambivalence but also because of fear of precipitating greater violence without necessarily being able to eliminate the terrorists. The threat becomes so severe that an international consensus in favor of intervention emerges. Pakistan says it will help, but what it really means is that it will stand aside and not object as U.S. and other advanced forces (“assistance”) move in under a UN mandate. The terrorists are suspected of having chemical weapons and maybe a radiological weapon.

Objective: Find and eliminate terrorist organizations without requiring Pakistani assistance or allowing Pakistani presence to interfere with the mission.

North Korean Pacification

Background: The North Korean state buckles under the weight of economic collapse and complete isolation. Unification seems certain but is deferred because of the dire human and security conditions in the North. North Korean nuclear weapons and materials are not accounted for, and a million or more armed former DPRK soldiers are operating in small groups. The UN Security Council decides on coalition intervention. China, the United States, Australia, and South Korea are given geographic sectors in which to bring security and pave the way for a massive humanitarian relief effort. Cross-sector collaboration is important. Because of North Korea’s lack of resources and the presence of die-hard supporters of the old regime, the security situation is worse than it was in postwar Iraq—with everything from looting to small-group fighting to attempts to gain control of WMD and other sources of power.

Objective: Secure known WMD sites and restore order in North Korea sufficiently for humanitarian effort and nation-building to begin.

Violent Instability in a Palestinian State

Background: As part of an agreement to establish a Palestinian state, NATO has been given a mandate by the UN to provide and guarantee security of the new interstate border. By agreement with the parties, this includes responsibility to eliminate terrorist and other threats to Israel from within Palestine. The NATO force, which is commanded by the United States, is expected to discharge its duties to the extent possible in cooperation with Palestinian security forces. Hardened fighters within Palestine, coming from the rejectionist wing of Hamas, are mounting cross-border terrorist attacks that the Palestinian regime is unable to stop—or is unwilling to take the extreme measures necessary to stop. Israel is threatening a major incursion into the new state if NATO does not put an end to the attacks and eliminate the attackers. The Palestinian government concurs that NATO should act and offers intelligence but no forces. The Hamas rejectionists are concentrated in Gaza and several West Bank towns and are embedded within civilian neighborhoods. The reaction of noncombatant Palestinians to NATO operations within Palestinian population centers is unpredictable.

Objective: Find and eliminate terrorists with minimal collateral damage and casualties to the rest of the Palestinian populace.

Counterterrorist Action in Yemen

Background: As the War on Terrorism continues to expand, a number of countries become regular operating areas for Western antiterrorist military forces; Yemen is one of them. Given Yemen’s inhospitable territory and societal environment and the small likelihood of support from that country, U.S. and UK forces decide to base themselves on ships off the coast of Yemen in the Red and Arabian

Seas and in Djibouti and to operate throughout Yemen using unmanned aerial vehicles (UAVs) and unmanned combat aerial vehicles (UCAVs) as their primary operational units. Because of the requirement for ongoing operations against terrorist suspects and supporters, small-unit reconnaissance to determine the hiding places of targets must be directed from the ground to support the UAVs/UCAVs. The United States and the UK deploy small units of reconnaissance and forward observer capabilities into Yemen, supported by and supporting the UAVs/UCAVs.

Objective: Capture or destroy terrorist cells with minimal disruption to Yemeni society; create conditions for Yemen to take responsibility for policing internal terrorists.

Zimbabwe Collapse

Background: Robert Mugabe's regime collapses as the dictator flees to preserve his wealth and safety. A void is left in the country and order begins to give way to anarchy. The British Commonwealth resolves to restore order and the UK, South Africa, and Australia all volunteer forces to assist in the rebuilding of the country. An interim coalition government is formed, made up of members of all political parties, but it has little power to actually restore order. Looting and sporadic violence persist as local people struggle to find basic necessities to survive. International humanitarian organizations stand by to assist, but refuse to go into Zimbabwe until some semblance of order is restored. Commonwealth sources indicate that their forces will encounter little opposition, but pockets of resistance are likely, especially among ex-Mugabe supporters who hope to consolidate gains made during his regime.

Objective: Restore order so that humanitarian organizations can begin to assist the population.

These ten contingencies offer a look at a number of variables that might affect the nature of the operational challenges facing intervention forces:

- size of the intervention force required
- level, nature, capability, and motivation of organized armed opposition
- tempo of operations
- presence or absence of coalition forces and/or local allies
- level of involvement of civil agencies, e.g., for humanitarian relief
- relative difficulty of geographic access for intervention forces
- kind of terrain (wooded, rugged, urban, open).

Examining Required Capabilities in the Light of Operational Problems

Every contingency, real or imagined, poses a different set of operational problems. Whether we draw from actual experience or conjecture from imagined experience, we can derive needed capabilities—the composition of the forces themselves and how they are armed, organized, informed, and employed—from key operational problems that must be overcome.⁴

⁴ An early and still useful explanation of deriving force requirements from operational challenges can be found in *Transforming the Force: Suggestions for DoD Strategy*, Paul K. Davis, David C. Gompert, Richard J. Hillestad, and Stuart Johnson, Santa Monica, Calif.: RAND Corporation, IP-179, 1998.

(Of course, it is essential to specify the circumstances and the military objectives, which we have already done for each scenario.)

Having specified the objectives for each scenario, we can form a composite representative set of problems often encountered in nonpermissive operations other than war. We think of these problems as arising during the *phases* of an operation, although we recognize that all phases will not always be present or distinct in a particular operation and that a given operational problem will not always correspond to one phase. We use the following phases: *deployment, engagement, stabilization, and recovery.*

To define a set of representative operational problems, we examined the ten differing scenarios in depth to identify problems that friendly forces may face during each operation. Some of these operational problems were common to most scenarios; others were limited to just one or two. Appendix A shows the relationship between the operational problems used during the analysis portion of this paper and the ten scenarios. Additionally, to reduce the possibility of misinterpreting the terminology involved, we specifically defined each operational problem. These definitions are found in Appendix B.

The operational problems common to each phase are shown in Table 1. Some problems, such as interoperating with allies and operating in a variety of terrains, are applicable to all phases of an operation and are listed separately.

Strictly speaking, only two of these characteristics—being better informed and easier to distribute—result directly from networking. The main reason forces can be lighter is that being networked enables units to call upon firepower and other assets available throughout the force. Of course, this does not mean that heavy forces cannot also benefit from being networked. In addition, networking provides greater flexibility because forces can be repositioned more quickly, providing the commander with more options. Finally, although precision *munitions* were developed before networking was even thought of, precise *effects* depend on networking insofar as information from sensors throughout the network affords sharper discrimination and action. Overall, when we speak of “networking capabilities,” we mean

Table 1
Common Problems in Nonpermissive Operations Other Than War

Phase	Problem
Deployment	Deploy rapidly worldwide Insert forces into unimproved areas
Engagement	Ascertain enemy capability Gain information on enemy intent Detect indication of enemy action Control large area (air, land, sea) Conduct reconnaissance Find enemy combatants/friendly forces Distinguish combatants/noncombatants Conduct strikes on fixed enemy Conduct strikes on fleeting targets Engage dispersed/concealed forces Conduct rescue/evacuation missions Seize critical sites (hostile) Assess battle damage to enemy

Table 1—continued

Stabilization	Protect indigenous noncombatants (stopping genocide) Eliminate residual threat Restore order Manage refugees Train local allies
Recovery	Interact with humanitarian organizations Provide protection to humanitarian operations Facilitate NGO relief missions
Overall conditions	Integrate with local allies Interoperate with networked expeditionary allies Interoperate with nonnetworked expeditionary allies Operate in complex terrain Operate in unimproved terrain Operate in urban terrain Minimize unwanted destruction Protect own forces (organic protection) Sustain operations

those made possible by the exploitation of information technology broadly speaking, of which networking is perhaps the most important form.

More specific networking capabilities are shown in Table 2 and described explicitly in Appendix C to avoid any misunderstanding about what each capability represents.

The main analysis underpinning this paper is the assessment of the utility of the capabilities that distinguish networked forces (from Table 2) in meeting the operational challenges on nonpermissive operations other than war (from Table 1) for the scenarios summarized. For example: How useful are the improved effectiveness and survivability of

**Table 2
Capabilities of Networked Forces**

Characteristic	Capability
Better informed	Gather and fuse higher-quality intelligence Allow increased situational awareness through information sharing
Lighter	Operate with smaller force structure having same or improved capability Promote ease of deployment and movement with lighter and faster forces
Easier to distribute	Operate in a dispersed manner Integrate with other forces for coordination or access to inorganic resources
More flexible	Conduct simultaneous operations under a single headquarters Adapt easily to a change of mission or situation
More precise	Use precision munitions and effects

small units operating against dispersed armed opposition? How important is the wide dissemination of useful information to the ability to control large areas? The results are presented in the next chapter, but in short, our analysis sought to understand how the capabilities associated with networked forces can overcome a common set of operational problems.

In relating networking capabilities to operational problems, we had good reason not to limit our analysis to the employment of U.S. forces. As noted above, the United States is not the only country whose military is developing network-centric concepts and capabilities. As a matter of national strategy, the UK is working to remain abreast of the United States in network-centric warfare (or network-enabled capabilities) and has the full spectrum of missions very much in mind.⁵ Other countries that view networking as valuable, if not invaluable, in meeting military missions include Australia, Sweden, and Canada. (The list is growing, especially among NATO allies, prompted by the decision to develop a NATO Response Force, which must be networked if it is to interoperate with U.S. forces.) In some of these cases, the main purpose is to contribute to international security by taking on demanding roles short of all-out war, knowing that the forces of a large number of countries can handle low-intensity operations. The analysis presented here benefited from exchanges with allies that are exploring networking as a way to improve performance in nonpermissive contingencies.

⁵ The UK Ministry of Defence's 2002 "New Chapter" (part of the UK Strategic Defence Review) spells out a similar concept of "Network Enhanced Capabilities."

Results

Our analysis yielded some preliminary indications of the utility of key networking capabilities in meeting serious operational problems that could be encountered in nonpermissive operations other than war. Recognizing that networking is bound to be generally advantageous, the analysis is specifically concerned with how important which capabilities could be for which operational problems in what sorts of contingencies. We use the following scale of values in the remainder of this paper to signify relative utility:

- *Vital*: The networking capability is essential for solving the problem. Without it, the effort could fail, take too long, or cause unacceptable damage or casualties.
- *Helpful*: Although traditional forces might suffice, networking enables the problem to be solved faster, at lower cost and risk, or with fewer forces.
- *Unimportant*: Networking provides no significant advantage over traditional capabilities (or is not applicable).

The first step in the analysis was to assign a value to the utility of each networked capability for each operational problem. We systematically examined each capability–operational problem combination and used our expertise and judgment, along with external resources, to come to a consensus on the value to be assigned. We validated these values by presenting them to a group of outside experts to ensure that there were not inconsistencies in the values assigned. Figure 1 shows the complete problem-by-capability results.

There are two ways to read these results: by cells and by patterns. Individual cells in the matrix can be examined both for their validity and for their implications. For example, it appears that the ability of networked forces to function effectively while spatially distributed—in large part *because* they are distributed—could prove essential in carrying out urgent and dangerous evacuations (assuming, of course, that the evacuees are not preassembled). The reason is simply that it is possible for networked intervention forces to reach more pockets of evacuees faster and over a wider territory, and to use or call up force if needed to defeat resistance. If this preliminary result is borne out by further analysis, it suggests that operating concepts for networked forces ought to be developed and used for evacuation contingencies, whether to rescue expatriates caught in foreign conflicts or to respond to large-scale terrorist attacks. Numerous interpretations of this sort can be made from examination of the individual intersections of networking capabilities and operational problems. Figure 1 shows the complete analysis aggregated for all the operational problems considered; Appendix D contains specific analysis for each scenario described in Chapter Three of this paper.

Figure 1
Effects of Networked Forces on Operational Problems

		Informed		Light		Distributed		Flexible		Precise	
		Gather and fuse higher-quality intelligence	Allow increased situational awareness through information sharing	Operate with smaller force structure having same or improved capability	Promote ease of deployment and movement with lighter and faster forces	Operate in a dispersed manner	Integrate with other forces for coordination or access to inorganic resources	Conduct simultaneous operations under a single headquarters	Adapt easily to a change of mission or situation	Use precision munitions and effects	
Operational Phase	Operational Problem										
Overall Conditions	Integrate with local allies										
	Interoperate with networked expeditionary allies										
	Interoperate with nonnetworked expeditionary allies										
	Operate in complex terrain										
	Operate in unimproved terrain										
	Operate in urban terrain										
	Minimize unwanted destruction										
	Protect own forces (organic protection)										
Deployment	Sustain operations										
	Deploy rapidly worldwide										
Engagement	Insert forces into unimproved areas										
	Ascertain enemy capability										
	Gain information on enemy intent										
	Detect indication of enemy action										
	Control large area (land, sea, air)										
	Conduct reconnaissance										
	Find enemy combatants/friendly forces										
	Distinguish combatants from noncombatants										
	Conduct strikes on fixed enemy										
	Conduct strikes on fleeting targets										
	Seize critical sites (hostile)										
	Secure site										
	Engage dispersed/concealed forces										
	Conduct rescue/evacuation missions										
	Assess battle damage to enemy										
Stabilization	Protect indigenous noncombatants										
	Eliminate residual threat										
	Restore order										
	Manage refugees										
	Train local allies										
Recovery	Interact with humanitarian organizations										
	Provide protection for humanitarian operations										
	Facilitate NGO relief missions										

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A second way to read the results is to look for patterns—in particular, the following:

- operational phases and problems for which networking is most important
- networking capabilities that are most important
- types of contingencies for which networking is most important
- how networking affects the ability to work with other forces and organizations.¹

We address each in turn.

¹ As the authors examined each of these questions, they collapsed the complete matrix (Figure 1) in several different dimensions in order to discover general trends in the data. This was done by looking at the particular cells to be collapsed and making an informed judgment as to the appropriate value for the aggregated data. In most cases, this involved taking the “average” value of the cells, but exceptions did occur—most notably if a certain cell’s value was so crucial that it dominated the other cells around it.

Operational Phases and Problems for Which Networking Is Most Important

Not surprisingly, networking can help substantially throughout all phases of the contingencies—deployment, engagement, stabilization, and recovery. As Figure 2 shows, the advantages of using networked forces seem to drop off somewhat once opposing forces are defeated, dangers subside, and time pressure eases. This suggests that the main, but by no means only, advantages of networked forces are associated with hostilities—an important observation worth further examination.

With regard to the deployment phase, the most important benefit of networking lies in the fact that networked forces, being smaller and lighter than traditional forces, can be deployed faster and with a reduced footprint. This is extremely important when speed is of the essence, as it often is in the contingencies we are concerned with here. For example, threats against expatriates or indigenous noncombatants can arise suddenly, and it may take capable air-transportable forces to save them. In addition, lighter networked forces can be more easily deployed to out-of-the-way, unfamiliar, undeveloped locations (e.g., Africa), where these contingencies often occur.

Once networked forces arrive and engage, their advantages become even clearer. Chief among these are the ability to gather and fuse information and to distribute it throughout the force. This can have enormous importance in the confused and fluid situation common to the contingencies of interest here. In addition, the ability to conduct distributed operations can be crucial in situations where enemy forces, noncombatants in need of protection, and key locations to be seized are widely dispersed.

Even after hostilities have abated and stabilization operations begin, networking can be invaluable. Stabilization often requires finding and eliminating scattered residual resistance, establishing and enforcing control, reaching endangered populations, and facilitating urgent humanitarian relief. Enhanced information available throughout the force and flexible command and control are especially vital during the unpredictable transition from combat to recovery.

More specifically, networking is of high and often vital importance in meeting every operational challenge during all operational phases, as seen in Figure 3.

Figure 2
Effects of Networked Forces, by Phase

	Informed	Light	Distributed	Flexible	Precise
Deployment	Helpful	Vital	Helpful	Helpful	Helpful
Engagement	Vital	Helpful	Vital	Vital	Helpful
Stabilization	Vital	Helpful	Helpful	Vital	Vital
Recovery	Helpful	Helpful	Helpful	Helpful	Unimportant

Figure 3
Effects of Networked Forces on Operational Problems, by Phase

		<table border="1"> <tr> <td style="background-color: #cccccc;">Vital</td> </tr> <tr> <td style="background-color: #e0e0e0;">Helpful</td> </tr> <tr> <td style="background-color: #ffffff;">Unimportant</td> </tr> </table>					Vital	Helpful	Unimportant
Vital									
Helpful									
Unimportant									
Operational Phase	Operational Problem	Informed	Light	Distributed	Flexible	Precise			
Deployment	Deploy rapidly worldwide								
	Insert forces into unimproved areas								
Engagement	Ascertain enemy capability								
	Gain information on enemy intent								
	Detect indication of enemy action								
	Control large area (land, sea, air)								
	Conduct reconnaissance								
	Find enemy combatants/friendly forces								
	Distinguish combatants from noncombatants								
	Conduct strikes on fixed enemy								
	Conduct strikes on fleeting targets								
	Seize critical sites (hostile)								
	Secure site								
	Engage dispersed/concealed forces								
	Conduct rescue/evacuation missions								
	Assess battle damage to enemy								
Stabilization	Protect indigenous noncombatants								
	Eliminate residual threat								
	Restore order								
	Manage refugees								
	Train local allies								
Recovery	Interact with humanitarian organizations								
	Provide protection for humanitarian operations								
	Facilitate NGO relief missions								
Overall Conditions	Integrate with local allies								
	Interoperate with networked expeditionary allies								
	Interoperate with nonnetworked expeditionary allies								
	Operate in complex terrain								
	Operate in unimproved terrain								
	Operate in urban terrain								
	Minimize unwanted destruction								
	Protect own forces (organic protection)								
	Sustain operations								

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The patterns of this figure suggest that networking has particular advantages in

- finding, distinguishing, and destroying resistance
- pursuing distributed objectives, controlling wide areas, and seizing critical points
- rescuing, evacuating, and protecting noncombatants
- eliminating residual (scattered) threats and restoring order
- minimizing damage and casualties while accomplishing these tasks.

If recent experience is any guide, these advantages could be especially critical in the sorts of contingencies addressed here—when enemy forces might be irregular and dispersed, when infrastructure might have to be spared, and when security might have to be established with the fewest possible casualties.

It follows that enhancing the ability to overcome those challenges could reduce the risks and costs of the operation and increase confidence in the success of future interventions. This could be an important, even decisive, factor in national decisions to intervene or not, especially when vital national interests are not at stake, as may be the case in humanitarian and peace-enforcement crises, for example.

Networking Capabilities That Are Most Important

Just as all sorts of contingencies benefit from networking, many capabilities of networked forces (shown in Table 2) can yield operational benefits. Depending on the operational problem, most networking capabilities are vital or at least highly important, although in a few cases they could be unimportant. For example, in deploying and engaging forces in rough terrain, light, distributed forces are critical, but precise effects have little direct significance. If, however, the problem is avoiding unwanted destruction, precision is obviously critical—whereas it matters less whether the forces are light or heavy (since heavy ones can be as precise as light ones).

A look at the contributions of specific capabilities shows that the ability to gather, fuse, and share information is important for overcoming nearly *all* operational problems associated with nonpermissive contingencies other than war. Although it is obvious that greater battlefield awareness will have widely positive effects, there may be even more to the story. In considering the various scenarios, we found that having better-informed forces is (a) of considerable value even if other networking capabilities are not present *and* (b) a precondition for realizing other networking capabilities (e.g., more effective light forces and a more flexible force as a whole). Thus, even though better information does not contribute more than the other characteristics, it might be considered of higher priority.

Equally noteworthy is the ability of distributed, smaller, lighter units to operate coherently and effectively because they can make use of information, firepower, logistics support, and other assets available through the network. The sorts of contingencies we examine here are often not conducive to large, heavy, concentrated forces, either because the stakes do not justify a large-scale commitment of ground forces or because the opposing forces or objectives are dispersed. The policy choice may be between small, light intervention forces or none at all.

Our scenarios also highlight the importance of flexibility—the ability to adjust and respond as fresh information permits and changing circumstances dictate. Flexibility tends to be overlooked in the intellectual debate surrounding the benefits of transformation. But if our scenarios are representative, it is not unusual for perceived conditions, and even objectives, to change—perhaps even more than in all-out war—putting a premium on the ability to adjust the effects of one's forces.

Networking forces, like networking in general, can increase flexibility in several ways:

- Forces can concentrate effects on any point regardless of how they themselves are distributed.
- They can maneuver more rapidly and freely.
- Units can call upon one another as the need arises.
- Complete and common operating pictures increase options.
- Distributed C2 permits more rapid decisionmaking and reaction times.
- Networks can be reconfigured far more easily than can rigid structures.

To take full advantage of the benefits that increased flexibility offers, the right emphasis must exist within command philosophies and systems. Networking permits both centralized and decentralized C2—the former because top commanders can have a complete and

detailed operating picture, the latter because information can be readily shared with units and commanders throughout the force. If C2 architectures and practices are too centralized or rigid, lower-level units may be deprived of valuable authority and agility. For the benefits of networking to be fully realized in these sorts of contingencies, field unit commanders must be permitted to take advantage of shared information when reacting to change and uncertainty, as well as to support one another without having to be told to do so. The operations represented by our scenarios are, on the whole, better met with a more permissive C2 model.

In sum, the most important characteristics of networked forces in nonpermissive contingencies other than war are the following:

- They are *better informed*.
- They can conduct *distributed* operations, with concentrated effects, involving *lighter, smaller, faster forces*.
- They have the *flexibility* to adapt to a change of mission or situation.

The weakest impact of networking capabilities seems to be in the area of precision effects. But this may be misleading, because the ability to avoid unwanted destruction can be indispensable in just the sort of limited contingencies we are examining. Moreover, it is important to think of precision not as weapon accuracy but as maximizing desired effects and minimizing undesired ones.

Types of Contingencies for Which Networking Is Most Important

The most conspicuous message from these results is that networking could help substantially in all of the types of nonpermissive contingencies represented by the ten chosen scenarios. It seems to make no appreciable difference whether the required size of the intervening force is large or small, whether the conditions are clearly nonpermissive or only potentially so, whether opposing forces are capable or not, or whether there are indigenous populations or other noncombatants in need of protection. While this observation is not surprising, it is significant insofar as it confirms that operational advantages of networking extend well beyond waging war. The military information revolution is indeed a sweeping one.

That said, it appears that the more suddenly and swiftly intervention forces must act, the greater the utility of networking. Examples include quick strikes on opposing forces and, as noted, urgent rescue operations. Networking can also make a big difference when opposing forces that are scattered, on the move, or hidden must be engaged at the same time as damage to surrounding populace and infrastructure must be minimized. Altogether, the promise of networking in time-critical, short-warning operations against irregular forces, possibly dispersed among noncombatants in need of protection, could be extremely important in the evolving international security environment. Figure 4 illuminates this point by showing those operational problems that are especially time-sensitive.

Figure 4
Effect of Networked Forces on Time-Sensitive Operational Problems

Operational Problem	Force Characteristics				
	Informed	Light	Distributed	Flexible	Precise
Insert forces into unimproved areas	Helpful	Vital	Helpful	Helpful	Helpful
Conduct strikes on fixed enemy	Helpful	Helpful	Helpful	Helpful	Vital
Conduct strikes on fleeting targets	Helpful	Helpful	Helpful	Helpful	Vital
Seize critical sites (hostile)	Helpful	Helpful	Helpful	Vital	Helpful
Engage dispersed/concealed forces	Helpful	Helpful	Helpful	Vital	Helpful
Conduct rescue/evacuation missions	Helpful	Helpful	Helpful	Helpful	Helpful
Eliminate residual threat	Helpful	Helpful	Helpful	Vital	Vital
Restore order	Helpful	Helpful	Helpful	Vital	Vital
Manage refugees	Helpful	Helpful	Helpful	Vital	Unimportant

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How Networking Affects the Ability to Work with Other Forces and Organizations

Networked forces and nonnetworked forces do not interoperate easily: The former are highly integrated, use shared information, and operate according to novel concepts, making it harder for them to accommodate traditional forces; the latter cannot exploit the advantages of networks with which they cannot integrate, and they have not adopted new concepts of operation. Not surprisingly, our scenarios point toward greater utility of networking with coalition forces that are themselves network-based—all the more reason for the United States to extend encouragement and help for force transformation to friends and allies whose forces may be available for U.S.-led coalition interventions.

Yet it appears that networking affords some advantages even in working with friendly forces that are not similarly networked. Local allied forces, which could be fairly rag-tag (think of the Northern Alliance) can more easily be supported and directed by intervention forces that are distributed, well-informed, and decentralized by virtue of being networked. In addition, coordination with and protection of civil affairs, humanitarian, law enforcement, and reconstruction organizations can be performed better by networked forces even if those other organizations are not networked themselves.²

² These benefits may be more difficult to realize if the nonnetworked forces or humanitarian groups are not willing to either be segregated from the networked forces or allow the networked forces to augment them. This could be particularly true of humanitarian organizations that are hesitant to appear too integrated with U.S. networked forces out of concern that they may compromise their mission or perceived independence.

Implications

Why are the results of analyses such as those in this paper useful? First, they emphasize the pivotal importance of leveraging the flexibility made possible by networking. Recent operations in Afghanistan and Iraq indicate that networking is reinforcing a tendency toward centralized C2 within the U.S. military and is thus not delivering the benefits of decentralized decisionmaking. Whatever the merits of centralized versus decentralized C2 in waging war, the flexibility that comes with decentralization can be crucial in contingencies short of war. Work within the joint community to fashion new C2 concepts, as well as the attitudes of top operating commanders, should take this fact into account.

Second, these results could influence investment in defense research, development, and system procurement. Although the investment program for future U.S. forces is driven mainly by the requirements of major war, investment in certain capabilities could receive an additional impetus in light of their wider utility, especially for the sort of demanding contingencies that only the United States and a few other countries can perform. Investment in the following would pay valuable dividends in such operations:

- deployable ISR systems
- deployable, flexible, and jointly interoperable C2 systems
- greater intratheater mobility, with armaments and vehicles for light forces
- controlled-effects munitions.

In contrast, investments in precision strike and strategic lift justified for major war are more than ample for contingencies other than war.

Third, specific concepts of operations should be formulated and exercised. To the extent that operational problems encountered in nonwar situations are essentially the same as those arising in war—destroying fleeting targets, for instance—similar concepts of operations may suffice. However, there are some problems in such lesser contingencies that are not so common, or at least do not receive much attention, in regard to war. Network operating concepts are needed for the following problems:

- protecting indigenous populations from indigenous forces
- discriminating between combatants and noncombatants
- protecting concurrent humanitarian relief operations
- evacuation.

Fourth, operational and force planners must consider how U.S. forces will interact with allied or local forces of all sorts. Although U.S. forces may operate alongside those of

only a few highly advanced allies in war, contingencies other than war often involve the participation of many nations, as well as official and private international relief organizations. When such forces can be networked with U.S. forces, significant synergies can be gained. However, the United States needs to be able to operate effectively with nonnetworked forces as well—especially since many of the lower-spectrum operations it may undertake could involve operating with military forces that lack the sophisticated technology and doctrine of U.S. forces.

Finally, studies such as this one will be important in shaping general policies and specific decisions with regard to interventions. The factors that bear on such policies and decisions are too complex to detail here. However, to the extent that the networking can make interventions less dangerous and more certain of producing desired results, the United States and other countries may be more inclined to use their military capabilities to fulfill international security and humanitarian needs when their own strategic or material stakes are small. In that sense, networking may lower the threshold for action by the international community, or at least the advanced democracies, in order to save human beings from massacre, chaos, and starvation.

Next Steps

The need for further and more practical analysis is obvious. Real-world experiences should be studied for lessons about the utility of networking for this segment of the spectrum of military operations. In addition, more hypothetical scenarios could be analyzed. Both networking capabilities and operational problems should be examined in greater detail and in the light of other analysis regarding transformation.

Two directions of qualitative analysis are especially important:

- *Studying operations that are further “down spectrum.”* Major war and nonpermissive operations other than war constitute only part of the spectrum of military operations. Analysis similar to the one offered here could be performed on a variety of missions, from unchallenged peacekeeping and humanitarian relief to occupation to support of local security forces.
- *Studying organizations other than military forces.* Much can be learned from how “forces” of all kinds face demanding circumstances with the aid of networks—police, emergency responders, humanitarian nongovernmental organizations (NGOs), and the like. This analysis could shed light on military options and be important insofar as military forces must often work with such organizations in contingencies other than war.

Additionally, it is critical that any research into the value of networking on lower-end military operations be examined through modeling, simulation, and other available scientific and mathematical methods. The development of models to study the effects of networking on operations other than major war involves two challenges in design and development. The first challenge is to represent adequately the effects of command, control, and other cognition-based capabilities on military outcomes, which is quite different from modeling the physics of force movements and weapon delivery. The second is to model operations other than war, with their many dimensions, limitations, and branch points. Existing mathematical methods should also be used to further examine these issues. Information theory, estimation theory, complexity theory, and probability theory can help to understand the fundamental structure of a networked force in ways that modeling and simulation cannot.

Finally, the U.S. military establishment would do well to share with and learn from allied and other militaries that are embracing networking.¹ For some of them, as noted, im-

¹ This, of course, is one of the main tasks of the Joint Forces Command: offering cooperative concept development and experimentation to allies and close friends.

proving the ability to operate in demanding conditions other than major war is of paramount importance. Consequently, they give it more focus than their U.S. counterparts do. Because they are smaller and less well resourced, they may be more energetic in exploiting change and less patient with institutional inertia. The greatest benefit of engaging others may be that they think about networking from a different perspective and thus in a different way. We have learned that they are more inclined to exploit networking by giving greater authority to officers in the field than by exercising tight control from the task-force commander level. They also tend to see the network as a practical enabler of individual units and officers faced with “retail-level” problems, whereas their American counterparts may see the network as the wholesale structure of the entire joint force. We believe that both perspectives have merit.

Operational Problems in Hypothetical Contingencies

Operational Phase	Operational Problem	African Genocide	Cuban Transition	Georgian Hostages	Unrest in the Gulf	Indonesian Uprising	Failed City	Korean Pacification	Palestinian State	Yemen Antiterrorism	Zimbabwe Collapse
Deployment	Deploy rapidly worldwide	X	X	X				X		X	X
	Insert forces into unimproved areas	X		X	X			X			X
Engagement	Ascertain enemy capability	X	X	X	X	X	X	X	X	X	X
	Gain information on enemy intent	X	X	X	X	X	X	X	X	X	
	Detect indication of enemy action	X		X	X	X	X	X	X		
	Control large area (land, sea, air)		X		X	X		X			X
	Conduct reconnaissance	X	X	X	X	X	X	X	X	X	X
	Find enemy combatants/friendly forces	X	X	X	X	X	X	X	X	X	X
	Distinguish combatants from noncombatants	X	X	X	X	X	X	X	X	X	X
	Conduct strikes on fixed enemy			X	X		X	X	X	X	
	Conduct strikes on fleeting targets	X	X			X		X		X	X
	Seize critical sites (hostile)		X	X	X			X			
	Secure site	X	X	X		X	X		X		X
	Engage dispersed/concealed forces	X	X		X			X		X	X
	Conduct rescue/evacuation missions	X	X	X							
	Assess battle damage to enemy			X	X		X	X	X	X	
Stabilization	Protect indigenous noncombatants	X	X		X	X		X			X
	Eliminate residual threat				X			X			
	Restore order	X	X		X	X		X			X
	Manage refugees	X	X			X		X	X		X
	Train local allies				X	X			X	X	
Recovery	Interact with humanitarian organizations	X	X			X		X	X		X
	Provide protection for humanitarian operations	X	X	X		X			X		X
	Facilitate NGO relief missions	X	X					X			X
Overall conditions	Integrate with local allies	X		X	X	X			X		
	Interoperate with networked expeditionary allies			X	X	X	X	X	X	X	X
	Interoperate with nonnetworked expeditionary allies	X		X	X			X			X
	Operate in complex terrain	X	X	X				X			
	Operate in unimproved terrain	X	X	X				X		X	X
	Operate in urban terrain		X			X	X		X		
	Minimize unwanted destruction		X		X		X		X	X	
	Protect own forces (organic protection)	X	X	X	X	X	X	X	X	X	X
	Sustain operations	X			X			X			X

Definitions of Operational Problems

Deploy rapidly worldwide. Move a complete force package via air transport from a point of debarkation to a point of embarkation in a relatively short period of time.

Insert forces into unimproved areas. Deploy into areas without airfields or supporting infrastructure.

Ascertain enemy capability. Identify enemy equipment and personnel that can be used in combat operations.

Gain information on enemy intent. Collect and evaluate intelligence to help determine future enemy actions.

Detect indication of enemy action. Become aware of warning signs of enemy movement or engagement.

Control a large area (land, sea, air). Prevent the enemy from effectively conducting operations against friendly forces or the civilian populace.

Conduct reconnaissance. Obtain information on the enemy, potential enemy, or the characteristics of a particular area. Reconnaissance consists of deploying collection assets throughout the area of operation.

Find enemy combatants/friendly forces. Locate targets or allies through reconnaissance or other intelligence-gathering means.

Distinguish combatants from noncombatants. Differentiate between hostile and non-hostile individuals and groups.

Conduct strikes against a fixed enemy. Attack non-time-sensitive targets (most likely to be a permanent facility or stationary units).

Conduct strikes on fleeting targets. Attack time-sensitive targets within a limited window of opportunity for success.

Seize critical sites (hostile). Physically occupy and clear sites of all enemy forces.

Secure site. Gain possession of a position or terrain feature, with or without force, and to deploy in a manner that prevents its destruction or loss to enemy action. The force may or may not have to physically occupy the site. The combat characteristics of this task will depend on the presence of an enemy force and the capabilities of the enemy force.

Engage dispersed/concealed forces. Find and destroy enemy forces that are spread throughout the area of operations and hiding in a variety of locations (buildings, caves, tunnels, etc.).

Conduct rescue/evacuation missions. Extract friendly forces or civilians from a hostile area.

Assess battle damage to enemy. Observe the target after engagement to determine the extent of damage.

Protect indigenous noncombatants. Protect noncombatants from harm, especially if hostile forces target them.

Eliminate residual threat. Destroy the die-hard holdouts and remnants of a defeated regime or force or cause them to leave the area of operations.

Restore order. Stop the looting, killing, and rioting. Establish a forceful presence that allows the community to conduct normal business. Assist in establishing government and government services as required.

Manage refugees. Control the flow of refugees to prevent interference with military operations. Establish refugee camps and provide services as required.

Train local allies. Provide a small number of experts to train allied forces in combat and stability operations.

Interact with humanitarian organizations. Coordinate operations and establish liaison between military forces and NGOs.

Provide protection for humanitarian operations. Provide convoy security, distribution point security, and command post security.

Facilitate NGO relief missions. Provide a wide range of assistance to assist NGOs in relief missions. This could include security, liaison with local governments, and provided transportation assets.

Integrate with local allies. Join forces with local allies in accomplishing any mission. Integrating with any ally requires mutual understanding of the operation, cooperation between forces, and clear command and control relationships. This is primarily a human, face-to-face endeavor accomplished through the intense use of liaison officers from all interested parties.

Interoperate with networked expeditionary allies. Conduct military operations with allied forces having networked capability that deploy to the area of operations.

Interoperate with nonnetworked expeditionary allies. Conduct military operations with allied forces that do not possess networked capability that deploy to the area of operations.

Operate in complex terrain. Conduct operations in heavily vegetated, mountainous, or urban terrain. The defining characteristic of complex terrain is difficulty of movement for all forces.

Operate in unimproved terrain. Conduct operations in terrain with nonexistent or immature infrastructure (roads, bridges, airports, ports).

Operate in urban terrain. Conduct operations in cities or built-up areas.

Minimize unwanted destruction. Destroy only what is necessary for accomplishing the task. Protect civilian noncombatants, infrastructure, and buildings.

Protect own forces (organic protection). Prevent the enemy from inflicting damage on friendly forces through both conventional and unconventional means. This requires a good understanding of the enemy capabilities and intent.

Sustain operations. Provide the logistical support necessary for conducting operations indefinitely.

Description of Network-Centric Force Capabilities

Capability	Description
Better Informed	
Gather and fuse higher-quality intelligence	<p>Network-centric (NC) forces can gather and fuse more and higher-quality information about the terrain, the enemy, and the friendly forces. They can collect more intelligence through imagery assets, abundant sensors, and improved optic sights. This intelligence collection provides more data than does intelligence collection by traditional forces, which lack the robust collection assets available to networked forces.</p> <p>The advantage of NC forces is greatest when the intelligence can be collected with technological means, such as satellite imagery, high-resolution photography, long-range observation, signals intelligence (SIGINT), and electronic intelligence (ELINT). However, if the necessary intelligence must be gathered by human intelligence sources (HUMINT) and counterintelligence, networked forces would not have a significant collection advantage over traditional forces.</p>
Allow increased situational awareness through information sharing	<p>Because information can be shared quickly and accurately at all levels, NC forces have a significant advantage over traditional forces in building situational awareness.</p> <p>Understanding the situation correctly allows networked forces to act quickly without specific orders from higher headquarters. The improvement in situational awareness makes forces more flexible and able to change mission without needing an explanation of how the situation is different from what was expected. This advantage is particularly important for time-sensitive missions or unpredictable environments.</p>
Lighter	
Operate with smaller force structure with the same or improved capability	<p>NC forces can accomplish the same mission with fewer forces than traditional forces can or accomplish the mission more efficiently than can traditional units of the same size.</p> <p>The primary advantage of a smaller force is ease of deployment. But a smaller force is at a disadvantage when the mission requires a large number of personnel and is not technology intensive.</p>

Capability	Description
Deploy and move more easily with lighter and faster forces	NC forces are lighter than traditional heavy forces (easier to deploy and move) and faster than traditional light forces (easier to move in the area of operations). Because they are lighter, NC forces also have a significant advantage in countries with an old infrastructure, narrow roads, and complex terrain. NC forces can move in areas that are not trafficable by heavy traditional forces. But they are still restricted by dense vegetation, urban, or mountainous terrain.
Easier to Distribute	
Operate in a dispersed manner	<p>Dispersed operation provides a significant advantage for securing multiple sites in the area of operation, protecting the force from any WMD threat and positioning limited forces to respond to changing threats.</p> <p>Dispersed forces can move through complex terrain using a variety of routes unavailable to traditional forces. The disadvantage is that they are not so visible if the presence of forces is needed to send a message. They are also more difficult to sustain.</p>
Integrate with other forces for coordination or access to inorganic resources	The high level of integration among battlefield operating systems allows an NC force to mass effects without massing the units. NC forces can utilize fire support and logistics resources that are not organic to their unit, allowing a smaller unit to accomplish the same mission as a larger traditional unit by massing additional effects.
More Flexible	
Conduct simultaneous operations	NC forces can conduct a variety of missions under the command and control of a single headquarters. The situational awareness and speed of information flow allows subordinate units to accomplish different missions while keeping the higher headquarters informed. Traditional forces rely on voice communications and manual battle tracking, making it more difficult to manage a variety of missions.
Adapt easily to a change of mission or situation	The ease of information collection and information sharing allows units to change the mission or adapt to a changing situation faster than traditional forces.
More Precise	
Use precision effects with accuracy	NC forces hit what they shoot at and nothing else.
Use appropriate force	NC forces can use the appropriate weapon system to ensure the best effort at minimizing destruction while achieving the desired weapon effect.

Scenario-Specific Analytical Results

		Informed		Light		Distributed		Flexible		Precise
		Gather and fuse higher-quality intelligence	Allow increased situational awareness through information sharing	Operate with smaller force structure having same or improved capability	Promote ease of deployment and movement with lighter and faster forces	Operate in a dispersed manner	Integrate with other forces for coordination or access to inorganic resources	Conduct simultaneous operations under a single headquarters	Adapt easily to a change of mission or situation	Use precision munitions and effects
Operational Phase	Operational Problem									
Deployment	Deploy rapidly worldwide									
	Insert forces into unimproved areas									
Engagement	Ascertain enemy capability									
	Gain information on enemy intent									
	Detect indication of enemy action									
	Conduct reconnaissance									
	Find enemy combatants/friendly forces									
	Distinguish combatants from noncombatants									
	Conduct strikes on fleeting targets									
	Secure site									
	Engage dispersed/concealed forces									
Conduct rescue/evacuation missions										
Stabilization	Protect indigenous noncombatants									
	Restore order									
	Manage refugees									
Recovery	Interact with humanitarian organizations									
	Provide protection for humanitarian operations									
	Facilitate NGO relief missions									
Overall Conditions	Integrate with local allies									
	Interoperate with nonnetworked expeditionary allies									
	Operate in complex terrain									
	Operate in unimproved terrain									
	Protect own forces (organic protection)									
Sustain operations										



Cuban Transition

		Informed		Light		Distributed		Flexible		Precise	
Operational Phase	Operational Problem	Gather and fuse higher-quality intelligence	Allow increased situational awareness through information sharing	Operate with smaller force structure having same or improved capability	Promote ease of deployment and movement with lighter and faster forces	Operate in a dispersed manner	Integrate with other forces for coordination or access to inorganic resources	Conduct simultaneous operations under a single headquarters	Adapt easily to a change of mission or situation	Use precision munitions and effects	
Deployment	Deploy rapidly worldwide										
Engagement	Ascertain enemy capability										
	Gain information on enemy intent										
	Control large area (land, sea, air)										
	Conduct reconnaissance										
	Find enemy combatants/friendly forces										
	Distinguish combatants from noncombatants										
	Conduct strikes on fleeting targets										
	Seize critical sites (hostile)										
	Secure site										
	Engage dispersed/concealed forces										
Conduct rescue/evacuation missions											
Stabilization	Protect indigenous noncombatants										
	Manage refugees										
Recovery	Interact with humanitarian organizations										
	Provide protection for humanitarian operations										
	Facilitate NGO relief missions										
Overall Conditions	Operate in complex terrain										
	Operate in unimproved terrain										
	Operate in urban terrain										
	Minimize unwanted destruction										
	Protect own forces (organic protection)										

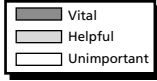
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Unrest in the Gulf

		Informed		Light		Distributed		Flexible		Precise	
Operational Phase	Operational Problem	Gather and fuse higher-quality intelligence	Allow increased situational awareness through information sharing	Operate with smaller force structure having same or improved capability	Promote ease of deployment and movement with lighter and faster forces	Operate in a dispersed manner	Integrate with other forces for coordination or access to inorganic resources	Conduct simultaneous operations under a single headquarters	Adapt easily to a change of mission or situation	Use precision munitions and effects	
Deployment	Insert forces into unimproved areas										
Engagement	Ascertain enemy capability										
	Gain information on enemy intent										
	Detect indication of enemy action										
	Control large area (land, sea, air)										
	Conduct reconnaissance										
	Find enemy combatants/friendly forces										
	Distinguish combatants from noncombatants										
	Conduct strikes on fixed enemy										
	Seize critical sites (hostile)										
	Engage dispersed/concealed forces										
	Assess battle damage to enemy										
Stabilization	Protect indigenous noncombatants										
	Eliminate residual threat										
	Restore order										
Overall Conditions	Train local allies										
	Integrate with local allies										
	Interoperate with networked expeditionary allies										
	Interoperate with nonnetworked expeditionary allies										
	Minimize unwanted destruction										
Protect own forces (organic protection)											
Sustain operations											

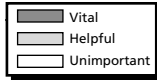
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Georgian Hostages

Operational Phase		Operational Problem		Informed	Light	Distributed	Flexible	Precise		
		Gather and fuse higher-quality intelligence	Allow increased situational awareness through information sharing	Operate with smaller force structure having same or improved capability	Promote ease of deployment and movement with lighter and faster forces	Operate in a dispersed manner	Integrate with other forces for coordination or access to inorganic resources	Conduct simultaneous operations under a single headquarters	Adapt easily to a change of mission or situation	Use precision munitions and effects
Deployment	Deploy rapidly worldwide									
	Insert into unimproved areas									
Engagement	Ascertain enemy capability									
	Gain information on enemy intent									
	Detect indication of enemy action									
	Conduct reconnaissance									
	Find enemy combatants/friendly forces									
	Distinguish combatants from noncombatants									
	Conduct strikes on fixed enemy									
	Seize critical sites (hostile)									
	Secure site									
	Conduct rescue/evacuation missions									
	Assess battle damage to enemy									
Recovery	Provide protection for humanitarian operations									
Overall Conditions	Integrate with local allies									
	Interoperate with networked expeditionary allies									
	Interoperate with nonnetworked expeditionary allies									
	Operate in complex terrain									
	Operate in unimproved terrain									
	Protect own forces (organic protection)									
	Sustain operations									

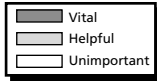
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Indonesian Uprising

Operational Phase		Operational Problem		Informed	Light	Distributed	Flexible	Precise		
		Gather and fuse higher-quality intelligence	Allow increased situational awareness through information sharing	Operate with smaller force structure having same or improved capability	Promote ease of deployment and movement with lighter and faster forces	Operate in a dispersed manner	Integrate with other forces for coordination or access to inorganic resources	Conduct simultaneous operations under a single headquarters	Adapt easily to a change of mission or situation	Use precision munitions and effects
Engagement	Ascertain enemy capability									
	Gain information on enemy intent									
	Detect indication of enemy action									
	Control large area (land, sea, air)									
	Conduct reconnaissance									
	Find enemy combatants/friendly forces									
	Distinguish combatants from noncombatants									
	Conduct strikes on fleeting targets									
	Secure site									
Stabilization	Protect indigenous noncombatants									
	Restore order									
	Manage refugees									
	Train local allies									
Recovery	Interact with humanitarian organizations									
Overall Conditions	Integrate with local allies									
	Interoperate with networked expeditionary allies									
	Operate in urban terrain									
	Minimize unwanted destruction									
	Protect own forces (organic protection)									

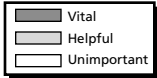
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Failed City

		Informed		Light		Distributed		Flexible		Precise	
		Gather and fuse higher-quality intelligence	Allow increased situational awareness through information sharing	Operate with smaller force structure having same or improved capability	Promote ease of deployment and movement with lighter and faster forces	Operate in a dispersed manner	Integrate with other forces for coordination or access to inorganic resources	Conduct simultaneous operations under a single headquarters	Adapt easily to a change of mission or situation	Use precision munitions and effects	
Operational Phase	Operational Problem										
Deployment	Deploy rapidly worldwide										
Engagement	Ascertain enemy capability										
	Gain information on enemy intent										
	Detect indication of enemy action										
	Control large area (land, sea, air)										
	Conduct reconnaissance										
	Find enemy combatants/friendly forces										
	Distinguish combatant from noncombatants										
	Conduct strikes on fixed enemy										
	Secure site										
	Assess battle damage to enemy										
Overall Conditions	Integrate with local allies										
	Interoperate with networked expeditionary allies										
	Operate in urban terrain										
	Protect own forces (organic protection)										

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Korean Pacification

		Informed		Light		Distributed		Flexible		Precise	
		Gather and fuse higher-quality intelligence	Allow increased situational awareness through information sharing	Operate with smaller force structure having same or improved capability	Promote ease of deployment and movement with lighter and faster forces	Operate in a dispersed manner	Integrate with other forces for coordination or access to inorganic resources	Conduct simultaneous operations under a single headquarters	Adapt easily to a change of mission or situation	Use precision munitions and effects	
Operational Phase	Operational Problem										
Deployment	Deploy rapidly worldwide										
	Insert forces into unimproved areas										
Engagement	Ascertain enemy capability										
	Gain information on enemy intent										
	Detect indication of enemy action										
	Control large area (land, sea, air)										
	Conduct reconnaissance										
	Find enemy combatants/friendly forces										
	Distinguish combatants from noncombatants										
	Conduct strikes on fixed enemy										
	Conduct strikes on fleeting targets										
	Seize critical sites (hostile)										
Stabilization	Engage dispersed/concealed forces										
	Assess battle damage to enemy										
	Protect indigenous noncombatants										
	Eliminate residual threat										
Recovery	Restore order										
	Manage refugees										
	Interact with humanitarian organizations										
Recovery	Facilitate NGO relief missions										
Overall Conditions	Integrate with local allies										
	Interoperate with networked expeditionary allies										
	Interoperate with non-networked expeditionary allies										
	Operate in complex terrain										
	Operate in unimproved terrain										
	Protect own forces (organic protection)										
	Sustain operations										

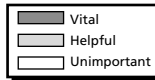
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Palestinian State

Operational Phase	Operational Problem	Informed		Light		Distributed		Flexible		Precise
		Gather and fuse higher-quality intelligence	Allow increased situational awareness through information sharing	Operate with smaller force structure having same or improved capability	Promote ease of deployment and movement with lighter and faster forces	Operate in a dispersed manner	Integrate with other forces for coordination or access to inorganic resources	Conduct simultaneous operations under a single headquarters	Adapt easily to a change of mission or situation	Use precision munitions and effects
Engagement	Ascertain enemy capability									
	Gain information on enemy intent									
	Detect indication of enemy action									
	Conduct reconnaissance									
	Find enemy combatants/friendly forces									
	Distinguish combatants from noncombatants									
	Conduct strikes on fixed enemy									
	Secure site									
	Assess battle damage to enemy									
Stabilization	Manage refugees									
	Train local allies									
Recovery	Interact with humanitarian organizations									
	Provide protection for humanitarian operations									
Overall Conditions	Integrate with local allies									
	Interoperate with networked expeditionary allies									
	Operate in urban terrain									
	Minimize unwanted destruction									
	Protect own forces (organic protection)									

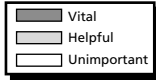
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Yemen Antiterrorism

Operational Phase	Operational Problem	Informed		Light		Distributed		Flexible		Precise
		Gather and fuse higher-quality intelligence	Allow increased situational awareness through information sharing	Operate with smaller force structure having same or improved capability	Promote ease of deployment and movement with lighter and faster forces	Operate in a dispersed manner	Integrate with other forces for coordination or access to inorganic resources	Conduct simultaneous operations under a single headquarters	Adapt easily to a change of mission or situation	Use precision munitions and effects
Deployment	Deploy rapidly worldwide									
Engagement	Ascertain enemy capability									
	Gain information on enemy intent									
	Conduct reconnaissance									
	Find enemy combatants/friendly forces									
	Distinguish combatants from noncombatants									
	Conduct strikes on fixed enemy									
	Conduct strikes on fleeting targets									
	Engage dispersed/concealed forces									
	Assess battle damage to enemy									
Stabilization	Train local allies									
Recovery	Facilitate NGO relief missions									
Overall Conditions	Interoperate with networked expeditionary allies									
	Operate in unimproved terrain									
	Protect own forces (organic protection)									

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Zimbabwe Collapse

		Informed		Light		Distributed		Flexible		Precise	
Operational Phase	Operational Problem	Gather and fuse higher-quality intelligence	Allow increased situational awareness through information sharing	Operate with smaller force structure having same or improved capability	Promote ease of deployment and movement with lighter and faster forces	Operate in a dispersed manner	Integrate with other forces for coordination or access to inorganic resources	Conduct simultaneous operations under a single headquarters	Adapt easily to a change of mission or situation	Use precision munitions and effects	
Deployment	Deploy rapidly worldwide										
	Insert forces into unimproved areas										
Engagement	Ascertain enemy capability										
	Control large area (land, sea, air)										
	Conduct reconnaissance										
	Find enemy combatants/friendly forces										
	Distinguish combatants from noncombatants										
	Conduct strikes on fleeting targets										
	Secure site										
	Engage dispersed/concealed forces										
Conduct rescue/evacuation missions											
Stabilization	Protect indigenous noncombatants										
	Restore order										
	Manage refugees										
Recovery	Interact with humanitarian organizations										
	Provide protection for humanitarian operations										
	Facilitate NGO relief missions										
Overall Conditions	Interoperate with networked expeditionary allies										
	Interoperate with nonnetworked expeditionary allies										
	Operate in unimproved terrain										
	Protect own forces (organic protection)										
	Sustain operations										

Further Reading

- Alberts, David S. *Command and Control in Peace Operations*. Washington, DC: National Defense University Press, 1995.
- Alberts, David S. *Information Age Transformation: Getting to a 21st Century Military*. Washington, DC: U.S. Department of Defense, 2002.
- Alberts, David S., John J. Garstka, and Frederick P. Stein. *Network Centric Warfare: Developing and Leveraging Information Superiority*. Washington, DC: National Defense University Press, 1999.
- Alberts, David S., and Richard E. Hayes. *Power to the Edge: Command... Control... in the Information Age*. Washington, DC: CCRP Publication Series, 2003.
- Boling, James L. "Rapid Decisive Operations: The Emperor's New Clothes of Modern Warfare." *Chairman of the Joint Chiefs' of Staff Strategic Essay Competition*, 2002.
- Cebrowski, Vice Admiral Arthur K., USN, and John J. Garstka. "Network Centric Warfare: Its Origin and Future." *Proceedings of the Naval Institute*, Vol. 124, No. 1 (January 1998), pp. 28–35.
- Hundley, Richard O. *Past Revolutions, Future Transformations: What Can the History of Revolutions in Military Affairs Tell Us About Transforming the U.S. Military?* Santa Monica, CA: RAND Corporation, MR-1029-DARPA, 1999.
- Libicki, Martin C. *What Is Information Warfare?* Washington, DC: National Defense University Press, 1995.
- Maurer, Martha. *Coalition Command and Control: Key Considerations*. Washington, DC: National Defense University Press, 1994.
- Murray, Williamson, ed. *Army Transformation: A View from the U.S. Army War College*. Carlisle Barracks, PA: Strategic Studies Institute, 2001.
- Ochmanek, David A., Edward R. Harshberger, David E. Thaler, and Glenn A. Kent. *To Find, and Not to Yield: How Advances in Information and Firepower Can Transform Theater Warfare*. Santa Monica, CA: RAND Corporation, MR-958-AF, 1998.
- Smith, Edward A. *Effects Based Operations: Applying Network Centric Warfare in Peace, Crisis, and War*. Washington DC: CCRP Publication Series, 2003.
- U.S. Army. *The Army in 2020*. Arlington, VA: US Army Objective Force Task Force, 2003.
- U.S. Army. *United States Army Transformation Roadmap 2003*. Washington, DC: Headquarters, U.S. Army, 2003.