Meeting the Challenge of International Peace Operations: Assessing the Contribution of Technology

Alex Gliksman, Editor

Proceedings of a conference held in Livermore, California September 9-10, 1996

June 1998

Center for Global Security Research

Lawrence Livermore National Laboratory
University of California, Livermore, California 94551
The Center for Global Security Research (CGSR) was established at Lawrence Livermore National Laboratory (LLNL), Livermore, CA, in 1996. CGSR helps to enhance global security through analyzing and understanding the factors that could lead to reducing the threat associated with weapons of mass destruction and other advanced weapon types. Primary emphasis is on bridging the gap between the technology and policy communities by evaluating how technology can enhance the international security framework. Broad international participation is encouraged, and term assignments to the CGSR are available. CGSR develops its research programs through "calls for proposals." Successful applicants will be given a term assignment to the CGSR for the period required to perform the work.

Specific objectives of the CGSR are:

- To provide the United States and international agencies with detailed analysis of the technical options associated with effective management, control, and reduction of the threat arising from weapons of mass destruction and other advanced weapon types.
- To provide an integrating mechanism for the multidisciplinary and diverse arms control and nonproliferation study activities at LLNL.
- To provide an outreach to campuses and other academic institutions, industry, government, and international organizations.
- To provide a forum for training/discussion of international security issues among diverse communities.

For information about CGSR and "calls for proposals," please contact the CGSR Director at:

Center for Global Security Research
Lawrence Livermore National Laboratory
P.O. Box 808, L-189
Livermore, California 94551
USA
Phone: (510) 422-6141
FAX: (510) 422-5252
Internet home page: http://www.llnl.gov/nai/cgsr.html

The Center for Nonproliferation Studies (CNS) at the Monterey Institute of International Studies addresses the international proliferation of nuclear, missile, biological, chemical, and advanced conventional weapons technologies. Established in 1989, the CNS provides research tools, analysis, training, and education on nonproliferation issues to scholars and policymakers around the world. The Center currently has a staff of 35 full-time and more than 40 part-time personnel, making it the largest nongovernmental program in the United States devoted exclusively to research and training on nonproliferation issues.

The Chemical and Biological Weapons (CBW) Nonproliferation Project at the CNS monitors the proliferation of chemical and biological weapons and develops strategies for halting and reversing their spread. The project emphasizes "demand-side" approaches to CBW nonproliferation: efforts, such as global arms control regimes and regional confidence-building measures, to change the incentive structure of proliferators so that they no longer seek these weapons. Current research activities cover three areas: (1) monitoring compliance with the Biological Weapons Convention; (2) overcoming obstacles to chemical disarmament in Russia; and (3) assessing motivations for acquisition of CBW by states and terrorist groups.

For information about the CBW Nonproliferation Project and the CNS, please contact:

Chemical and Biological Weapons Nonproliferation Project
Center for Nonproliferation Studies
Monterey Institute of International Studies
425 Van Buren Street
Monterey, California 93940
USA
Phone: (408) 647-4154
FAX: (408) 647-3519
e-mail: CNS@miis.edu
Internet home page: http://cns.miis.edu
Meeting the Challenge of International Peace Operations: Assessing the Contribution of Technology

Conference Proceedings

Alex Gliksman, Editor
DISCLAIMER

This document was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor the University of California nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or the University of California. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or the University of California, and shall not be used for advertising or product endorsement purposes.

Work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract W-7405-ENG-48.
Contents

Editor's Overview
  Chapter 1. The Challenge of International Peace Operations:
  Assessing the Contribution of Technology ........................................ 1
  Alex Glikman

Part I: Operational Challenges—Lessons from Recent Experience

Peacekeeping and Peace Monitoring
  Chapter 2. Overview of Challenges in Recent Peace Operations ............. 19
  Dr. Mats Berdal
  Chapter 3. Lebanon and the Nordic Experience in Peacekeeping ............ 31
  Major General Trond Furuhovde

Extended Peacekeeping/Peace Enforcement
  Chapter 4. Peacekeeping and Peace Enforcement: Can
  Technology Help?—Lessons From UNOSOM II .................................. 41
  Admiral Jonathan T. Howe
  Chapter 5. The Challenge of Bosnia—The IFOR Experience ................... 53
  Rear Admiral Brian Goodson

Humanitarian Relief and Post-Conflict Reconstruction
  Chapter 6. Complex Emergencies in Africa in the 1990s:
  The Role of Technology ................................................................. 61
  William J. Garvelink
  Chapter 7. The Challenge of Integrating Civilians
  and the Military in Peace Support Operations ................................... 71
  Dr. M.G.D. Evans
  Chapter 8. Reflections on a Post-Conflict World ................................. 83
  Frederick M. Burkle, Jr., M.D.

The Role of Regional and Emerging Powers
  Chapter 9. A Commander’s Perspective on the Role of the Developing States
  in Peace Operations ............................................................................. 87
  Lt. Gen. Satish Nambiar
  Chapter 10. Regionalism, Peacekeeping, and Australia’s Experience ........ 97
  Ambassador David Reese
Part II: Role and Relevance of Technology

Key Technologies

Chapter 11. Overview of Key Technologies for Peace Operations ........................... 107
   Dr. Anthony Fainberg and Dr. Xavier Maruyama

Chapter 12. Unattended Ground Sensor Technology ............................................. 135
   David A. Fuess

Chapter 13. Counter-Sniper Technology .............................................................. 143
   John Miller and John S. Eicke

Chapter 14. Landmines, Peacekeeping, and Technology ................................. 153
   Colonel Daniel H. Layton

Challenges of Insertion and Application

Chapter 15. Technology Insertion in Peace Operations ................................. 159
   Richard E. Hayes, Ph.D.

Chapter 16. A Japanese Perspective on Peacekeeping and Technology .............. 169
   Toshio Kunikata

Chapter 17. Commentary on Nonlethal Weapons in Peace Support Operations ...... 173
   Colonel Sebastian J. L. Roberts

Part III: Managing the Process

Chapter 18. Managing the Process: A View from the White House ....................... 177
   Eric Schwartz

Appendix I: List of Participants ............................................................................... 181

Appendix II: List of Acronyms ............................................................................. 185
Editor’s Overview
The Challenge of International Peace Operations: Assessing the Contribution of Technology Conference Summary

Alex Gliksman*

Background

Peace operations, broadly defined, have emerged as key to redressing threats to global security and stability in the post Cold War era. Unless means are found to enhance the effectiveness, reduce the risks, and limit the costs of peacekeeping, peace enforcement, and disaster-relief operations, calls for aid and intervention in response to conflict and man-made and natural disasters will increasingly go unheeded. Reluctance to intercede in foreign crises is already pronounced, at the very time that demands for global action continue to grow.

Combined with diplomacy, appropriate doctrine, and tactics, technology can be a tool for enhancing the responsiveness of peace operations while mitigating their associated liabilities.

Given the importance of peace operations to international security, the Center for Global Security Research (CGSR) at the Lawrence Livermore National Laboratory (LLNL) chose to examine the role of technology in peace operations as the subject of its inaugural conference. To thoroughly address the subject, the Center assembled an international panel of peace-operations practitioners, policy-makers, and technologists in Livermore, California.

The panel included senior military commanders and senior civilian directors active in several recent or ongoing operations, notably in Bosnia (both the United Nations and NATO operations), Somalia, Lebanon, Rwanda-Zaire, Northern Iraq, and the Sinai. Technologists on the panel were drawn from Department of Energy Defense Program laboratories, the Department of Defense, Defense Service laboratories, the Department of State, former staff of the Congressional Office of Technology Assessment, and the United Kingdom Ministry of Defence. Senior officials with responsibility for policy, program direction, and acquisition priorities in the National Security Council, the Department of Defense, and the United States Congress were also included. Foreign officials charged with similar responsibilities participated, including representatives from the Prime Minister’s Office in Japan and the British Foreign and Commonwealth Office. A complete list of participants is included at the end of this volume (Appendix I).

* Alex Gliksman, an LLNL consultant, has served on the staffs of the House Intelligence Committee and the Senate Foreign Relations Committee.
To focus conference deliberations, the panel concentrated on four key issues:

- A review of the unique challenges presented by recent and ongoing operations.
- An examination of how available and emerging technology can help address the challenges.
- An assessment of the obstacles to the introduction of technology into peace operations.
- An assessment of the operational challenges that warranted top priority in technology development and funding by governments, international organizations, and foundations.

What follows is a conference summary. In an effort to derive the maximum value from the meeting, and to give readers a flavor of the discussions, this summary identifies observations that appeared to have the broad endorsement of panelists. Issues on which a significant divergence of opinion was evident are also noted. Readers should be aware that there was no attempt to formally poll panel members on their views. Accordingly, responsibility for this summary rests with the editor.

Readers are also advised that this summary is intended to complement and not substitute for a reading of the papers presented during the meeting; they constitute the heart of this volume.

The Contribution of Technology

The panel recognized that technology is not a panacea in addressing the challenges of contemporary peace operations. Panelists noted that technology cannot:

- Substitute for good political judgment.
- Make up for solid advanced mission planning and execution.
- Eliminate the need for sound military doctrine, tactics, and training.
- Provide contributing states with the will to act.
- Give belligerents the wisdom to compromise.

The panel agreed that technology can provide powerful tools in supporting these requirements and in addressing the wide variety of tasks that are critical to the success of peace operations. More specifically, technology can be a vital element in:

- Mission analysis and planning—assisting civilian and military leaders in making decisions about the commitment of personnel and other resources, especially in ensuring that, if commitments are made, the resources and capabilities provided are a match to the operational challenges.
- Training and simulation—providing troops and other operators the knowledge and know-how needed to perform key operations tasks; leveling the field between contributors from the developing and the developed world; and allowing civilian and military staffs from diverse nations and organizations to learn to work in collaboration by enhancing mutual understanding and addressing potential sources of friction.
- Force protection—limiting the risk of casualties to troops and civilians in situations in which casualties are not tolerated, including by providing sensors to warn troops of danger, counter-sniper systems to locate and respond to attacks, and systems to counter landmines.
- Mitigating violence—furnishing options for dealing with belligerents who are ready to use civilians as cover, including less-than-lethal weapons that could offer troops alternatives to killing or being killed in responding to hostility.
- Operational enhancement—serving as a force multiplier in the conduct of key mission tasks—including the
use of sensors in lieu of additional troops for border monitoring and perimeter defense—and as a force "augmenter" that can increase mission efficiency in situations in which the presence of troops in credible numbers continues to matter.

- Situational awareness—providing timely intelligence needed to intervene where and when needed, and to keep the peace and prevent incidents from escalating, including through the provision of airborne and ground sensors and operation-wide communications links—bridging all military and civilian operation components and connecting operators to the population(s) they seek to serve.

- Operational mobility—permitting the free and timely movement of troops, aid-givers, relief supplies, and noncombatants, including by the provision of enhanced materials to protect troops and transports, and to detect and remove mines.

- Emergency relief and reconstruction—providing means for timely delivery of aid to stressed populations, and furnishing the infrastructure necessary to sustain life during a crisis and begin reconstruction for the long term, including through the provision of food, clean water, shelter, power generation, and demining capabilities.

- Demining—providing tools for mitigating a threat that spans the entire spectrum of peace operations, including many of the mission-critical activities listed above. Landmines were singled out by the panel as the greatest challenge to peace operations in which advances in technology can have a dramatic impact.

- Media and public information—providing capabilities to educate local populations and to counter disinformation in a world in which the majority of the population relies on radio and television for news and guidance.

The panel cautioned that, to achieve its full potential in peace operations, technology must be:

- Affordable—to produce, operate, and maintain.
- Available—not just on the drawing board.
- Interoperable—particularly for communications.
- Reliable—especially in stressful operating environments.
- Simple—to operate and repair.
- Sharable—accessible to all contributors to international peace operations.

The Broad Trends—What Is New About Peace Operations

Panelists noted several new developments that have made contemporary peace operations distinctly different and, in many cases, far more demanding and dangerous than was true in the past. The tempo of peace interventions/engagements has grown—and dramatically so. The United Nations launched 13 operations between 1948 and 1987. In the decade since, more than 20 operations have been launched. The number of contributing countries has grown threefold. The number of troops deployed in missions has increased more than fivefold from 9,500 in 1988.

Statistics are only part of the story. Peacekeeping is now only one element in a wider constellation of activities that includes not only truce monitoring and military disarmament but also preventive diplomacy, peace enforcement, and the provision of aid in response to natural and man-made disasters.

The military forces of nations not traditionally involved in peacekeeping find themselves caught up in these developments. In many instances, they are now the
backbone of these operations. The United States stands out in this regard. The increasing risk of violence associated with intervention and the resort to peace enforcement to defend against such risk is one feature that underpins this shift. Another is the globe-spanning nature of these operations. The result is a reliance on the few counties with capabilities to operate globally. The conventionally oriented US military is now routinely called upon to support and/or lead nontraditional missions that previously fell to others, such as disaster relief, election monitoring, and refugee aid.1

Disaster-relief operations have taken on a new character, involving unstable situations that pose grave risks to aid-givers.2 The name “complex emergencies” best captures their nature. In past decades, aid-givers and the aid they provided were treated as sacrosanct. Today, humanitarian assistance is a target. Targeting aid-givers and aid has become a means to get rich and gain power. The result has led to a new focus on safety and the acquisition of security services for aid providers. It has also given birth to a necessary collaboration between humanitarian agencies and the military. Moreover, these emergencies are taking place in “failed states” that often lack the organization and infrastructure needed to receive and distribute aid on their own. This adds further to the burden of these missions.

Of necessity, peace operations have also come to include reconstruction and other infrastructure building programs. These are seen as essential to the amelioration of the root causes of conflict or other emergencies. Officials and experts have come to believe that unless programs to restore a country’s ability to provide for itself exist, intervention—whether by truce monitors, peace enforcers, or aid-givers—will provide little more than a temporary respite from the crisis.

From this perspective, peacekeepers/peace enforcers are analogous to a paperweight. Unless the period of intervention is used to begin addressing underlying problems—such as a shortage of arable land, scarce drinking water, or the lack of power generation—the paper will start to fly once the peace force is lifted and the first ill wind blows. The analogy applies not only to military-oriented operations designed to contain conflict—the NATO Bosnia operation is a current example—but also to complex emergencies that are dominated by the delivery of humanitarian services—the aid missions to the Zaire-Rwanda border and to Northern Iraq are examples.3

A foreign military officer on the panel took exception to the assessment that the military challenges of contemporary peace operations are truly different from those faced in the past. He noted his own experience in Africa in the 1970s while assigned to a small, lightly armed contingent that intervened between opposing forces in a civil war to facilitate a handover of power. While such operations and the risk they entail may be new to the United States, he thought them to be familiar to the United Kingdom, France, and others. Though “the technology [available to deal with the challenges] is new, the issues are not new,” he added.4 A commander reminded the panel that UN peacekeeping has long been thrust into the midst of deadly conflict. This has provided nations such as India with insights on armed operations. The reservoir of past experience needs to be tapped both to evaluate the appropriateness of existing technology and to develop doctrine for new technology before it is sent to the field.

Peace Operations: The Link Between Peacekeeping, Peace Enforcement, Humanitarian Emergencies, and Post-Crisis Reconstruction

Panelists agreed that it now makes sense to group peacekeeping, peace enforcement, complex emergencies, and reconstruction
under the single heading of peace operations, because these situations include common elements. They present similar, if not identical, challenges and their remedy often involves similar organizations, disciplines, and tools, including technology. Landmines exemplify the kind of problem that spans the entire range of peace operations. Recent changes in the operational climate—notably the rise of violence—provide further reason to group these activities. As aid and aid-givers have come to face threats to their safety and require protection, humanitarian assistance operations have acquired a security component common to other forms of peace operations.

A growing belief, noted by panelists, that reconstruction programs must be integral to the success of the various kinds of peace operations is another development that binds these activities. In complex emergencies, reconstruction/rehabilitation is seen by panelists as key to a strategy for avoiding long-term aid dependence. Panelists recognized a similar linkage between post-conflict reconstruction and the more militarily oriented operations—peacekeeping and peace enforcement. In this view, reconstruction is an essential ingredient in healing the wounds that cause and sustain conflict. This makes a post-conflict reconstruction plan a sine qua non of an effective military exit strategy. Reconstruction initiatives by the nations engaged in Bosnia are reflective of the importance now attached to this aspect of peace operations.

Military involvement in the entire range of peace operations is another common denominator. This involvement is growing—and not for security reasons alone, as has been noted. Armed forces are often the only institutions with the logistics to deliver supplies, and the technology and organization to rapidly create essential infrastructure in areas where it has ceased to function or never existed in the first place, including for communications, health services, water supply, and transportation projects.

Even those who were initially skeptical about treating this diverse set of missions—from peacekeeping to reconstruction—as a single discipline left the conference endorsing the logic of this approach. Toward the end of deliberations, a panelist admitted that he arrived at the conference doubting the wisdom of grouping these activities together, but he was swayed by the evidence and arguments presented at the conference to revise his view.

Traditional Peacekeeping

I The Operational Challenge of “Peacekeeping in an Enforcement Environment”

The proliferation of weapons, and related technology and expertise, has accelerated the pace of conflict and increased the level of violence and danger now faced by traditional peacekeepers. In the words of one participant, peacekeeping is no longer characterized by “a few blue helmets standing in a tower” and sending back reports. As the situation on the ground has become more unstable, peacekeepers cannot remain a safe distance from events if they are to have an impact.

The peacekeeper mission rests on the ability to “be there,” as one commander termed it, and intercede with observers in potentially volatile situations. Traditional peacekeepers arrive in areas of conflict carrying light arms and employing tactics that place them directly in harm’s way. By intervening in disputes, peacekeepers seek to prevent disputes from escalating into battle. Where fighting has erupted, peacekeepers have inserted themselves in the midst of the fray to serve as witnesses—in a sense becoming the eyes of the world—to any outrage. Their goal is to slow, if not stop, the tempo of violence and, in particular, to shield innocent inhabitants from harm. The peacekeepers’ effectiveness hinges largely on their impartial standing with all sides
to the conflict. Reports to the media that cast unfavorable light on belligerent misdeeds are perhaps the most potent weapon in the peacekeepers’ arsenal. The experience of the UN force in Lebanon is illustrative of the challenges faced by a lightly armed peace force.5

Conference discussions revealed that contributing forces to traditional peacekeeping is a task not suited to all countries. To be accepted as impartial by all factions and to avoid becoming a target themselves, peacekeepers typically come from countries that are viewed as having no direct stake in promoting any particular group or outcome. They must be seen as implicitly neutral—without ideological or geostrategic interests. In this regard, a panelist noted that as originally envisaged, members of the UN Security Council were to be excluded from participation in peacekeeping missions. This is also intended to reduce the risk of conflicts of interest when the Security Council writes UN operation mandates. Kept within these parameters, traditional peacekeeping remains a valuable tool in redressing many of today’s conflict situations.

### Technology’s Increased Relevance to Peacekeeping

Panelists agreed that technology is becoming more important as the risks of peacekeeping have grown. “Being there” to contain conflict and keep “small incidents from blowing up” requires knowledge of where trouble has already broken out or is about to. Systems for intelligence are “perhaps most important,” to quote one commander, especially as complements to the human contacts that are at the root of effective peacekeeping. Air and ground surveillance radar, and mobile unattended ground multi-sensors (UGSs) that can be easily repositioned around strategic points of concern are invaluable. In responding to time-urgent events, systems with real-time capabilities have special value. Enhancements in night surveillance are essential. Any improvements over the first- and second-generation night-vision goggles currently in the field would be welcomed. High in priorities are systems to facilitate communications with all factions and secure communications capabilities to link commanders at headquarters with field patrols.

Getting to flash points also requires mobility. Mobility involves more than better air and ground transports, though it requires that too. Mine-clearing technology is very important for mobility in places such as Lebanon, where the roads are mined every night. Enhanced demining systems would not only clear the path for the force, but also protect noncombatants from injury.

### Peace Enforcement

#### Conducting High-Risk Operations in a Risk-Averse World

If the level of violence continues to grow, traditional peacekeeping may no longer suffice. This is particularly true for situations in which one or more of the factions to a conflict oppose(s) the operation. When consent is lacking, persuasion alone may cease to work as an instrument for containing conflict.

An anatomy of the problems associated with operating in a hostile environment was presented to the panel in a case study of the United Nations operation in Somalia—an operation that began as humanitarian relief and ended as peace enforcement.6 As the situation on the ground deteriorated, thuggery ruled. Respect for peacekeepers and aid workers ceased to exist. Concerns for safety took center stage—virtually eclipsing the aid effort. In the end, the available resources—both troops and materiel—were inadequate to frustrate attack and to protect UN civilians, international aid workers, the troops, and installations.

Available weapons lacked the capabilities needed to counter opposition tactics, notably the use of crowds that mixed gunmen with civilians to swarm peacekeepers.
When the gunmen fired, soldiers were presented with the untenable choice of firing into the crowd and risking innocents or not responding and risking death. Recriminations and operational disharmony among the civilian and military contingents became pronounced. Some national contingents allegedly cut separate deals with warring factions.

As the mission changed from peacekeeping to enforcement, continued mission effectiveness rested on the adoption of new operating procedures and the resources to back them up. In retrospect, it is clear that the operation's preexisting organization and constellation of contributors were ill-suited to the new requirements. The outcome might have been different if the following had been present:

- A shared understanding of the capabilities and interests of national military contingents and their civilian counterparts.
- Agreed mission goals, rules of engagement (ROEs), responsibilities, and roles of national military contingents.
- Situational awareness—in a word, intelligence (and the communications that accompany it)—to advance a proactive strategy and to avoid surprises—including for "tracking Elvis," as the effort to seize Warlord Aidid came to be known.
- Mobility to resupply and reinforce isolated posts and aid stations.
- The capacity to control, if not deny, thug mobility.
- Tools for dealing with security, criminality, and crowds.
- A sustained capability for aiding the innocent.

### Building a Peace-Enforcement Tool Kit

Technologies that could have made a difference in Somalia are catalogued in the chapter by Admiral Jonathan Howe (Chapter 4). Additional items were identified by other panelists. A short list of relevant systems follows:

- Training tools to provide peacekeepers and aid workers with ground truth, such as CD-ROMs with encyclopedic information on Somali history, politics, culture, religion, geography, and language.
- Simulation systems to promote a shared understanding by participants of the mind-set that each brings to the situation and to advance agreed operational guidelines, including military ROEs. Distributed/interactive simulation is one technology that would allow commanders and their civilian counterparts to establish rapport before arriving in the field.
- Sensors—both airborne and ground-based—to increase situational awareness at both the local and regional levels, especially when complemented by and fused with reports from civilian and military outposts and human intelligence.
- Systems to detect arms caches. These would be invaluable in a disarmament campaign.
- Portal monitors and other devices to detect bombs and concealed weapons.
- Demining capability to increase mobility and protection for troops, aid workers, and noncombatants.
- Secure communications systems to coordinate across the operations community and support military command, control, and intelligence.
- Anti-sniper capabilities to protect troops and high-value targets, such as convoys, throughout the operating area.
- Less-than-lethal weapons to add a middle option between killing or being killed and to reduce the risk of casualties among the innocent.
The Somalia operation and United Nations Protective Force (UNPROFOR) in the Former Yugoslavia have provided lessons on the potential pitfalls inherent in organizing and equipping troops for contingencies involving possible enforcement actions. In launching the Implementation Force (IFOR) that succeeded UNPROFOR in Bosnia, NATO attempted to carefully apply the lessons. Here are some examples. ROEs were proposed and vetted by NATO prior to IFOR deployment. A "Certification Team" was formed to assess the capabilities of non-NATO contributors in advance of deployment. Demining efforts and mine-awareness training were a fixation. In communications, "UK-US interoperability made . . . more progress . . . in the three weeks before deployment than during the 40 years of NATO beforehand."

Less-than-lethal technology was deployed with US forces in Haiti. It was also fielded and used by the Marine Expeditionary Force during the extraction of the last United Nations troops from Somalia. The effect was dramatic. Lasers shined on thugs who were attempting to disrupt the withdrawal, causing them to retreat. Whether the startling effect will wane with repeated use has yet to be determined.

In the discussions, another commander on the panel urged that further effort be devoted to developing technology that will expand the capabilities available for dealing with what he terms "gray-zone" operations—the middle ground between peacekeeping and peace enforcement. A system to locate hostages taken from among unarmed observers, for instance, and effect their release was for him the kind of capability technologists should furnish.

One possible approach: Assuming that intelligence has localized the hostage-takers' hideout, a small radar imaging system, perhaps derived from Lawrence Livermore's micropower impulse radar (MIR), could be used to probe through building walls to determine the precise location of the hostages and hostage-takers. Then, stun grenades or similar devices from the less-than-lethal arsenal could be used to disorient the bandits so that hostages could be freed.

Responding to Complex Emergencies

The Many Facets of Humanitarian Assistance

The term "complex emergencies" has come to serve as shorthand for the unprecedented challenges that now confront aid-givers, and for the new methods that such challenges necessitate in providing humanitarian assistance. Humanitarian relief specialists on the panel enumerated the developments.

First, humanitarian assistance was traditionally delivered with the support of host governments. Since the late 1980s, beginning with the Ethiopian civil war and then in Somalia, aid-givers have increasingly faced situations involving internal strife and the breakdown of government. In response, the aid community has adopted a more assertive posture—delivering aid across borders directly to victims in conflict regions.

Second, the new approach that guides the provision of aid by the assistance community has significantly heightened security risks. In the past, aid-givers often waited for situations to stabilize before they acted. But delay often allowed crises to fester and become long-term aid problems. In the hope of containing disasters, aid providers have adopted a proactive strategy that leads them to intervene early on. One goal is to reach civilians before they abandon their communities—and the systems and structures needed for future self-sufficiency—to become refugees. The new approach routinely places aid organizations in the midst of unrest and leaves them exposed to danger.
Aid and aid-givers have traditionally been treated as inviolate. Operating in a volatile environment has changed this—aid has become a target. Warlords and other thugs in places such as Somalia and Sudan have come to view control of aid as a source of power and profit. The same holds true for Bosnia.

Third, in these circumstances, armed forces are often needed to secure the delivery of aid and give protection to the aid-givers. Moreover, the military is increasingly viewed as an essential component of aid delivery, particularly in providing logistics and transportation. In some cases, direct involvement in the provision of aid and services, such as health care and sanitation, now falls to the military.

These situations have fostered close but not always smooth collaboration between military and civilian elements of various aid-giving governments and international organizations, such as the United Nations High Commission for Refugees. Coordination between various nations’ military components—each with its own language, doctrine, and procedures—is difficult enough, even before adding civilians to the mix. Coordinating the US Government contributions to humanitarian emergencies is a significant challenge in and of itself.\(^\text{10}\)

Fourth, the rise of nongovernmental organizations (NGOs) as central players in the delivery of emergency aid—a major phenomenon in its own right—has compounded the complexity of these operations. Traditionally, only a small number of NGOs—for example, the International Committee of the Red Cross (ICRC) and CARE—responded to humanitarian disasters. But by the mid-1990s, more than 200 NGOs were “tripping over themselves,” as one participant put it, in aiding the Rwandan refugees.

A symbiotic relationship has also developed between a variety of NGO aid-providers and the more official aid components (both military and civilian) representing governments and international organizations. Many NGOs are not accustomed to the coordination and collaborative mission planning and reporting that are typical of government entities and militaries—and that are essential in operations involving massive logistics and security risks. Given the differing orientations and operating styles of each community, these relationships are often tenuous. Each community is often distrustful and ill-informed about the role and capabilities of the others. Tensions can be pronounced.\(^\text{11}\)

The result is disunity. Aid-providers entering disaster areas are a target for local profiteers. Disunity can be exploited to force up the price of goods and services, with the result that less money is available for relief. Disunity also exposes aid-givers to extortion and heightens their exposure to danger.

### Technology to Facilitate Effective Aid Delivery

One practitioner saw an urgent requirement for aerial reconnaissance capabilities. Deficiencies in this area have hindered NGOs and other emergency-aid providers, including relief operations in Zaire. In an emergency, quick aerial survey capabilities are essential to determine where and what kind of assistance is needed most. Because of the lack of access to specialized reconnaissance, aid-providers have had to improvise and use chartered aircraft to conduct inexact surveys. In Zaire, aid-providers were especially in need of data on the number, location, and movement of displaced people. In the view of one operator, the more information that can be gleaned on demographics (such as age distribution) and environment (such as the availability of water), the better the needy can be served. Airborne multi- and/or hyperspectral imaging systems, with associated data-exploitation capabilities, could be developed for this mission.
Systems to Enhance Collaboration

Communications were repeatedly mentioned by panelists as essential for efficient and secure aid delivery. At a minimum, systems should be interoperable. Communications address both coordination and intelligence needs. Here are some examples. Ensuring that security elements are on hand when needed to escort aid convoys—and that available supplies and other resources are distributed where they are needed most—requires coordination as a matter of routine. NGOs working in remote outposts are potentially an operation’s early warning system; they are often an operational headquarters’ only source of time-urgent intelligence about developments in the field. NGOs can use reporting channels to sound an alarm in the event that they are threatened.

Collaborative training in advance of field deployment is extremely desirable, if not essential, for smooth operations, panelists agreed. Technology is critical here. Simulations involving all parties in an operation would help build agreed-upon mission scripts, based on a shared understanding of each group’s interests and approach to aid problems, the resources and capabilities each component can bring to bear, and common definitions of the role(s) each will play. Distributed/interactive simulation—previously mentioned in the context of peace enforcement—would save on the time and cost of travel. It is a way to recruit participants from often understaffed NGOs that otherwise could not afford to spare personnel for exercises.

Even where communications exist, information does not always reach those who need it most. The problem is one of information management, and the US Government suffers from its share of such bottlenecks, as several participants noted. For instance, the Marines sent to withdraw the last units from Somalia did not know the location of relief sites, even though the information had been sent to Washington.

According to one panelist, the problem is not one of insufficient information. With the introduction of the Internet, aid providers are “lost” in the flood of information. A good deal of it comes from the NGO community, which has solidly gone “on line.” As this participation put it, “There is plenty of information; we just don’t know how to deal with it.” The challenge is how to separate out the data that are mission critical. Geographic information systems could address part of this requirement: tracking who is giving what aid, where, and to whom—to avoid overlap and under-coverage. Later in the discussion, another panelist suggested a complementary approach to geolocation that would rely upon global positioning satellite (GPS) technology to automatically report the location of individual soldiers, convoys, and other field elements.

Demining is also a major issue in complex emergencies. Landmines place operations staff in danger and slow the provision of aid. By causing casualties among the local populations, landmines compound the emergency, further stressing the aid operation. As a panelist noted, even injuries to farm animals can have devastating consequences for a family’s survival.

Organization Is as Important as Technology

Several panelists indicated that creating mechanisms/structures to direct and coordinate peace operations complements the full and effective use of technology. Such mechanisms make possible contacts that can cut through the cultural barriers and red tape when working across the diverse communities of operation contributors.

Attempts to create bridges between contributors in recent operations have, through trial and error, led to the creation of several distinct organizational structures, notably
the Civil-Military Operations Center (CMOC). The CMOC is a field office, assigned to an operational headquarters and staffed by liaison officers tasked to coordinate activities of civilian and military operational components, say, arranging for military escorts for aid shipments. Panelists indicated that long-term staffing arrangements were especially important. They promote an understanding of other organizations' missions and create the familiarity needed to lubricate communications.

Another participant noted that communications are key in extending the reach of the liaison mechanism across the field of operation. In the Former Yugoslavia, the On-Site Operations and Coordination Center (OSOCC) was set up with Swedish funding to create a communications infrastructure for operation contributors, using commercial fax and similar off-the-shelf systems. This experiment ended when funds ran out.

Post-Crisis/Post-Conflict Reconstruction

Humanitarian Assistance Means More Than Fast Relief

As has been noted, several participants raised the theme that assistance programs are doomed to failure if they are merely a quick fix. One participant summed up this perspective by noting that, while dealing with immediate suffering is important, the impact will be ephemeral if assistance is limited to the immediate crisis. Accordingly, the “rehabilitation and resilience” of the society must be viewed as integral to an assistance package. For this panelist, this meant undertaking programs of demilitarization and demining, road building, and power generation. Also important is the provision of expertise in rebuilding government and its institutions, particularly the police and judiciary—as these are key to the public safety needed for a return to normalcy. Unless attention is given to these aspects of the situation, the root causes of the emergency will retain a sufficient hold on the society to rekindle disaster.

In this panelist’s view, rebuilding the nation is a health issue, as it provides the needed access to health care—even if it is available. Without public safety and good roads, for instance, health care can be out of reach. The panelist stated that this has been confirmed by studies that find a strong correlation between access to transportation in a society and the state of health of its people.

Infrastructure Technology

The kit required to operate in devastated environments is enormous. The list includes items such as flight control towers, runway- and road-repair equipment, communications networks, medical supplies and personnel, water purification systems, and sanitation facilities. Many of these capabilities have relevance across the spectrum of peace operations.

On the leading edge of “infrastructure technologies,” as one participant termed them, are technologies such as:

- “Telemedicine,” designed to create a data/communications link between doctors and medics in the field and specialists, with access to the latest in diagnostic tools, half a world away.
- A hand-held diagnostic aid, based on LLNL’s MIR technology for field medical triage, under study by the Walter Reed Army Medical Center.
- Advanced packaging concepts—derived from commercial technology—for food, medicine, and other supplies that allow for safe air drops.
- Low-cost water purification using capacitive deionization technology, derived from LLNL defense programs.
Meeting the Challenge of International Peace Operations

12

- Advanced materials for insulating shelters and for generating heat.
- High-efficiency thermoelectric fuel cells.

This is just a short list of the possibilities.

The Military’s Technology Means a Widening Role

Many infrastructure technologies are derived from defense research and are primarily intended for use in traditional military operations. In preparing for future contingencies, military planners must be ready to provide organic support capabilities. They equip and train accordingly. The US military and a few other armed forces with worldwide responsibilities have the extensive capabilities to build logistic lines, security nets, roads, runways, bridges and shelters, and to provide medical assistance and sanitation. They are prepared to remove mines. No other organizations can hope to match these resources, including the expertise to employ them. This makes armed force participation across the spectrum of peace operations essential— including sharing technology with others and training them to use it in operations in which the military is not directly involved.

The Quadrennial Defense Review (QDR), completed since the conference, places preparedness for peace operations high among defense priorities. The military is likely to grow more capable of operating in unprepared environments as it responds to the priority now given to such contingencies. Perhaps reflecting the trend, one panelist noted a recent US Air Force study examining technology needed to sustain air operations from “a bare base.”

A concern for the impact that increased reliance on the military in peace operations could have on its readiness for traditional missions was expressed by some officers on the panel. As a flag officer put it, an overcommitment of military troops to peace operations could “erode their continued capability to undertake high-intensity warfare . . . . Once lost, [these capabilities] would take much time and cost to recover.”

The Role of Regional Powers and Developing Countries in Peace Operations

Regional Approaches

Concern that demands for major-power involvement in all crises will produce intervention fatigue has led some to call for a division of labor between contributing states. Big-power aversion is already evident in such things as the studied detachment some Western countries have adopted to recent crises in Africa, notably in Rwanda and Burundi.

One possible division of labor would assign responsibilities on a regional basis, giving the lion’s share of the duties to countries in or near the troubled neighborhood. Regional powers such as India, Australia, and Nigeria have long contributed to peace operations. These nations have considerable experience, including leadership roles, in places such as Bosnia, Somalia, Liberia, and the South Pacific.

Regional powers offer knowledge and understanding of the local political and cultural environment, the language, and the terrain. Mastery of ground truths is invaluable in mission performance. Close proximity to the action reduces stress on logistic lines. Burdened by financial and organizational difficulties, the United Nations also favors sharing and, occasionally, off-loading operations to regional groupings. The Nigerian-led Economic Community of West African States (ECOWAS) operation in Liberia exemplifies the former, while the NATO Bosnia operation exemplifies the latter.

Many regional powers lack the resources to undertake peace operations.
Accordingly, some initiatives have offered backup in the form of logistics or financial and technical support from the United Nations and/or others. The major powers will likely need to play a support role in transportation, logistics, equipment, and advanced technology services, notably reconnaissance and communications. A 1996 US initiative to launch an Africa Crisis Response Force contained these elements.

The panel was divided on the wisdom of regional approaches to peace operations. First, while countries in the neighborhood of conflict might have an advantage in speaking the language and knowing conditions on the ground, they may be less than even-handed in their approach—in perception, if not in fact. They could thus arrive already compromised and become part of the problem rather than part of its solution. Here, the Nigerian-lead Economic Community of West African States Monitoring Group (ECOMOG) was cited as a case in point. Nigeria was not a disinterested party. Second, because the major power would be left to support operations and foot the bill, panelists see few advantages to this division of labor. In summing up this position, one panelist asserted that, absent outside direction and support, “regionalism [in peacekeeping] does not work.”

Others on the panel found that conclusion too negative. First, while they recognized the problems, they thought that the capabilities of regional states to handle peace operations could be improved. Area expertise and proximity to the crisis should not be discounted—they position regional states for quick response to crises. Second, most regional organizations have to date focused largely on economic, cultural, and related issues. With encouragement, they could change and acquire the necessary operational expertise and capabilities. Organizations such as the Association of Southeast Asian Nations (ASEAN) that previously eschewed security are starting to address the topic—including peacekeeping.

Third, one panelist suggested that there are cases in which regional organizations can resolve security disputes, even when the UN or others cannot. This panelist credited regional intervention with calming conflict on the Ecuador–Peru border.

### Developing Countries

Because many developing states are located in regions of concern, greater reliance on developing countries is a sub-theme of burden-sharing arrangements, including those involving regional proposals. Countries such as India, Pakistan, and Malaysia have long shouldered significant peace-operation duties. As operations grow in number, size, and difficulty, developing countries are likely to be asked to do more. Their capacity to meet the challenge will vary. Some will not be equipped for the mission. For instance, in UNPROFOR the Nepalese arrived without armored personnel carriers and the Egyptians without helmets or flack jackets. Accordingly, a commander urged that readiness to contribute be measured on a country-by-country and case-by-case basis. Some developing states will be up to the task of leading operations in certain contingencies. Others will not be prepared, even for support roles. A capabilities survey taken in advance of an emergency is a way to begin, he added.

In the case of ill-prepared contingents, a decision needs to be made on whether to reject their participation or to bring them up to standard for the tasks they must perform. It is in no one’s interest to involve units that are ill-suited to the mission. Inadequacies create a “complex” that threatens mission cohesion and morale. They can also lead to a need to compensate. UN headquarters in the Former Yugoslavia was at least 30% overstaffed—in part to cover for incompetence.

Technology can help troops from developing regions prepare for future operations. Information—especially
operationally relevant information—can be a rare commodity in developing countries. Training would benefit from the many lessons to be gleaned from past experience—especially if presented in an audiovisual format. Advanced preparation for specific deployments could be enhanced by CD-ROMs or other media presentations of encyclopedic data on a country or region, including detailed maps. Information on religion, culture, and etiquette is especially important to avoid running afoul of local sensitivities. The advantage of using these formats is that they are cheap and easy to produce, and quick to disseminate.

Training videos and perhaps simulations could be used to provide instruction on basic peacekeeping skills, such as manning checkpoints, conducting patrols, surveillance, escort duties, and mine removal. Tools for learning negotiations and mediation methods are also needed.

In the field, developing countries require all equipment appropriate to the effective performance of their duties. This can include the latest technologies. Among those mentioned were sensors—both air and ground—for surveillance, GPS receivers to guide patrols, concealed weapons detectors at checkpoints, and forensic kits to investigate incidents.

Several panelists promoted regional training centers. These would raise the operational competence of all nations in a region. They could help build a core of peace operations specialists for concerted regional action or deployments in operations beyond the region. The process of creating training centers is well under way in Africa, where nations including South Africa and Ghana have come to recognize that they lack the doctrine, discipline, and training required to deal with their continent’s endemic problems. Regional “Centers of Excellence” in peacekeeping are designed to correct these deficiencies.

### Technology and the Media

#### The CNN Syndrome

The panel addressed the dramatic impact that the media now have in bringing immediacy to crises half a world away. In a phenomenon termed “the CNN syndrome” by several panelists, the media today can shape public opinion in bringing pressure on governments to act in response to conflicts and disasters even before events are fully assessed and response options are well-developed. What is less well-recognized is the direct impact of the media on decision-makers in Washington and other capitals. Speaking from his experience, one former senior official noted that, “We look at press summaries, not intelligence” first thing in the morning. The result: compromise of effective decision-making.

Similarly, factional leaders and the general population in areas of conflict also take their cue from the media. A poll cited by one participant found that 75% to 80% of the population in Bosnia turns to television as the primary source of news. Therefore, the ability to influence the editorial policy and content of the press and media in the conflict area can have a dramatic effect on developments on the ground. Once those developments hit the foreign media, they become news that affects decisions made in capitals half a world away.

Decision-makers and operators need to recognize that the media can be turned into a resource that works for the mission, panelists thought. This is illustrated by the traditional peacekeepers’ use of the media to draw attention to the misconduct of belligerents, with the goal of lessening the violence and shielding noncombatants, a point previously noted.
Overcoming Resistance to Media Technology

Several panelists noted that the United Nations has been a major obstacle to the effective use of the media as a peacekeeper’s tool. Officials in New York tend to view any media and public relations strategy as manipulation of public opinion or—worse—psychological warfare. This perception needs to be overcome if peace operators are to level the playing field with combatants—many of whom recognize the value of the media in bolstering their position in dealing with the mission. This point was driven home to the panel in lessons from the Somalia operation. The UN initially resisted providing broadcast equipment. When it relented, the equipment provided could not reach beyond Mogadishu. This gave the warlords a distinct advantage in using the airwaves to spread misinformation and fear—which proved significant in undermining the position of United Nations peacekeepers.

NATO has been deficient in Bosnia. A panelist noted that while information operations were recognized as important to the success of IFOR, no independent broadcast capabilities were deployed to support the operation.

Panelists believed that media technology, matched with a media strategy, must be a routine weapon in the peace operations arsenal. This includes transmitting information about the operation and its goals and preparing counters to misinformation from opposition.

In addition to radio and television, videos can be effective in spreading the peace force’s message. In Cambodia, video programs effectively countered a Khmer Rouge campaign of fear intended to thwart voter turnout in the United Nations’ supervised national election of 1993. Technology alone is not enough. Equally important is a well-trained media and public-relations team capable of exploiting the technology and briefing the media before they report the news.

One participant wanted to take matters further and urged, in extreme circumstances, the jamming of broadcasts. The crisis in Rwanda and Eastern Zaire would have qualified for such action in his view. He believed it would have been perfectly appropriate to block Hutu broadcasts inciting ethnic violence against Rwanda’s Tutsis.

The Insertion of Technology

The Pressure to Deploy Versus the Need to Vet

The critical importance of care in introducing new technology into the field was a theme raised by several conference participants. One assessment of the insertion of technology for use by the US IFOR element in Bosnia found that technology arrived absent operational training, a system of maintenance, well-thought-out doctrine, rules of engagement, or prior calculations of how these new systems would interface with the existing inventory of equipment. As a result, some systems were dependent on contractors for their operation. Other systems were not interoperable with or were redundant to fielded equipment. Some systems placed added stress on operators. Others, particularly new command, control, and intelligence systems, became barriers to sharing information with foreign coalition partners and the civilian organizations engaged in the operation.

The problems in Bosnia were compounded by contractors who viewed field demonstrations of their innovations as a means of getting on the acquisition fast track. Other developers’ success in earlier deployment was a lesson that contractors felt they could not ignore. The military’s embrace of the Joint Surveillance Target Attack Radar System (JSTARS) aircraft after its operational debut in the Persian Gulf War has had an especially powerful impact.
on the technology development commu-
nity. In Bosnia, the result was a "technol-
yogy flood," to quote one participant. More
than 100 systems were rushed to the field.
This contributed to a "clumsy" and incom-
plete insertion process.

Several remedies were suggested for
easing technology-insertion problems. One
is to convene a panel of technologists and
operators to examine candidate technolo-
gies, determine their relevance to opera-
tional requirements, and access the
implications for doctrine, logistics, training,
and other aspects of operations. The US
Army Materiel Command has reportedly
had some success with such panels. The use
of simulation to assess the operational im-
 pact of technologies before they are fielded
was suggested as another tool for evaluat-
ing technology before taking it to the field.15

Ultimately, creating a mechanism for
vvetting new systems is in the developer's
own interest. In words echoed by several
panelists, if a soldier has to choose between
"taking bullets, food, or [say] sensors with
him, he'll take bullets and food." Systems
that become permanent additions to the
peace-operator's kit must convince users
that they perform as advertised, enhancing
rather than burdening operations.

Less-Than-Lethal Weapons and
the Insertion of Technology

Practitioners on the panel reminded
their colleagues that the military's interest
lies in adding capability—not technology
per se. As noted above, promising technol-
ogy is often sent to the field without proof
of its operational utility or guidance for
troops on its effective use. Less-than-lethal
weapons were highlighted in discussions of
this problem. Less-than-lethal systems were
provided to troops going to Haiti, but with-
out guidance on when they should be used
and their effects against a variety of targets
and at differing ranges. This is a formula to
guarantee that in an emergency these weap-
ons will not be used.

A panelist noted that even the different
names offered for these weapons ("less-
than-lethal," "nonlethal," and a variety of
others) seem to reflect uncertainties—including among developers—about how
these weapons will perform.16 For instance,
as one participant noted, virtually any sys-
tem can kill in certain circumstances. A soft
projectile fired at high speed over a long
range might have the effect of temporarily
disabling an intruder, but at shorter ranges
the projectile might kill. Some panelists ex-
pressed a preference for other names for
this category of weapons. "Less lethal"
might be a better description, a panelist
thought.

Getting Proven Technology to
the Peace Operator

Panelists noted that while breakthrough
technologies are needed to advance capa-
bilities in areas such as demining, counter-
ing sniper capabilities, reconnaissance, and
less-than-lethal weapons, in the interim
mature systems can enhance mission effec-
tiveness. The problem is one of getting
available systems into operator hands. The
difficulties faced in introducing commercial
off-the-shelf, media-related technology and
secure communications systems have been
discussed above.

Panelists noted that, despite a broad
agreement among operators on the value of
these capabilities, several barriers hinder
availability. Some are cultural. One cultural
barrier—the UN's view of media technol-
ogy as a tool of manipulation—has been
noted. Another is the tendency of the UN
and non-governmental aid-providers to
view openness as an absolute good. The
acquisition of secure communications
equipment has, in consequence, suffered. In
a situation in which factions are hostile to
the operation, open communications can
make aid workers and the peacekeepers trying to protect them vulnerable to attack. It can also hobble traditional peacekeeping, as one commander noted. Readily available secure communications systems could address the problem, but their adoption has been resisted. Panelists suggested that they were beginning to see indications that recent operational experience is causing these organizations to rethink their positions.

Two other obstacles to the adoption of available systems are a lack of awareness among users of the existence of operationally useful systems and a lack of funds. Conducting surveys that identify user needs and the technology available to address them is the solution. Sharing the results of workshops, conferences, and training sessions involving representatives from across the operations community are other ways to reduce the knowledge gap.

### Identifying Multiple Funders for Peace-Operations Technology

Funding problems are harder to fix. Peace operations occur in a constrained budget environment, officials reminded the panel. (The conclusions of the QDR completed since the conference have shifted the balance in favor of preparedness for peace operations—including funding the capabilities that such operations will entail. But a major infusion of technology-development funds is unlikely based on the QDR alone.)

In promoting funding for technology development programs, several participants urged that greater attention be given to the multiple users of the technology within the peace operations community. As conference discussions made clear, advances in peace operations technology would have a long list of beneficiaries—the US military is only one of them. To briefly reiterate one example, demining capabilities protect all peacekeepers—from the UN, NATO, and other nations. Demining systems are essential for the delivery of relief by a variety of agencies, including USAID. Mine removal is essential in reconstruction and, as such, demining is an issue in development projects funded by the World Bank and foreign governments, among others. The list goes on.

Getting all stakeholders to fund a focused national—if not international—technology-development effort would promote significant advances in demining capabilities. Multiple backing for the program might also spur greater Department of Defense spending on demining. A similar approach could be adopted in promoting other peace operations technologies.

Other panelists argued in favor of a funding strategy that focuses on the multiple uses of peace operations technologies. Counter-sniper systems and less-than-lethal weapons will be needed in a variety of military contingencies; peace operations are but one of them. The FBI and law enforcement in general routinely respond to threats from gunmen. Police restraint is expected in subduing criminals and controlling crowds. The availability of less-than-lethal systems could broaden law-enforcement options. Cost-sharing arrangements across federal, state, and local governments could underwrite accelerated technology development and demonstration. Addressing the needs of multiple constituencies would heighten Congressional interest, thereby enhancing support for funding. The two funding strategies are complementary.
Notes

1. For the statistics and the details on the changing character of peace operations, see Mats Berdal's chapter (Chapter 2).

2. William J. Garvelink's chapter (Chapter 6) describes the rise of these emergencies and the demands they impose on the effective delivery of assistance.

3. The importance of reconstruction/infrastructure building programs in bringing a meaningful end to complex emergencies is addressed in the commentary by Frederick M. Burkle, Jr. (Chapter 8).

4. See Sebastian J. L. Roberts' contribution on this issue (Chapter 17).

5. Trond Furuhovde's chapter (Chapter 3) describes the challenges of commanding a lightly armed force between potentially hostile parties in Lebanon.

6. Jonathan T. Howe's chapter (Chapter 4) describes the challenge faced in Somalia and examines how technology might have helped to produce a different outcome.


8. The Dayton agreement was drafted to clearly detail the parties' responsibilities and establish a precise timetable for action and compliance.

9. The quote is from Brian Goodson in his chapter on the IFOR deployment (Chapter 5).

10. On organizing the US Government for complex emergencies, see the chapter by Eric Schwartz (Chapter 18). On the challenge of organizing international collaboration in these operations, see the chapters by William J. Garvelink and M.G.D. Evans (Chapters 6 and 7).

11. The challenge of civil-military relationships is the topic that M.G.D. Evans' chapter (Chapter 7) addresses.

12. On this point, see David Reese's chapter (Chapter 10), which assesses regional arrangements.

13. Satish Nambiar's chapter (Chapter 9) on the role of developing states in peace operations provides a detailed list of relevant technologies.

14. Toshio Kunikata's commentary covers potential problems posed by the introduction of new technologies (Chapter 16). Also see Richard E. Hayes' chapter (Chapter 15).

15. Richard E. Hayes' contribution details technology-insertion problems and some possible remedies (Chapter 15).

16. The Anthony Fainberg and Xavier Maruyama chapter (Chapter 11) presents an assessment of less-than-lethal weapons, sensor systems, and demining technology.
Part I:
Operational Challenges—
Lessons from Recent Experience
Peacekeeping and Peace Monitoring
Introduction

The purpose of this article is to set the scene. Specifically, I propose to examine some of the broader political and operational issues raised by the conduct of peace support operations after the Cold War. This, in turn, will provide us with the basis for a more detailed discussion of the role and place of technology in such operations.

To this end, the article is divided into three sections. First, I look more closely at the changing nature and context of peacekeeping in recent years. In particular, I wish to identify both elements of continuity and breaks with the more traditional or "classical" pattern of past peacekeeping operations. Second, I identify some of the key conditions that need to be in place for a peace support operation to have a positive and constructive bearing on any given conflict. Finally, and more briefly, I turn to some of the specific areas in which the application of new technologies (and the further development of older ones) can make a significant contribution to contemporary peace support operations.

If the focus of my discussion is UN-centric, it is primarily because the overwhelming majority of peace support operations since 1989 have been conducted under UN auspices or with some degree of UN involvement. Still, the overall analysis applies to peace support operations more generally.

International Peacekeeping after the Cold War

Post Cold War Peacekeeping: New Tasks, New Context

The post Cold War period has seen a significant increase in the number, scale, and types of missions given to peacekeepers. Between 1948 and 1987, 13 operations were launched by the UN; since 1987, more than 20 new operations have been launched. In January 1988, the annual UN budget for peacekeeping was calculated at $230.4 million; by late 1994, preliminary projections put the figure at $3.6 billion. Since 1988, the number of soldiers deployed in the field has increased from 9,500 to more than 50,000 while the pool of troop-contributing countries has expanded from 26 to 76 (a noteworthy aspect of this has been the growing involvement of the permanent members of the Security Council). The changes have
not, however, been only quantitative in nature; UN field operations have also become more complex in their composition and multifaceted in their objectives. Civilian elements are now more prominent in operations and, as a result, the traditional functions of military contingents have evolved.²

Specifically, military elements have been given a greater number of support functions aimed at promoting the primary objectives of other mission components, specialized UN agencies, and NGOs. The two principal support roles have been (1) the provision of theater-level logistics, and (2) the establishment of a secure environment for nonmilitary tasks to be carried out, including, *inter alia*, electoral monitoring, refugee repatriation, and the distribution of humanitarian relief supplies.

Eight categories of tasks may be identified as having evolved in recent years within the framework of the "established principles, procedures, and practices of peacekeeping"³:

- Electoral support.
- Repatriation of refugees/displaced persons and humanitarian assistance.
- Demining activities.
- Observation and verification of cease-fire agreements, buffer zones, foreign troop withdrawals, and human-rights compliance.
- Preventive deployments.
- Separation of forces, their demobilization, and the collection, custody, and/or destruction of weapons.
- Establishing secure conditions for the delivery of humanitarian relief.
- Disarming paramilitary forces and private and irregular units.

### Electoral Support

Electoral support has become an increasingly important and highly effective aspect of UN activity. In the course of 1994, the UN undertook electoral support activities in more than 20 countries.⁴ The nature of its involvement, however, has varied considerably from place to place. In Nicaragua, ONUVEN neither formulated electoral rules nor conducted elections; its 120 civilian observers only verified that the Sandinista defeat was the result of a technically free and fair election. By contrast, the UN in Cambodia was responsible for the entire electoral process, including registration, balloting, and verification. In Mozambique, ONUMOZ also had a wide mandate in the run-up to the 1994 elections. IFOR in Bosnia has assumed an important role in ensuring that the elections proceed smoothly in accordance with the Dayton peace accords.

### Repatriation of Refugees/Displaced Persons and Humanitarian Assistance

The provisions made for repatriating refugees displaced internally or to neighboring countries as a result of internal conflict have become an integral part of many contemporary peacekeeping operations. The scale of such operations is usually formidable, and they always involve major financial and logistical commitments. By February 1995, the total number of refugees and displaced persons within the Former Yugoslavia alone was estimated to be 3,723,000.⁵ As with the provision of electoral support, the military rarely acts as a lead agency in the process of resettling returnees and refugees. Rather, the scale of such operations and the limited capacity of local infrastructure to deal with them give military forces a critical role in providing security at assembly areas as well as basic services such as food, water, primary medical care, and temporary shelter. This was demonstrated most clearly (and successfully) in the case of Cambodia, where UNTAC helped in the repatriation of some 360,000 refugees from camps situated along the Thai-Cambodian border with the help of the UNTAC military component.
Chapter 2  Overview of Challenges in Recent Peace Operations  |  21

I Demining Activities
A particularly sinister feature of much contemporary warfare has been the resort to low-cost and low-tech mine warfare. The UN’s direct involvement in mine-clearing activities increased from one operation in 1988 to 12 in late 1994. Yet, the organization has only just begun to address seriously a problem that is bound to remain a key priority for many years.

I Observation and Verification of Cease-Fire Agreements, Buffer Zones, Foreign Troop Withdrawals, and Human-Rights Compliance
This category of operations covers traditional types of low-level military activity undertaken by UN forces: the creation of buffer zones, border patrols to supervise cease-fires and the integrity of armistice lines, and the passive observation of truce and cease-fire agreements. A substantial body of experience exists among traditional troop-contributing countries for these kinds of operations, the demand for which is not likely to diminish. A novel addition to the tasks of peacekeepers in places such as El Salvador, Cambodia, and Haiti has been human rights monitoring. In all three cases, years of civil conflict have been accompanied by widespread human-rights violations perpetrated by government forces. Under such circumstances, monitoring the functioning of new military and police forces is essential for the long-term viability of any peace process.

I Preventive Deployments
In December 1992, the UN Security Council authorized the preventive deployment of a Nordic battalion in the former Yugoslav republic of Macedonia along the border with Albania and the Federal Republic of Yugoslavia. The objective of the force, which was later reinforced by a US battalion, was to report on “developments which could pose a threat to Macedonia” and “by its presence . . . deter such threats from any source.” It was the first deployment of its kind, even though the concept of deploying multinational military forces in a preventive mode—that is, to prevent tensions from escalating to the level of violent conflict—has long been advocated by observers and the UN itself.

I Separation of Forces, Their Demobilization, and the Collection, Custody, and/or Destruction of Weapons
Comprehensive political settlements aimed at ending internal conflicts—as in Central America, Angola, Cambodia, and Mozambique—have all included provisions relating to the disarmament and demobilization of armed forces. Through various forms of weapons control, attempts have also been made, largely unsuccessfully, to place effective limitations on the ability of demobilized soldiers to resume fighting. Such demobilization operations, which involve a number of different agencies, external donors, and NGOs, are likely to remain an important task in the future.

I Establishing Secure Conditions for the Delivery of Humanitarian Relief
The adoption of UN Security Resolution 688 in the aftermath of the Persian Gulf War provided the basis for outside military intervention in support of humanitarian relief operations in northern Iraq. Although the significance of the resolution must be seen in the context of Iraq’s defeat in the war, Operation Provide Comfort, which followed its adoption, suggested that under certain circumstances member states were prepared to accept that the delivery of humanitarian supplies to a civilian population can be achieved only through forceful action. This assumption was reflected in the mandate for the second UN operation in Somalia (UNOSOM II), which in May 1993 assumed the task of providing security for humanitarian aid operations in Somalia. UNOSOM II’s hapless outcome, however,
has highlighted the difficulties of engaging in “coercive disarmament,” much as the humanitarian relief activities in Bosnia have highlighted the dilemmas of providing aid in the midst of an ongoing conflict.

Disarming Paramilitary Forces and Private and Irregular Units

Although parties to a dispute may have accepted formal agreements on paper, contemporary operations have shown that consent is rarely universal. In particular, consent at the operational level does not necessarily translate into cooperative behavior by local commanders. As UN operations in the Former Yugoslavia and Somalia have shown, the problem of limited consent and the consequent efficacy of traditional modes of peacekeeping is most acute when dealing with paramilitary forces and with private and irregular armed units. The UN’s involvement in disarmament operations (and in support of humanitarian operations in the midst of ongoing wars) has been the most complex and controversial of all of its post Cold War activities; this involvement has also been at the heart of a much broader debate about the possibilities and limitations of outside intervention under UN auspices.

It is clear from the eight tasks detailed above that contemporary peace support operations involve a number of new challenges. Chief among these is the fact that the operational environment in which forces are deployed has become increasingly volatile, complex, and liable to violent escalation. This development is closely related to the growing involvement of the international community in conflicts within states. Since January 1992, 9 out of 11 new UN operations have been related to an intrastate conflict. An important consequence of this (and, as will be seen, of direct relevance to the discussion of technology) has been that soldiers engaged in peace support activities have often been forced to operate with limited consent from warring parties. As a result, peacekeeping forces now face far greater risks than they have in the past. Indeed, as of late 1996 the total number of peacekeeping fatalities from the UN’s operations in Former Yugoslavia was more than 400.

Taken together, these developments raise an important question: can contemporary peace support operations be carried out on the basis of traditional peacekeeping principles, or have these principles lost all relevance in the contemporary context? It is a question that has been the subject of much debate in both the US and Europe, and it needs to be addressed before we turn to the conditions of success and the contribution of technology.

The Peacekeeping Doctrine Debate

Within military establishments and among academics, the debate has focused on the question of whether it is possible to conceive of an area of military activity between consent-based peacekeeping and enforcement based on traditional war-fighting doctrines. On the one hand, attempts have been made to develop a concept of “second-generation multinational operations.” The key assumption here has been that an outside peacekeeping force does not necessarily need to rely on or be guided by the requirement of consent from the parties to a conflict. The reason for this, in the words of Richard Connoughton, is that “consent and impartiality are too fragile to serve as a fulcrum around which a sensible doctrine can be built.” Instead, so the argument runs, a military force that is properly equipped, trained, and governed by the right operational concepts can engage in various intermediary “levels” of enforcement. Proponents of this view argue, in effect, that a “middle ground” or “continuum” of military activity exists between “classical” peacekeeping and large-scale enforcement. While this debate has been conducted, the actual requirement of
consent as a basis for UN involvement has been downgraded, most strikingly in the case of Somalia in May 1993. As a result, the assumptions of "middle-ground" theories have been tested in practice.

There is no doubt that recent peacekeeping operations have exposed major deficiencies in existing structures for managing field operations. In particular, the requirements of force protection, mobility, and intelligence for soldiers in the field have all been neglected, in some cases with disastrous consequences. This does not mean, however, that the defining characteristics of peacekeeping—consent, impartiality, and its essentially nonthreatening character—have no relevance for operations since the end of the Cold War. In particular, there is little in the experience since 1988 to suggest that the basic distinction between peacekeeping as an essentially consent-based set of activities and enforcement designed to impose a solution by coercive means should be lightly abandoned.

The experience of UNOSOM II in Somalia in the summer and autumn of 1993 is the clearest example of the dangers inherent in any attempt to combine peacekeeping and enforcement in one operation: it is likely to destabilize the operational environment in which forces are deployed. While consent in civil wars will clearly never be absolute, it is the conscious promotion of it—through adherence to principles of minimum force, constant liaison, and negotiation with local parties—that distinguishes peacekeeping from enforcement. It is perhaps worth noting in this context that the US Army, in its Field Manual for Peace Operations (FM 100-23), finalized after the US involvement in Somalia, recognizes the basic distinction between these two categories. "Peacekeeping" and "peace enforcement," it states, "are not part of a continuum.... A broad demarcation separates these operations." At the same time, it also recognizes that consent is rarely absolute and, indeed, "may vary dramatically over time."

None of this should be taken to suggest that any use of force is necessarily destabilizing in a peacekeeping operation; nor does it imply that enforcement will not, in certain circumstances, be a far more appropriate option than peacekeeping. What needs to be clearly appreciated, however, is that the political and military requirements of enforcement differ markedly from those of peacekeeping, and that to engage in both sets of activities within one operation carries considerable risks.

Lessons from Recent Operations

In view of these considerations, what are the conditions that need to be in place for an operation to have a constructive and positive bearing on efforts to manage and resolve conflict? What do recent operations tell us about the requirements for military effectiveness in peace support operations?

Four sets of conditions merit special mention: maintaining a clear distinction between consent-based operations and enforcement; continuing political support; clarity of mandate; and adequate financial and military resources.

Consent-Based Activities versus Enforcement

Although the UN clearly deserves some criticism for the management of its field operations in recent years, its senior officials have rightly stressed that in the absence of a firm willingness to impose a solution on warring parties from the outside, the limitations upon the use of force by peacekeepers remain considerable. In some circles, this view has been construed as little more than a lack of moral resolve in the face of seemingly intractable civil wars. Others have spoken of an "anti-military" bias within the UN and a conservative attachment to principles that have served the organization well in the past. As suggested above, however, these criticisms
fail to address the main point, namely, that the military and political requirements of enforcement are profoundly different from those of consent-based operations.

To reassert the importance of clearly separating peacekeeping (or more broadly consent-based operations) from war-fighting is not tantamount to ruling out enforcement as an option available to the international community. Yet, enforcement action requires political will (and above all a willingness to accept casualties), as well as proper military resources to prosecute it. These conditions did not obtain in the case of the Former Yugoslavia.

Continuing Political Support

The second condition is that of continuing political support and broad international consensus behind the decision to establish and sustain an operation. Such support comes from the Security Council and needs to be reaffirmed and transmitted to the field, both to the heads of mission entrusted with implementation and to the parties on the ground. It was manifestly absent in the case of the Former Yugoslavia. By contrast, between 1992 and 1993 UNTAC benefited greatly from the broad international consensus behind the Paris Peace Accords, and the operation itself enjoyed solid support throughout from all members of the Security Council. Similarly, in Mozambique, the Special Representative of the Secretary-General (SRSG), Aldo Ajello, enjoyed continuous support from the Council, as well as from troop-contributing countries.

Clarity of Mandate

The third condition is clarity of mandate and, equally important, a readiness to take account of its operational implications. Such “clarity” is needed to ensure that the various tasks given to complex missions are internally consistent and that political objectives are capable of translation into realizable goals on the ground. It is also needed to ensure that relations between the UN and other organizations—in terms of tasks, as well as command and control arrangements—are properly spelled out. Beyond these vital requirements, however, “clarity” cannot mean that the drafting process should remove all ambiguities. In the first place, nearly all Security Council resolutions reflect a measure of political compromise that manifests itself in the way a mandate is drawn up. If a requirement of complete “clarity” is demanded, very few resolutions are likely to be passed. Second, and more important in this context, force commanders and SRSGs in the field have frequently stressed the value of operating with mandates that allow them to “flexibly interpret” conditions and requirements on the ground.

Adequacy of Financial and Military Resources

Finally, mandates cannot be implemented without adequate financial and military resources. The tragedy of Angola and its relapse into civil war in 1991–92 is only the most glaring example of how an underfunded and ill-equipped UN mission is left unable to address realities on the ground. Since 1991, inadequate support, both financially and logistically, has resulted in a number of operations coming perilously close to collapse or serious derailment.

The Role and Contribution of Technology

In what ways, then, can the application of new technologies, or the further development and refinement of older ones, improve the prospects of peace support operations? Two basic, albeit crucial, points need to be made at the outset.
First, there are no “technological fixes” to the challenges posed by contemporary conflict. Technology can serve as a force multiplier; it allows forces to take on a wider range of tasks; and it can improve force readiness and protection. By so doing, the credibility and legitimacy of a peace support mission is increased in the eyes of contending parties. In all these ways, technology can facilitate peace support missions and enhance the prospects of success. Nevertheless, it is progress on the political front that remains the critical determinant of success. The role of technology should be examined with these considerations in mind.

Second, there is a tendency in much of the literature on the application of new technologies to focus on very sophisticated and advanced systems. While this is undoubtedly important, it should not be forgotten that what has been lacking most in recent UN operations has often been quite basic categories of equipment with a premium on reliability and interoperability. Indeed, categories of equipment identified in a study in 1993 still remain in short supply. These included radio-equipped trucks and jeeps, portable housing and office equipment, force communications equipment (e.g., radio terminals/tactical satellite terminals, GPS systems), air-transportable medical supplies and water purification systems, and observation/surveillance equipment (including night-vision devices and more advanced types of ground sensors).

Mindful of these considerations, let me turn to two areas in which I see a particularly strong need for a more concerted effort to apply technology to peace support operations. These are (1) intelligence, information-gathering, and processing; and (2) the problem of landmines and unexploded ordnance. These are clearly not the only areas that deserve closer attention, though I do want to single them out as priority areas.

### Intelligence, Information-Gathering, and Processing

To strengthen its claims to impartiality, the UN has traditionally refrained from activities that may be interpreted by the parties to a conflict as involving the collection of intelligence by covert means. “Information” has been the preferred term, and collection activities have often been disguised under labels such as “public information” and “military observers.” Recent operations have shown, however, that in politically fluid and militarily complex situations, more advanced resources and procedures for collecting, assessing, and distributing intelligence within a peace support mission are required. Indeed, information about the strengths and dispositions of local factions, the location of mine fields, the prevailing level of violence, and socioeconomic and geographic features in an area of deployment is essential both for planning and carrying out specific tasks. A few examples clearly highlight this need.

In the summer of 1992, the Security Council responded positively to a request by the parties in Bosnia-Hercegovina to make arrangements for the supervision of heavy weapons held by parties to the conflict. The force commander accordingly instructed the sector commander in Sarajevo to contact the parties with a view to identifying the locations and quantity of weapons to be supervised. Even if local commanders had divulged the information, however, the absence of confirmatory data would have made verification impossible. This is merely one instance in which the lack of independent means for verifying information provided by factions can prevent forces from carrying out tasks entrusted to them. Similarly, the lack of gunlocating radars deployed with UNPROFOR often made it difficult for military observers to pinpoint sources of indirect fire from mortars and artillery. This, in turn, complicated efforts to protect humanitarian
convoy as well as to mediate between local factions on the basis of neutral information.

More regularized information gathering and processing is necessary for another reason: it enables a force to anticipate developments on the ground (or, at least, it gives it the capability to do so) when the failure to do so can have potentially disastrous consequences. For example, in Namibia in 1989 the first contingent of UN troops concentrated almost entirely on monitoring the South African troop withdrawal in the south of the country and was caught off guard when SWAPO launched an offensive from bases in Angola into northern Namibia, threatening to derail the peace plan.

In Cambodia, a great many of the early difficulties encountered by UNTAC could have been overcome if reconnaissance of the area of deployment had been properly coordinated and fed into the planning process before deployment. Once the UN contingents began to arrive in the country, they suffered from a very limited tactical intelligence capability. In particular, as with the UN mission in El Salvador (ONUSAL), UNTAC in Cambodia did not have the surveillance and tracking technologies necessary for monitoring movements across borders in dense jungle terrain, as well as for the location of arms caches.

These isolated examples suggest that the systematic collection and analysis of information by means of ground reconnaissance, aerial surveillance, and information-processing systems has been a neglected area of activity in recent peace support operations. In addition to the specific examples listed above, an effective aerial and ground-based reconnaissance and surveillance capability—based on a combination of sensors and imaging techniques (many of which are now in commercial use)—would also significantly improve a mission's ability to monitor cease-fires over large areas, as well as over strategic waterways and sea lanes. A peacekeeping force that used sensor technologies effectively was the Sinai Support Mission (SSM), a non-UN operation set up by the US at the request of Israel and Egypt in 1974 and consisting of four sensor fields and three watch stations to monitor military activity in parts of the Sinai. The Multinational Force and Observers (MFO) deployed in April 1982 to supervise the military annex to the Camp David Agreement also effectively used a combination of ground sensors, aerial photography, and on-site verification.

More recently, steady advances in the field of satellite imagery have also benefited forces at the tactical level. During Operation Restore Hope, the US Army Space and Strategic Defense Command provided the 10th Mountain Division with a multispectral satellite-imagery terminal running advanced mapping software and capable of accessing LANDSAT (civilian) spacecraft. This gave the division a “quick-response” mapping capability, producing maps within hours for distribution to unit commanders and enabling them to disperse rapidly from arrival areas to positions in the interior.

The Problem of Landmines and Unexploded Ordnance

An estimated 80 million to 100 million landmines of various types are believed to be planted in more than 60 countries. Some areas have been particularly hard hit by this modern scourge. In Angola, estimates range from 9 million to 20 million landmines planted over a period of more
than 20 years; in Mozambique, an estimated 1 million to 2 million mines have not been cleared; and in Cambodia, figures range from 7 million to 9 million. Apart from the horrific toll of casualties (some 26,000 are claimed by landmines every year), the indiscriminate use of mines has left another sinister legacy: large tracts of land polluted by mines have been rendered unusable for agricultural activity. During conflicts, mines are also typically laid in irrigation or water-delivery systems, in power plants, on paths and roads, as well as near and around national infrastructure facilities. All this seriously undermines economic reconstruction initiatives.

In spite of this, attempts to regulate the production and trade in mines have made scant progress. A comprehensive ban on the production, transfer, stockpiling, and use of landmines—as advocated by the ICRC at the UN review conference convened in April 1996 to examine the effectiveness of existing restrictions on the use of landmines—would undoubtedly have improved the situation in the medium to long-term. Agreement, however, could not be reached and the “compromise” solution, focusing in particular on the use of self-destruct and other neutralization mechanisms for mines, represents a setback in international attempts to address the landmine crisis. It is partly for this reason that one has little choice but to look even more closely at technological improvements as a means of addressing the problem.

As the UNTAC operation and the current mission in Angola have shown, mine clearing, especially of roads around basic infrastructure facilities and agricultural land, is vital for securing access to and establishing assembly areas for the demobilized, as well as for generating economic recovery, resuming agricultural activity, and assisting the resettlement of refugees. It is, however, a costly, time-consuming, labor intensive, and highly dangerous activity. The average cost of clearing one mine alone has been estimated at $300 to $1000, in part because technologies for mine clearing remain underdeveloped. According to UN estimates, the present rate of mine clearing worldwide is 34 times slower than the rate of planting. While countries have developed and experimented with mine-field breaching technologies (such as the use of air fuel explosives to detonate mines by shock wave over a large area), for environmental reasons alone, such technologies pose major problems. The scale of the landmine problem is such that the only solution seems to lie “in finding mine-clearance methods which are markedly faster and safer.” Research in this area will have to be intensified accordingly.

Concluding Remarks

I have argued that technology can make an important contribution to the effectiveness of contemporary peace support operations. Indeed, recent operations have highlighted a number of areas that require particular attention in this respect. Technology is not, however, a panacea, and it can only be effective if its application is in support of a political process aimed at addressing underlying sources of conflict.
Notes


2. For example, the number of civilian police officials deployed in UN field operations has increased from less than 100 in 1988 to more than 2,000 in early 1995.


7. Two important exceptions to the more benign pattern of UN peacekeeping before 1988 were ONUC in Congo and UNIFIL in Southern Lebanon. In both of these cases, the host country was not in de facto control of all its territory, and the operational environment was shaped by ongoing “civil war” and domestic strife.


13. For further discussion, see Berdal, “Whither UN Peacekeeping?,” especially Chapter 2.

14. As will be seen, sophisticated technologies (certainly by UN standards) were introduced by UNOSOM II in Somalia, though this did little to rescue that political process aimed at resolving outstanding differences among the parties and getting national reconciliation under way.


17. In 1993, the UN learned (largely by chance) that more than 100 secret arms caches in El Salvador and Nicaragua had been excluded from the original inventory submitted by the FMLN. “Letter from Secretary-General to President of Security Council Concerning the Discovery of an FMLN Weapons Cache,” S/25901, June 8, 1993.


21. UAVs, which proved their value during the Gulf War, may be of particular interest in future peace support operations on grounds both of low cost (human and financial) and increased sophistication and versatility.


24. In addition to international humanitarian law, existing restrictions are governed by the UN “Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects” adopted in 1980.

25. Africa Confidential, 23, 23 (1993). Afghanistan is still the country with the most serious landmine and UXO problem worldwide. It has the highest number of casualties per year and at the present rate of clearing (which involves some 2,500 deminers at a cost of about $12 million a year), it will taken “hundreds of years before Afghanistan is free of mines.” See Patrick M. Blagden, “Mine Clearance,” UNIDIR Newsletter, No. 29, May 1995, p. 20.


Meeting the Challenge of International Peace Operations
Introduction

This presentation is based purely on my own experiences in the Middle East conflict. To some extent I will discuss technology, but I will be very careful to avoid speculative descriptions about advantages and disadvantages. Whether or not it is possible to give a uniform and functional definition of technology in this context is difficult to say. However, it seems necessary to establish a common platform for the discussion.

Technology here means any electronic, electrooptical, or mechanical device, or any integrated system operating on land, in the air, or at sea with the purpose of making movement swifter, communications safer, weapons' terminal effects higher, and the combat environment safer for the single soldier. I realize that technology does have limitations. For example, I have never believed in “low-risk military operations.” I oppose expressions such as “surgical precision in military operations,” and so on.

Given this background, it is important to determine what role technology shall be given, whether to:

- Reduce the costs of an operation.
- Increase efficiency.
- Reduce the number of troops.
- Increase freedom of action, etc.

It must also be determined both what impact the introduction of technology will have on the parties on the ground and consequently on the operation itself and what its role is as a peacemaking stabilizer. Does it make any difference whether we decide in advance on the type and level of technology, or if we leave the question of technology to be answered by changing operational requirements? Maybe the capability of changing technology or introducing other technologies during an operation is an expression of operational flexibility.

To come closer to the question of the role and level of technology, I find it useful to examine the operational aspects into which United Nations Interim Force in Lebanon’s (UNIFIL’s) mission can be divided.

UNIFIL’s field mission is determined not only through its mandate but equally by belligerent party actions taking place on the ground. We can therefore derive the following four operational aspects:

- First, a peacekeeping aspect. Its main task is keeping the belligerents apart and monitoring the truce.
Second, a crisis-management aspect (i.e., the capacity to deny minor operations between the belligerents). This capacity also contains the capability to secure an operational reserve. In the case of UNIFIL, this capacity is very limited. In fact, the capacity lies mostly in psychological and moral factors. However, this has proven useful and effective at times, and it is mostly a question of seeing the means, believing in them, and being willing to use them.

Third, a humanitarian aspect. This part of any operation can never be overestimated. Any peace operation is an integrated multifunctional operation. Through direct contact with the local population, troops develop a situation of mutual confidence, which is one of the most important conditions for success in any peace operation.

Fourth, a standby aspect. If withdrawal by one or more of the parties occurs, the force must be ready to follow up by filling any vacuum with its presence. This role is based on the assumption that a withdrawal is defined and therefore predictable in its consequences on the ground.

By describing operational challenges, I hope to shed some light on problems connected with the introduction of technology into a peacekeeping operation. The gap between technological limitations and human expectations can probably only be filled by human efforts.

The focal points in an operation, from a technical point of view, are the peacekeeping and humanitarian activities.

In the sections that follow, I will examine each of the four operational aspects listed above. Where it is natural, reference will be made to appropriate technology. Defects in the concept of operation or the force structure will always be a major issue, but for political and other reasons, they will not be discussed here.

**Peacekeeping Aspect**

The First United Nations Emergency Force (UNEF I), 1956–57, became the prototype for UN peacekeeping and the paradigm after which Dag Hammarskjöld codified the UN rulebook for what we refer to today as "traditional peacekeeping." The background for this paradigm has changed dramatically over the years. The superpower balance that served as the main stabilizer is now replaced by uncertainties about the balance of power. So far, the uncertainties have curbed any attempted adventures in the Middle East. Force structure and weapon technology have undergone enormous changes. All of these factors, and more, have had their impact on UNIFIL’s concept of operation, but no changes to UNIFIL’s mandate have ever been made.

Consequently, UNIFIL has found itself squeezed between a task taken from an outdated textbook and belligerents pressing for their self-declared legitimate cases, all of which occurs in a political near-vacuum. In this situation, everybody expects UNIFIL to fulfill its mandate, but at the same time blames UNIFIL for a lack of success. It is fair to say that the peacekeeping force has succeeded at least to some extent by helping restore partial peace and security and by assisting the Lebanese government to reestablish effective authority. With no political peacemaking process in progress, our combined military and humanitarian efforts deserve some credit for this success.

Operationally the force has been employing a limited number of techniques, namely, the establishment of checkpoints, observation posts, and reconnaissance patrols. These are underpinned by tactical, mobile reinforcement units; combat-support units; and supply units. Together, these units have been able to form a multifunctional force.
While having an obvious combat potential, UNIFIL is not in the Middle East to engage in combat. The Israelis, the Hezbollah, and the Palestinian groups initiate and conduct their operations with only limited obstruction from UNIFIL. However, some obstructive methods have proven effective under certain conditions, assuming there is effective contact with the parties involved (contact directly with the chain of command on both sides or at least as close as possible to the chains of command). This underscores the importance of intelligence. Daily activities consist of establishing traffic control (checking cars and personnel) and observation posts and of conducting patrols. The main objective is to prevent the Hezbollah and other groups from bringing weapons, ammunition, drugs, and other illegal goods into the area of operation. At the least, these activities have a preventative effect.

As to weapons and ammunition, the situation was different: much more difficult and explosive. The buildup of weapons caches had been going on for many years. To pinpoint them took some time. When caches were first located, we concentrated on surveillance. Through surveillance and control of the parties’ movements, we could prevent them from taking up firing positions. This was done by inserting UNIFIL units in blocking positions, thereby reducing the level of hostility. Actions taken against the Hezbollah were the easiest. Actions taken against the Israeli Defense Force (IDF) were more difficult for the simple reason that they were far superior technically. This frustrated the UNIFIL command because IDF tactics were not always predictable. Sometimes this was a product of technology alone, rather than superior skill in its application. This advantage created a tactical imbalance for UNIFIL in which I used intelligence as an equalizer. Firepower never became a point in question. However, the force commander’s (FC’s) knowledge about these issues was essential and proved so during the Israeli operation in July 1993.

If I am going to point out any important technological areas at this stage, it must be within the operational fields of surveillance and communications. Surveillance can be separated into several subareas. The most important in this case is ground surveillance, which can be carried out with radars, sensors (laser, acoustic, seismic-based technology), night-vision equipment, TV devices, RPVs, etc. These are tools which, together with intelligence in the broader sense, form the basis of the force’s stabilizing role.

The structure, strength, and operational concept are the elements in a peacekeeping force that constitute the basics in relation to the peacemaking process. Any changes that are considered must not result in a reduction in the force’s ability to carry out its mission. In UNIFIL, the need to reduce spending is as pressing as anywhere else. But contingency planning must take into account the realities of the situation. These realities include the ongoing peace process and the current acceptance of UNIFIL—by both of the main parties and the subactors—as an integral part of the situation on the ground. Any contingency that assumes any changes—conceptual, technological, or numerical—has to take these realities into consideration. Attention must be given to the following four preconditions:

- First, any adjustments or streamlining recommended must avoid sending the wrong political signals or disturbing the political process.
- Second, any changes in UNIFIL’s organization and/or concept have to be adapted to the timetable under which the peace process is working.
- Third, to support the population in the area, changes must not lead to a reduction in the operational capabilities of the force. In this respect, I specifically underline that UNIFIL’s presence in the villages of the area must not be reduced.
Fourth, recommended changes must not jeopardize the mission given to the force in Resolution 425. Similarly, the consequences of implementing recommended changes should be predictable.

Foremost in my mind are the close interactive mechanisms between peacekeeping and peacemaking. It is generally accepted that the peace process has progressed to a stage at which, finally, an agreement concerning South Lebanon may be realized. This being the case, I feel it is vital that we be particularly sensitive to the effects of any changes in the force. In this regard, I would reiterate that UNIFIL is clearly accepted as an element in the political process currently taking place. Any changes in the force, be they geographic, organizational, or operational, must be undertaken with this in mind. UNIFIL is an important stabilizing force in South Lebanon. The stability it offers is crucial to the peacemaking process. I therefore cannot recommend changes that would affect the situation on the ground by increasing uncertainty and tension in the area. I would also highlight that these interactive mechanisms must always be dictated by the political process and not by the peacekeeping force. For this reason, I feel strongly that any suggestions about tactical or technological change should come from outside. If it came from within UNIFIL, it could negatively affect the political situation.

Today, the mission of UNIFIL remains unchanged. This includes using its "best efforts to prevent the recurrence of fighting and to ensure that its area of operations is not utilized for hostile activities of any kind."22

Since 1978, this modus operandi developed into an operational concept, primarily described by its static nature, using a network of positions to observe, report, and react. In considering any change in the concept of operations that would allow for a reduction in manpower (which in today's conditions could be a distinct possibility) and, at the same time, not result in a reduction of the operational capability of the force, there are two major options:

- Changing to a mobile concept.
- Introducing high technology.

First, consider a change to a mobile concept. UNIFIL has already been seeking to adjust its concept of operations from the traditional static model to a semimobile concept. This has become a necessity partly because of the rapid growth of the road network in the south over the last several years. This development has made the task of the subunits more difficult in terms of controlling their areas. The change was also partly necessitated by a 10% reduction in manpower carried out in 1992.

Notwithstanding the changes that have taken place, a major shift away from the current concept—one that allows for a significant reduction in manpower—would require substantial initial investment. In addition, there would be a need for an expansion of the force's maintenance capacity, which would require further expenditures. Given that the Secretary General initiated this reduction as a direct result of financial considerations, it would appear unlikely that necessary capital expenditures could be made available in the short term to save money in the longer term. Furthermore, another factor to consider is that this kind of substantial change would also be time-consuming.

Second, consider the introduction of high technology. One method of reducing manpower while at the same time maintaining operational efficiency would be to introduce a number of high-technology aids. With proper training, these would allow the force to observe and report activities in its area more effectively. At battalion level, such equipment could include portable surveillance radars and sensors. For the force as a whole, consideration could be given to coastal radars, air-surveillance radars, LLLTV (low-light-level television), thermal-
vision equipment, and ground sensors (seismic, acoustic, infrared, radio, laser, etc.)—all contained as parts of an integrated system.

The introduction of high technology would naturally save manpower. However, it would still be necessary to physically control activities in the area with troops. As with the change to a mobile concept, the integration of high-technology aids would involve significant expenses. In addition, it would require extensive training and education in terms of handling and command and control. Furthermore, any such change would also be relatively time-consuming, given the complexity of purchase, training, and introduction of the required technology. Notwithstanding these comments based on experiences from an ongoing mission, the introduction of high technology remains a highly recommended development for future peace operations.

■ Crisis-Management Aspect

For UNIFIL, the challenge is not the conflict per se, but how we handle it. Both the mandate and UNIFIL itself are being looked upon by the parties in conflict from their own perspectives. How is this conflict defined? What are the static and what are the dynamic elements of the conflict? The parties will certainly define their own values, expectations, perceptions, sense of justice, etc. Compared with the mandate and its terms of reference, we must admit the complexity of the situation.

The relations between Israel and Lebanon are dictated by the question of security. However, beyond that, water—a scarce natural resource—is another source of conflict in this region.

If we look at the relations between Syria and Israel, to a large extent these reflect the overall situation in the region: first, because they contain security, resource, and legal aspects, and second, because two major nations are sponsoring the two parties in conflict. These sponsors are acting on the basis of their own motives and with their own perceptions and expectations.

It is quite clear that an overall solution in the area can be achieved only at a "macro" or strategic level—in other words, with the participants of the major nations directly involved as troop contributors and/or guarantors. For this reason, I feel it is important that we consider the elements of any such agreement the major powers may be involved in, as well as the possible consequences of such an involvement.

As we look to the future, the basic strategic elements in any Middle East security would, in my opinion, include the following:
- Ground/sea.
- Air.
- Resources.
- Time.
- Ballistic sphere.
- Environment.

The first four elements could be referred to as "old" dimensions. The two additional elements reflect the need to deal with the spread of missile systems and problems associated with scarce resources. The question of the environment must not be underestimated, particularly with regard to water. Environmental elements can pose a threat to one or more nations, and therefore have security implications. For this reason, they will have to be contained in any regional security mechanism. The need to protect and cultivate water resources will lead either to an unprecedented level of cooperation or to confrontation among the states of the region.

The latest wars in the Middle East (Iran-Iraq, Kurdistan, Gulf War) have clearly shown that traditional strategic concepts are almost obsolete. One important result is that as we approach the 21st century, "strategic depth" has little meaning. Medium- and long-range ballistic missiles have "turned the home front into the front line.” Based on these realities, any overall
security system must deal with such ballistic weapons. Arms control and arms reduction also become vital elements in the picture.

The security systems that will eventually be put in place are likely to be structured around two mechanisms: a nation-to-nation mechanism and a nation-to-region mechanism.3

The initial nation-to-nation mechanism itself will deter possible aggression and surprise attacks. In this regard, UNIFIL could fulfill a role in this mechanism. In addition, the duties imposed by the regional mechanism will help enforce the peace. This is because only a regional framework will allow a dismantling of the power structures, work toward disarmament, and neutralize dissident "trigger-happy" figures. For example, a program can be implemented at the regional level to collect data on military activities and the environmental situation. These data can be reported to all sides, thereby helping ensure long-term stability. The regional mechanism would probably employ satellite systems, operated in collaboration with the major powers. Such a mechanism is the only way to ensure a reasonable level of national security in an age of ground-to-ground missiles and nuclear capability. The UN does not appear to have either the capacity or the capability to operate such a system. However, this could be an important future goal.

To complete this picture of the conflict, it is necessary to fill in the most visible elements. First is the essential state-building process going on in Lebanon. This is actually a separate dimension of the whole peace process. The completion of the democratization process is an important condition in the peace process. As a part of the state-building process, Lebanon is also rebuilding its armed forces, a demanding task that is making good progress.

Second, the Palestinian problem adds to the picture. In April 1994, Lebanese Finance Minister Bouez disclosed a government plan for solving Lebanon’s refugee problem, saying “Lebanon cannot, under any circumstances, naturalize the Palestinians.” It was the first time a Lebanese government official put forward a detailed concept for solving the refugee problem. The plan consisted of four main proposals:

- Returning 20% of the Palestinians to Israel.
- Organizing a family reunion scheme under which refugees would rejoin their families in Egypt, Syria, and even the US and Canada.
- Encouraging countries such as Canada, Australia, and others to give priority to Palestinian emigrants.
- Reminding “Wealthy and vast Arab countries” that they “have a moral and political responsibility to help in solving the refugee problem.”

Finally, there is the problem of the South Lebanon Army (SLA), an organization created by the Israelis, which consists of Lebanese soldiers fighting for Israel in Lebanon. It is easy to see the political and legal difficulty of their position.

In general, when looking at any “militia,” we can apply a number of criteria. First, does the militia accept and keep its activities within the framework of international laws and conventions? Second, does it have a national origin, i.e., is it supported by a particular state? Third, is it organized according to military principles, i.e., in terms of recruitment and training? From observations, it is obvious that the SLA does not keep within international laws and customs of war. Consequently, we can say that if the SLA were left alone, it would be without legal protection under international conventions, with the exception of the basic rights and protection to which individuals are entitled.

The Israelis have obvious obligations. Prime Minister Hariri said when we met in April 1994: “Any solution would be based on the following three principles: no re-
venge; maintaining the unity of the country; and not jeopardizing the security of the state." This tends to point to an eventual solution based more on political necessities and principles than on purely legal grounds.

In all these problem areas, UNIFIL is deeply involved, rightly with varying intensity. In this, it is guided more by the FC's insight and initiative than by directives from UN Headquarters, New York.

How do we apply technology in this situation? I believe we all can see endless challenges. Again, the main problem will be to find the right point of balance between the role of technology and that of human resources.

I Humanitarian Aspect

Humanitarian assistance is an integral part of any peace operation. The July 1993 Israeli operation in Lebanon is a good example. In addition to the massive scale of artillery bombardment and air strikes, the main feature of the Israeli operation was their stated desire to "depopulate" the area, ostensibly to create a "battlefield free of civilians" but also to create an internal refugee problem that they hoped would pressurize the Lebanese government to restrain the Hezbollah. UNIFIL's response to the Israeli operation was characterized by the following.

First, I decided that no UNIFIL position would be evacuated, despite the scale and effect of the bombardment.

Second, I insisted on freedom of movement for UNIFIL personnel, both on land and in the air. The IDF sought to restrict such movement. For example, UNIFIL was informed by the IDF on 29 July that "all movement in South Lebanon shall be considered hostile by the IDF, with the exception of NORBATT." I informed the IDF that this was not acceptable and that UNIFIL vehicles would continue to move. Similarly, the same day, I planned to fly by helicopter to IRISHBATT to view the situation there at first hand. The IDF, however, refused to give clearance for the flight. I informed them that the flight would take off as planned, which it did. The response in the remaining population left no doubt that these actions contributed to their safety.

Third, during the operations, UNIFIL units undertook to give aid and shelter to the local population. Many took shelter inside UN positions and were, in addition, provided with basic necessities, such as food, water, and medicine.

Fourth, patrolling and establishing temporary checkpoints continued where possible to protect civilians who had not left their villages. Patrolling also provided the accurate information necessary for me to have a clear picture of the situation on the ground. In turn, this information was used in the formulation of protests to the IDF.

Fifth, I repeatedly and strenuously protested to the IDF about their actions. These protests outlined the extent of the human suffering and material damages. In addition, I continually emphasized the need for the IDF to maintain some credibility in the area. If it failed in this regard, the prospects for peace in the future would be greatly reduced.

In general, UNIFIL's role during the Israeli operation was twofold. Both are illustrative of a classic peacekeeping operation. On the military level, the continued presence and patrolling of UNIFIL troops—"showing the flag" in the villages—acted as a restraint on the IDF actions. The Israelis took the possibility of UN casualties and the resulting international "public relations" damage very seriously. By extension, our presence therefore afforded protection to the population and property in the area. I have no doubt but that had we been absent, far greater damage would have been inflicted.

Our contacts with the Hezbollah were just as detailed as with the IDF. However, these contacts reached their highest intensity prior to the Israeli operation. With the
Hezbollah I worked along two tracks. One was based on the fact that because they also had to think about their future role and legitimacy, they had to pay attention to the safety of the population. This required staying clear of occupied buildings and sensitive objectives. The other track was more direct and at times confrontational. By monitoring the Hezbollah and other groups, we were able to predict what they had in mind and react accordingly, taking up positions where we knew they would operate. Depending on the situation, we succeeded in reducing their activities.

At all times during the operation, I kept contact with both sides, through the authorities in Beirut and Saida, in Tel Aviv and Zefath. Special contacts were also activated to the extent necessary. I urged restraint by both sides and protested strongly about their actions. These contacts did have a positive effect. By the very fact that we were there and took action, we played an important humanitarian role, both directly and indirectly. The noncombatant civilian population was provided with protection, food, water, and medicine. After the cessation of hostilities, the force helped clear up the villages and aid the speedy return of refugees (approximately 300,000 persons). UNIFIL also worked with the other UN aid agencies in Lebanon to help in the reconstruction of the area.

In conclusion, UNIFIL provided protection to the local population, restrained the activities of the IDF and the other parties, and, by providing information on the events in the area, aided the peacemaking process.

■ Standby Aspect

Issues in South Lebanon that may affect the situation during and after negotiations include the following: first, the relationship with the SLA; second, relations with the Palestinians; third, sharing of natural resources: fourth, the principles of the withdrawal; fifth, international borders and questions about encroachments; and sixth, security arrangements.

I believe UNIFIL will initially have a role in the process. After some time, UNIFIL will be replaced by another type of force, probably a monitoring force. In planning for Israel's withdrawal from Lebanon, two models have to be studied:

- Withdrawal taking place in a hostile environment.
- Withdrawal taking place in the absence of hostilities.

It is necessary to define what we mean by withdrawal. In both of these scenarios, UNIFIL can play a role. There is a question of whether or not Israel would prefer to withdraw in a hostile environment. Lebanon will probably try to avoid hostilities while the Israelis withdraw, and UNIFIL would support this.

The security systems that will be put in place are likely to be structured around two mechanisms. In the nation-to-nation military mechanism, the most important elements are confidence and commitment. The initial nation-to-nation mechanism itself serves to deter possible aggression and surprise attacks. In this mechanism, UNIFIL could fulfill a role. Against the background of American participation, we can foresee two major options: multinational (peacekeeping) forces outside the UN or a monitoring force under the UN umbrella.

Additional measures to stabilize the situation could include the establishment of major international peace-maintaining institutions such as a regional bank, balanced regional force reductions, mutual inspections, notification of troop movements, and verification. UNIFIL could be used to perform important tasks in the main process, providing:

- A mechanism to mediate between the parties.
- A link to the SLA.
A military presence until the situation is considered stable.

A reorientation from a stabilizing force to a monitoring element. The so-called "security zone" turns into a "monitoring zone" until the situation is stabilized. A prerequisite to withdrawal will be the disarming of the SLA. As soon as withdrawal takes place, we can have either a demilitarized zone (DMZ) under a UN force or a force outside the UN umbrella. The withdrawal from Golan and the withdrawal from south Lebanon are closely linked. In the case of a partial withdrawal from Golan, south Lebanon may continue to serve as a pressure point on Israel for a complete withdrawal.

Concluding Remarks

What I have presented here is not an extract from "Nordic experiences" for the simple reason that a compilation of such lessons does not exist. What I have presented here is an extract from my own experience. Although it would be possible for me to suggest technological solutions (it has been tempting), I will not go into further details on this issue.

Peace operations are an integrated part of political solutions. Technology introduced into a peace operation has to be tailored to further political goals.

What we observe these days is in fact very much characterized by the tendency to find some kind of a deus ex machina in the military apparatus. The paradox in this situation is the general trend to reduce military budgets. At the same time, we see a dramatic increase in the use of military force to solve political problems—at an early stage of conflict.

The motives to argue for employing new, better, and more technology are many, from security for the troops, to establishing superiority in combat power to the belligerents, to saving money. Yet, the main lesson learned involves a deeper understanding: real power and the ability to handle conflicts are not measured in military power, but in the ability to reason.

Because this picture truly is not black and white, the need for sufficient military capability cannot be ignored. In my opinion, technology in peace operations, first and foremost, can support the peacemaking political process if it is tailored to the intelligence organization, enhances monitoring capabilities, and improves operational mobility in the widest sense of the word.

Technology can support confidence-building measures, the credibility of the mission, and help sustain the entire process as its goals. But ultimately, technology is nothing without the people who employ it. It is the commander and his troops, their presence, and commitment to the locals, no matter who they are, that are key to confidence and mission success.
Notes

1. The intelligence on which I depended can be separated in two parts: one based on the force military information service, and the other based on the force commander’s (FC’s) information. The senior military information officer’s (SMIO’s) background and insight in intelligence, and the personal professional contact between the FC and his SMIO turned out to be crucial. All operational and other decisions were basically based on UNIFIL’s organic intelligence.


3. Shimon Peres, The New Middle East, pp. 67 ff.

4. UNIFIL could also be used as a basis for such a reorganization.

5. Putting American troops on Golan and/or in south Lebanon would have certain consequences: (1) expose those troops unnecessarily to terrorist attacks, (2) cause the US to become “neutral” between Israel and states such as Syria, (3) “compromise” Israel’s freedom of action to strike Syria in case of emergency, and (4) diminish US respect for Israel’s self-reliance.
Extended Peacekeeping/
Peace Enforcement
In reviewing the nasty, tangled, and complex struggles that have challenged peacekeepers in the unstable post Cold War world, it is clear that improved technology could have contributed significantly to the effectiveness of various efforts around the globe. Better technology might not have made the decisive difference, but there is no doubt that it would have improved the chances for success of many peacekeepers who have found themselves operating in the quicksand of Operations Other Than War (OOTW). Too often we have asked peacekeepers to deal with these messy situations with inadequate means. We have not taken full advantage of technology that is already available, and we have not adequately explored what better tools technology could provide to future peacekeepers in the inevitably similar challenges of the future.

This paper primarily addresses the situation in Somalia during 1993 and 1994 because it was a complex peace enforcement operation with which I am intimately familiar and one in which the costs were too high and ambitious goals only partially achieved. After briefly exploring the problems associated with a hastily organized international military force in Somalia, I will then consider how technology might have made a difference, given the tasks unique to that situation. Those familiar with other recent peace enforcement challenges can probably identify with the glaring needs in Somalia. The similarity of problems faced by peacekeepers in differing situations around the world is striking. Many of the problems encountered by the UN mission in Somalia, for example, were similar to those being experienced by other missions going on at the same time in Cambodia and Bosnia.

Many of the instabilities unleashed during this period have been ethnically based and internally centered. Such complex situations require a skillfully applied mix of political, humanitarian, and military resources. Whether operating under Chapter VI or VII of the UN Charter, a peacekeeping mission needs to minimize the use of force whenever possible and to take extra precautions to avoid collateral damage. It is important to maintain the support of the majority of the population, whose goodwill is essential to any recovery, even if force must be used against troublemakers.

However, in many situations ahead, this new world disorder will require determination, commitment, and readiness to use
force. Often, the UN or other peacekeeping organization will face obstructionists who have no interest in reasonable solutions to conflicts. Coercion or the recognition that force could be used will be necessary to convince troublemakers to cooperate with international authorities. This has been true in the case of external aggression (e.g., Iraq's invasion of Kuwait) and in the case of internal disintegration of countries with growing anarchy and humanitarian catastrophes (e.g., ethnic cleansing in Bosnia, genocide in Rwanda, and man-made starvation in Somalia).

Some veteran peacekeepers believe it is impossible for international organizations such as the UN to use force without seeming to be taking sides among disputing groups, placing themselves in a dangerous no-win situation. But there will undoubtedly be future situations in which one party is the clear aggressor (as in Bosnia) or the UN has been directly attacked by a single faction (as in Somalia). In such situations, the ideal option of neutrality may no longer be appropriate and decisive action may be required by a peacekeeping force if it is to remain effective and credible. The prospect of peacekeepers standing by while innocent people are slaughtered or of peacekeepers being taken hostage or chained to facilities as human shields (as in Bosnia) is clearly unacceptable.

Others would oppose the use of a technological advantage if it gave the appearance of being "unfair." It is argued by some that peacekeepers should be unarmed or only lightly armed and that any fighting should be on a nearly even playing field. These arguments may have some merit in unusual circumstances, but as a general rule technology should be exploited to its fullest advantage to prevent casualties to peacekeepers, to minimize injury to those who interfere, and to convey, to those who choose to oppose a peacekeeping operation, a clear message that cooperation is the only sensible alternative. Technology can help minimize force as well help make an emphatic point.

The Somalia Challenge

In reviewing the UN experience in Somalia, it is often overlooked that the means available to the UN mission were not equal to the tasks assigned by the Security Council. The UN was so unready for that complex peace enforcement and nation-building operation that it is difficult to make a valid judgment about what might have been possible with proper preparation, resources, and technology.

A frustrating UN attempt to use a small force (UNOSOM I) under Chapter VI of the UN Charter was one of the reasons that the larger coalition spearheaded by the US-led Unified Task Force (UNITAF) in December 1992 was given unprecedented peace enforcement powers under Chapter VII of the Charter. In relieving UNITAF in May 1993, the UN peacekeeping force (UNOSOM II) was also given the same far-reaching authority. But the UN clearly was not ready for the political stresses of a Chapter VII operation. Such a mandate recognizes the potential need to use force to achieve its goals and, implicitly, that there may be armed opposition.

In Somalia, the challenges were more political than technical, more dependent on the commitment and perseverance of nations than on technique and technology. Nonetheless, it is likely that with better technical capabilities the story would have been different.

For its first Chapter VII operation in a failed nation, the UN developed a force along the familiar lines of Chapter VI. But in conducting an operation for which consent from various contesting factions might not be obtainable and was not a prerequisite for the entry of the UN, the force needed a high degree of political and military cohesion. Organized opposition quickly exposes weaknesses and requires greater
mutual protection, cooperation, integration, and unity.

In preparing for this peacemaking force, the UN solicited countries with a wide range of backgrounds and capabilities. Nations that normally are rivals (e.g., Pakistan and India) were thrown together and expected to cooperate. By way of contrast, although the NATO alliance has many political and military weaknesses, it has prepared for potential combat through more than 40 years of training exercises and has developed political and military procedures for coordinating and unifying the policy interests of nations. In addition, it is primarily a defensive alliance of nations with shared values.

For UNOSOM II, some 30 nations were brought together in small units to intervene in a failed and fractured nation. Desert Storm and the UNITAF part of the Somalia operation were organized under a single dominant, unifying force. The US provided the overwhelming bulk of the military strength. When UNITAF left Somalia, responsibilities shifted from a superpower to a weak and diverse international organization.

Almost all of the nations involved limited what tasks their troops would undertake, where national units could work (e.g., some refused to be located in the capital, Mogadishu), and how their troops would react to various situations. Nations delayed for months in sending urgently needed troops that had been promised, rotated their units frequently, and arbitrarily pulled them out altogether on short notice. The UN military commander was frequently unable to move ahead with strategic plans because of the need to cover gaps caused by departing units or to readjust the disposition of his forces.

The state of training and the quality of equipment of units varied significantly. In trying to find replacements, UN headquarters in New York tended to simply count numbers of troops. But one was not equal to one when evaluating soldiers from different nations. Some of the units simply did not have the training to do what the Force Commander required. For example, some units were uncomfortable patrolling at night or expanding the perimeters around compounds to help prevent short-range mortar attacks.

When heavier or more capable equipment was urgently requested by the commander, the UN was dependent on nations for immediate results. It had no reserve of its own to draw on in emergencies. After the attacks of June 5, 1993 against the Pakistani force, for example, the Security Council urgently called for member states to contribute “armored personnel carriers, tanks, and attack helicopters.” More than a month later when eight old M-48 tanks finally arrived for the Pakistanis, who needed heavier equipment to operate in Mogadishu, their breech blocks were inoperative.

From ammunition to maintenance to language, interoperability of this hastily assembled force from all over the world was a continuing challenge. Such problems are to be expected in a “pick-up” international force. But an even more difficult problem is the inherent tendency of nations to micromanage their units from distant capitals. It is understandable that nations would want to control their units facing dangerous situations, but this inclination presents a nearly insurmountable obstacle for a commander trying to marshal limited resources and to implement a coherent strategy. On one occasion, a unit was stopped by its capital from counterattacking in mid-battle. Instead of receiving an important message concerning the consequences of interfering with peacekeepers, the adversary was emboldened. Some national units were even suspected of colluding with opponents of the United Nations, at least to the extent of providing them a de facto sanctuary.

Another problem was that each nation seemed to have a different political threshold for casualties. No country had an easy
time justifying losses in what was basically a humanitarian situation. In fact, this is a critical vulnerability of peace enforcement. Tolerance for causalities is very low because the threat to national interests is often equally low. In Somalia, some nations seemed to believe that Chapter VII still implied a relatively risk-free operation. When dangers increased, the result was often inaction, accommodation with adversaries, or departure. This series of reactions produced a much less effective force. Given how the force in Somalia had been assembled, with no unifying set of deeply shared national interests, expectations should not have been high that it could accomplish much if tested. The UN demonstrated that it was not yet ready for Chapter VII peace enforcement operations. However unrealistic, better technology might have helped compensate for this inherent political dependence on nearly casualty-free operations.

Tasks for Technology in Somalia

With more effective technology, the tasks faced by UN military forces in Somalia could at least have been made easier and might have helped produce better outcomes. For the most part, the UN did not face overwhelming, sustained, or even skillfully executed attacks. Somalia has a large land area, but a relatively small population. Although there were different types of challenges throughout the country, most of the opposition was limited to a portion of Mogadishu. The tactics used against the international force there were typical of guerrilla warfare in many areas of the world. Nonetheless, in an urban setting such as Mogadishu these tactics can be difficult to combat even with a well-trained force.

The following are some of the requirements of the UNOSOM II forces that could have been met more effectively with better technology.

Good Intelligence

To do their jobs, UN military commanders needed to be able to detect the movement of opposing forces, determine the locations of hidden arms stockpiles, and anticipate the plans of those who might attack. In trying to control a city at night and to ensure that various transportation routes remained open and were not used for smuggling arms into the city or relocating militias, 24-hour surveillance was necessary. Helicopters and AC-130s were the best means for active reconnaissance in the city, but these were not always available. Commanders requested the support of remotely piloted vehicles that could maintain good coverage over a sustained period. These might have provided a better picture around the clock, but they were never deployed.

Intelligence, of course, was also critical to the civilian effort to understand the political situation and to facilitate the complex reconciliation process among multiple factions and clans. Human intelligence and other means of understanding a complex society and sorting out intentions were essential.

Frustrating Attacks

Related to good intelligence was the need to be a step ahead of opponents and to anticipate their moves. When confronted with periodic random attacks such as ambushes and mortar attacks, it is important to prepare for them by taking proper defensive measures. Those in the military compounds were subjected to frequent mortar and rifle-propelled grenade (RPG) shelling and had to sprint from soft quonset huts and tents to makeshift shelters. Civilians, as well as military personnel, were equipped with flak jackets and helmets, but still they were constantly at risk.
Early warning helped, but it was often incorrect or unavailable. Warning can also allow more effective countermeasures and provide an opportunity to disrupt attacks before they are launched. This, however, requires good intelligence and the ability to evaluate, disseminate, and react rapidly. In an unsophisticated society, very ancient means of collection need to be fused with the most modern methods.

### Protecting People

A constant worry in Somalia was how to protect UN civilians and international relief workers. Shelling was just one of the dangers they encountered. Civilian vulnerability was the Achilles heel of the operation. Safety for civilians was paramount if the job of facilitating the recovery of the country was to be accomplished. Military units were organized, had the training and means to protect themselves, and faced danger as part of their responsibilities. Civilians, in contrast, were often assigned to remote areas where there were no nearby military forces or lived in compounds that did not have military protection. This made them vulnerable to criminals as well as to those trying to disrupt UN operations for political reasons. Locally hired guards were of uncertain reliability. Accusations were commonplace that guards hired by the NGOs protected them by day and robbed them by night.

In the case of civilians living outside the military compounds in Mogadishu, it was decided in mid-May, before the attacks of June 5, 1993, that the best way to improve their security was to deploy a Nepalese Gurka battalion. Eventually a civilian protection service, which could give some assurance of the reliability of locally trained Somalis, would be hired. In spite of the urgency of this need, it was four months before the first Gurkas arrived and protection improved for the civilians. This was typical of the unresponsiveness of the UN system to pressing needs in the field.

Fortunately, only one UN civilian was lost. Ironically, this tragic death came after the cessation of hostilities and resulted from a carjacking attempt by common criminals. Clearly, there needed to be ways of reducing the individual risks to these courageous men and women.

### Protecting Fixed Installations

Fixed positions and facilities required sensors that would give early warning of attacks or of the nearly continuous criminal activity. Night vision was essential, but very few UN units were trained in it and very little equipment was provided. There was every reason for the UN to control the night, but it did not have the training or equipment to do so.

Light mortars shelled UN facilities on many evenings, wounding civilians and military alike, damaging unprotected helicopters on the ground, and contributing to a sense of vulnerability and insecurity. Mortars would be pulled from vans and quickly set up; after a few shells were fired, the attackers would speed away. Greater vigilance at checkpoints and more active patrols outside the perimeter would have helped make it more difficult to reach the compounds with short-range mortars and with other weapons such as RPGs. Counterbattery radar finally did arrive and in some instances was helpful in pinpointing the areas from which attacks were conducted, but it would have been invaluable to have the ability to shoot back with confidence that the attacker would be struck and that collateral damage would be minimized.

There was also concern that terrorist raids would be initiated from inside. Large Somali trucks visited the compounds daily to bring supplies or to pump water or fuel; workers entered by the hundreds for construction or other services. Some of these
workers belonged to the Aidid political faction that was attacking the UN. Truck bombs could easily have been brought into the compounds. Gate inspection procedures were tightened, but this is not easy to accomplish in a multicultural organization. Advanced technology would have improved detection probabilities.

**Crowd Control**

A favorite opposition tactic was to stage a demonstration and attempt to provoke peacekeepers. Women and children would be deliberately mixed into organized crowds to complicate the problem of control. A classic example took place on June 13, 1993, when a demonstration was staged in front of a Pakistani strong point. Not by accident, the site selected was next to the only international press center in the city. As the mob converged on the Pakistani position, shots were fired at the soldiers from on top of nearby buildings and from the crowd. The beleaguered Pakistanis were provoked into returning fire, wounding some of the Somalis in the crowd. However, there was evidence that some Somalis in the crowd were also shot from behind by their own people in order to present an image for the press of a UN out of control. This incident was one of the reasons that it was decided four days later to declare that faction leader Aidid had become a menace to public safety who should be detained.

It would have been far preferable to have been able to disperse this organized crowd with nonlethal means, thus preventing a contrived demonstration from becoming damaging in terms of world opinion. Although the Pakistanis were supposed to have riot control equipment and training in how to use it, preparations were inadequate. It was believed, however, that prevailing winds would have prevented the use of conventional tear gas if it had been available. Equipment was flown in urgently and some training was subsequently conducted for UN troops with the help of US forces.

Capabilities improved, but crowds continued to be a problem. There was a need for a nonlethal means of breaking up mobs under all weather conditions and at least being able to separate out and protect noncombatants. Somali women and children were repeatedly mixed in with gunmen and used as shields. On June 17, 1993, they were used to close a Moroccan column to handgrenade range, resulting in serious casualties to perplexed soldiers who were reluctant to use bullets to stop them. Women and children were often used to construct roadblocks and were mixed into ambush groups. Aidid reportedly boasted that these tactics would intimidate UN soldiers. If he guessed wrong and women and children were hurt by UN peacekeepers, he could count on a media propaganda victory.

In one incident, a combination of US engineers and Pakistani escorts trying to remove a roadblock on a main artery were confronted by several hundred Somalis. With women mixed in their group, male shooters attacked from behind walls and buildings. The resulting defense by tanks and helicopters, in order to extract UN personnel from the ambush, resulted in heavy casualties to the Somali attackers. But the resulting media play was much more damaging to the UN.

Not only Aidid used these tactics. During the UNITAF period, Belgian peacekeepers watched helplessly in Kismayo while fighters from one faction (Morgan's) infiltrated into the town and a mixed-gender crowd chased out the supporters of another faction (Jess's). The Belgians were accused by Jess followers of deliberately allowing this to happen, but the Belgian troops were actually at a loss to figure out how to break up these mixed groups of combatants and noncombatants.

Swarming was also a difficult tactic to combat. It was evidently assumed that if
enough people ran at a vehicle or a cordon protecting a search operation, UN soldiers would face the difficult choice of either having to shoot unarmed civilians or having to retreat.

In all of these situations, an effective means of breaking up crowds and isolating shooters would have been useful. At one point, a multipurpose anti-riot control vehicle was offered to the UN by the French, but the price for this new technology was extremely high and there was only one of them available. The possible availability of slippery foam, super-slick oil, or super-stick glue and other nonlethal means to inhibit crowds is very appealing to peacekeepers who have been frustrated by these types of situations.

**I Communications**

For a widespread community of workers, both UN and NGO, there was a glaring need to be able to communicate flexibly within the cities and towns and between isolated posts and regional or national headquarters. In a dysfunctional country with no telephone system, the problem for the UN was to be able to talk reliably with representatives in widespread and remote areas of the country. This was necessary for safety as well as for timely reporting and policy discussions. Portable phones and radios were finally acquired in sufficient numbers to facilitate short-range communications within cities, but these were insecure. When phones were stolen or lost, Somalis were soon on the nets with disruptive chatter.

Better technology can ensure secure and reliable communications at short and long distances. Technology can also provide the means for intercepting, pinpointing, and blocking or interfering with the transmissions of troublemakers. Even in a nontechnological society, the ability to control communications, whether by radio broadcast, sound truck, or with high-frequency radios, would have been an advantage.

**I Freedom of Movement**

The ability to move throughout Mogadishu was important to resupply and reinforce isolated positions and bases, to transport relief supplies within and outside the city from the port, and to move personnel from housing to their place of work or to do business or conduct meetings within the city. These movements were countered by roadblocks, which were sometimes combined with ambushes, buried mines, and remotely detonated explosives. Bypass roads were constructed and guarded, routes were swept in advance and posted, times of convoys were varied and routes were changed regularly, helicopter transportation was used as an alternative, and escorts were provided.

Nonetheless, there was a need for earlier detection and better protection to reduce the dangers of ground movement. Work was hampered by the inability to move during daylight hours, and it was difficult to hold meetings when people had to come from different locations. Heavy armored vehicles for breaking down roadblocks were not available until after organized hostilities had been concluded. Technology may have some answers for the safer movement of people and vehicles in a dangerous urban environment.

**I Controlling Movement**

The opposite of ensuring UN movement was to deny it to potential attackers or those smuggling arms and ammunition into the city. A system of citywide strong points and checkpoints manned by UN military forces was developed, but this network was only partially effective. Inadequate searches at checkpoints and simple evasion techniques contributed to the inadequacies of this system. An integrated network was needed to
spot and counter those circumventing checkpoints with trucks and other vehicles. More thorough and effective inspections of vehicles were required to detect arms and other illicit goods. Indiscriminately shooting from the air at anything that moved was not a feasible alternative, given the potential for collateral damage, misidentification, and injury to innocent individuals.

Helicopters were of value, but eventually became a target for massed gun fire when flying low to the ground. There were rumors of shoulder-fired surface-to-air missiles, and precautions had to be taken to reduce vulnerability, but no missiles were actually detected. The “eyes over Mogadishu” program of surveillance with helicopters had some deterrent effect on movement, but observations from the air needed to be better integrated with effective monitoring, inspection, and interdiction on the ground. When AC-130 gunships were available, they had success in detecting and countering activities at night and were a respected deterrent.

- **Disarmament**

There was a need to find, contain, and destroy heavy weapons. Weapons were moved out of agreed storage sites and hidden in various clandestine caches around the city and in the countryside. While many illegal weapons were found and destroyed, an improved capability was needed to detect their presence and to destroy stockpiles from standoff distances without causing a high degree of collateral damage.

- **Demining**

As in many other countries torn by civil war, areas of the country were hazardous and difficult to use because large numbers of mines had been planted. This complicated the job for peacekeeping forces and those transporting food supplies. It was also a hazard to Somali civilians. A large number of Somali young men hobbled around on only one leg.

Civilian firms employing Somalis and enterprising Somali contractors were used to try to clear areas of mines, primarily by hand. The need for safer and more effective mine detection and clearing capabilities was apparent in Somalia, and the problem is even more severe in many other areas of the world.

- **Tracking “Elvis”**

Finding a few prominent individuals in a Third World city is not easy. Capturing them without significant casualties on either side requires a high degree of training and technology. Given a number of unsuccessful experiences worldwide, this is an area in which technology may one day provide some better answers. Part of the problem in Somalia was that specially trained forces did not come for more than two months, losing valuable time and adding to the degree of difficulty when they finally arrived.

It was also important to have the ability to locate and rescue hostages and prisoners. In Somalia, those who had been kidnapped or captured were only retrieved by negotiation. For this kind of situation, human intelligence is important, but technology may be able to help. For example, people going into dangerous situations may need hidden devices so that they can be tracked in the event of capture.

- **Security**

Security of information and military/diplomatic planning is essential. In a UN operation, individual units from different countries of a rapidly assembled force bring a diversity of standards. In Somalia the protection of telephone and other communications was nearly nonexistent and classified information was loosely handled. Surprise Ranger raids into Aidid areas uncovered...
sensitive documents of various UN and military organizations that had obviously been lifted from careless units.

On the civilian side, where there also were many sensitive negotiating and strategy papers and other documents that needed protection, the small UN staff came from 80 different nations. With traditional peacekeeping operations, UN personnel have been used to a wide-open system. Openness was considered a virtue because it helped reduce suspicion. The precautions required during a dangerous peace enforcement mission were not understood and UN personnel were not trained in proper security measures. This was not a case of carelessness and occasional lapses; the good habits that come from training and practice were nonexistent. Somalis who were not regular staff members were constantly lurking around offices in significant numbers, having been hired as cleaners and for other work requirements. Many came from surrounding local neighborhoods where Aidid’s clan was predominant. On one occasion, Aidid bragged to the UN political division chief that he saw papers intended for the Special Representative before the UN chief did.

Some training and tightening of rules resulted in security improvements. Safes and file cabinets with locks were ordered. Documents were shredded and burned and doors were locked when UN staff left their offices. Nonetheless, the whole operation was very loose and undoubtedly too much sensitive information was easily accessible.

Months went by before the mission could communicate in semisecure fashion with UN headquarters in New York from a few phones. Secure phones also were available to only a handful of officials in New York, meaning that considerable amounts of sensitive information undoubtedly were passed in the clear. Secure faxes helped with the most sensitive written communications, but faxing was a laborious procedure and many documents did not even have this modest degree of protection. Clearly, technology can help with this problem, but the UN culture and way of looking at dangerous operations also needs to be changed.

### Countering Criminality

Even in times when there was no organized opposition to the UN, criminals were a constant problem. In a society of 90% unemployment and desperate human needs, this is not too surprising. Compounds would be infiltrated regularly by thieves. NGO facilities were regularly robbed of cash, and even the UN payroll was stolen.

Once the UN received vehicles (shipped from the Cambodian operation that was winding down) they began to disappear, even from the UN compound. A veteran of UN Transitional Authority in Cambodia (UNTAC) remarked that exactly the same phenomenon had been experienced by that operation. In Mogadishu, there were numerous carjacking attempts. Simple anti-theft devices and countermeasures were needed. For example, a stolen car needed to shut down automatically. A March 31, 1995, newspaper headline from Haiti seems all too reminiscent, “U.S. Shifts Haiti ‘Rescue’ to UN But Criminals ‘Claim the Night’.”

Of critical importance to most peacekeeping operations is the ability to restore law and order for the civilians who live there and to shift the task as rapidly as possible to local police and judges who are reliable and acceptable to the populace. This allows UN peacekeepers to get out of the politically undesirable task of policing with foreign soldiers. It is often a task for which peacekeepers are ill-prepared. Technology can provide the tools that peacekeepers and local police need for dealing more effectively with common criminals, recognizing that political aspects and training are also essential to recovery of law and order in the hands of the host population.
I Civilian Needs

The civilian programs for providing humanitarian assistance, supporting the selection of District Councils in remote areas, and restoring the legal system needed help in many ways. One area recognized as critical from the beginning was the ability to reach the Somali population with information. The UNOSOM newspaper helped, although there were constant distribution problems, and it only reached a small percentage of the population.

But Somalia is an oral society and one in which destructive misinformation is often believed. Somalis listen intently to the radio, and UNOSOM needed to be able to reach audiences throughout the country. A broadcast system, inherited from UNITAF, reached Mogadishu and a little beyond, but a system was needed for the whole country. This was not the result of a technological gap. Equipment existed on the shelf. The challenge was to convince bureaucrats and committees in New York that communicating with the Somali people was an essential part of the mission. The value of this type of capability in the Cambodian operation had already been demonstrated.

After many budget battles and inexcusable delays, approval for a radio system that would extend nationwide was finally gained for Somalia. But this approval came so late that the equipment was never installed. The value of regular communication with the people was critical to an operation dependent on the good will and cooperation of the inhabitants. The provision of effective radio (and in some cases television) facilities should be an essential part of the packup kit for any peace enforcement operation in the future. Early delivery of portable and mobile packages would have helped in Somalia.

I Nonlethal Alternatives

There were many instances when nonlethal alternatives would have been considered if the means had been available. For example, this might have been a better method than aircraft guns for removing Aaidid’s propaganda radio from the airways.

As indicated in the section on crowd control, there were many situations in Somalia in which civilians were deliberately used to intimidate peacekeepers or to accomplish tasks such as putting up roadblocks that interfered with UN military operations. A means for stopping these activities without permanently injuring the civilians would have been useful. In most instances, such alternatives also would have been desirable for both humanitarian and political reasons. In such situations, one does not want to be accused of injuriong “innocent civilians” even if they are guerrilla fighters in disguise.

In addition, it is far preferable in peace enforcement situations to be able to disable rather than kill a potential attacker when feasible. Military victories can become political defeats in the glare of global media and when facing the subtle complexities of shifting clan alliances and loyalties in an entirely different cultural framework. It is also desirable to limit collateral damage to civilians, their infrastructure, and the environment. Ultimately, much of what is destroyed will probably have to be rebuilt if the society is to get back on its feet. Therefore, it is desirable to have precision weapons systems that can deliver accurately ordnance that is appropriately sized for the specific task at hand.

Peace enforcement walks the fine line between decisive military action and passive neutrality. Peacekeepers of the future will need tools that are both flexible and
Chapter 4 Peacekeeping and Peace Enforcement | 51

accurate. Such options add to the burden of training soldiers and could increase vulnerability if there is over-reliance on these measures at the expense of active self-defense. Nonetheless, a set of graduated responses to deal with a wide range of situations might increase the probability of success of a policy. Nonlethal weapons were carried by US Marines who returned to Somalia in March 1995 to cover the final departure of UN forces. They have also been selectively deployed in Bosnia to support some of the US military activities there.

Conclusions

Although many of UNOSOM II’s needs could have been filled with better training, increased resources, and a more responsive system, UN experiences in Somalia demonstrated a number of technological needs. As described above, some of these requirements included the following:

- Better ways to prevent and counter short-range mortar attacks. Early warning of these and other types of attacks is essential to protection of personnel.
- Improved capabilities to detect and prevent intrusion into fixed installations, especially at night.
- More effective riot-control equipment. Noncombatants need to be discouraged from mixing with combatants or carrying out tasks on behalf of shooters who use them for shields or to accomplish other dangerous tasks. Swarming tactics by unarmed “civilians” must be thwarted with means other than bullets.
- Advanced capabilities in the detection of mines, remotely operated explosives, and ambushes.
- Ways to reduce the dangers to civilians operating alongside the military in a semihostile environment.
- A system of overhead coverage with real-time feedback to ground forces to improve opportunities to disrupt hostile or illegal activities.
- More effective methods of moving people in a city with potential guerrilla/terrorist threats.
- Better ways to inspect personnel and vehicles legally entering guarded compounds.
- Secure, flexible, reliable, and redundant means for communicating to both short- and long-distance sites.

The types of challenges UN forces faced in Somalia are probably typical of what can be expected in many future situations. Technological advances and proper training can ease the difficult tasks of peacekeepers and their civilian counterparts. While not a panacea, nonlethal options can provide essential flexibility. If we hope to have an effective capability for peace enforcement, improved technology will have to help supply the means.
Note

A friend of mine, currently serving on the Central Staff in the Ministry of Defence in London, recently visited Split and was talking to the UK Consul there, a Croatian. They were admiring the stunning coastal view and my friend asked the Consul how long he thought it would take before some form of normality might return to this beautiful country.

"Two or three," was the answer.
"Years?" asked my friend.
"No—generations," was the Consul’s reply.

Prelude

There is sometimes the urge to see the various factions in Bosnia in “good guy” and “bad guy” roles. Nations’ experience in-theater does not support this.

In parallel with attacks on the safe havens, a US-sponsored peace initiative was under way in August 1995, led by Ambassador Holbrooke, who stepped in to lead the US team after Ambassador Frasure was tragically killed outside Sarajevo. The Holbrooke-brokered ceasefire became effective on October 12 and the Dayton peace talks began on November 1.

Overture

The foundation stone of the IFOR deployment and operation was the Dayton Framework Agreement and its 11 annexes. The key date to which all progress was related was the date of Transfer of Authority (TOA), December 20, 1995, on which command in-theater was transferred from UNPROFOR to IFOR. It must be said that IFOR was purely the military instrument of the Dayton agreement and governed by just one of its 11 annexes (Annex 1). The other annexes dealt with the vast range of civil administration matters, among them elections and reconstruction, without which no lasting peace could begin, let alone endure. At the heart of Annex 1 are the requirements for compliance by the warring factions and the primary tasks for IFOR.

The warring factions had to follow a three-phase process:
• Phase 1. Withdraw behind a Zone of Separation (ZOS), 2 km either side of the ceasefire line, remove weapons and mines from ZOS, and mark mines elsewhere—within 30 days of the TOA.
Phase 2. Vacate and clear territory to be transferred to another faction—within 45 days, IFOR providing security until Day 90.

Phase 3. As confidence-building measures, withdraw heavy weapons and forces to barracks or designated places and demobilize forces which cannot be accommodated—within 120 days. IFOR’s primary tasks were to:

- Monitor and help ensure compliance with the warring factions’ withdrawal, redeployment, and establishment of the ZOS. This includes ensuring compliance with the cessation of hostilities.
- Authorize and supervise the selective marking of ceasefire and inter-entity boundary lines and the ZOS.
- Establish liaison arrangements by setting up the Joint Military Commissions.
- Assist in the withdrawal of UNPROFOR and, if necessary, United Nations Confidence Restoration Operation in Croatia (UNCRO).

The Dayton milestones were:

- December 14: Agreement signed in Paris.
- December 15: UNSCR 1031 passed, authorizing IFOR to act under Chapter VII of the UN Charter.

The intention was to have all IFOR fully deployed by the middle of January. Without any doubt, the execution of Dayton from a standing start would not have been possible. Several factors, however, helped considerably. First, both SHAPE and CINCSOUTH had already been through similar planning processes for the Vance-Owen Peace Plan, the Geneva Peace Plan, and planning for the extraction of UNPROFOR. As part of this, NATO had completed extensive reconnaissance of routes, infrastructure, ports, and airfields. NATO also had a fully worked up Corps HQ—the ACE Rapid Reaction Corps HQ. In addition, IFOR was not moving into a bare base situation but was taking over UN facilities, units, and information. Finally, as you might imagine, as soon as there was a sniff of a chance that a deployment might be on the cards, wheels began turning in the preparation process—even before the Dayton talks commenced.

The Main Event

SACEUR’s plan translated Dayton into a five-phase sequence for IFOR:

- Phase 1. Preparation and deployment of theater-enabling forces.
- Phase 2. Reception and onward movement of forces in-theater.
- Phase 3. Execution of peace implementation missions and tasks.
- Phase 4. Transition to peace, maintaining the established lines and areas of separation and helping with reconstruction and the expansion of civilian contributions.
- Phase 5. Exit. The withdrawal of all IFOR personnel and equipment from theater.

Let me take each of these phases in turn and pick out the highlights for you of the IFOR experience in each one.

Phase 1

Force Preparation

As you would expect, many aspects of this were put in-hand weeks before the actual deployment. Matching troops to task required an in-theater force of over 50K on the ground coming from 30 countries including all NATO, selected Partnership for Peace countries, and some others. The politics involved were sometimes difficult but there was a general eagerness to be involved combined with some firmly held, and occasionally esoteric, views on what individual contributions should be.
First of all, there was a useful rump to be retained from UNPROFOR, of which the bulk were French and UK. Then the mix needed to be changed to provide greater fighting capability with heavy weapons, attack helicopters, armor, and more mechanized units. Finally, a major augmentation in numbers was needed. This brought in for the first time some 20K US ground forces, among others. NATO mechanics for force generation were used and the different stages of FORCEGEN (SHAPE's invitation for contributions from nations), FORCEPREP (proposals from nations), ACTWARN (SHAPE notice to be ready to move) and ACTORD (SHAPE order to deploy) worked well.

In IFOR’s view, however, the necessary force structure was never fully resourced. For example, a Corps Reserve was never provided and there were virtually no Corps-level troops, particularly logistics, for the Corps Commander to deploy across divisional boundaries. A crucial innovation that worked well was the sending of a NATO “Certification Team” to each non-NATO contributing nation to assess if the proper level of preparedness had been achieved for training, equipment, structure, and logistics. NATO provided assistance with training and advice where necessary. The Military Committee, the North Atlantic Council, SHAPE, CINCSOUTH, and individual nations worked through various iterations of the OPLAN, Rules of Engagement, and Force Proposals. These were approved by the NAC and issued by SACEUR on December 16.

**Finance**

This aspect seemed always to move at Cold War speed and to be controlled by continuous crisis management. The root problem was how to fund common services in-theater, where one nation could find itself reconstructing a bridge, renovating a building, or repairing a road, all of which would then also be used by other nations. Certainly the issue was raised at SACEUR level in December and addressed by NATO finance committees and nations, but a responsive blueprint on common funding was never achieved and requirements were still being worked on by ARRC HQ three months into the deployment. At least this was recognized as a problem at the outset and, while common IFOR solutions were lacking, it was possible for each nation to train and advise its own finance staff in-theater on how to deal with the most common problems.

**Logistics**

Earlier OPLANS for Vance/Owen, etc., had envisaged a multinational logistics structure governed by the principles of MC319. However, it became clear in the planning process for IFOR that nations were unwilling to risk losing some control of their own support, particularly with so many non-NATO nations involved. IFOR logistic support therefore was provided on a national “stovepipe” basis. As a very rough general assessment, there was about a 30% overinsurance for logistics as a result—with the attendant extra cost. A novel innovation for IFOR was the introduction by CINCSOUTH of a two-star Commander Support in Zagreb, accountable direct to CINCSOUTH and responsible for coordinating common support functions at third line. This US Army General, in post with his staff well before IFOR deployment, provided invaluable help, particularly with movements coordination, organizing a proper handover with the UN administration of logistic services and UN equipment, and arranging blanket contracts for common commodities such as fuel—thus avoiding some potentially awkward price wars.

**Deployment**

It was crucial to achieve a properly coordinated and executed deployment because anything less than the prompt arrival of complete and powerful formations
would not have allowed a neat transfer from the UN and would have sent entirely the wrong signal to the warring factions in-theater. The biggest task by far belonged to the US, which had to move an armored division, complete with all equipment, overland from Germany, across Austria, Hungary, and Croatia, into the northern sector. The weather and shortage of rolling stock did not help but the major move was completed and provided the first operational opportunity for the C17 heavylift aircraft to show its very impressive capability flying loads, including main battle tanks, into Tuzla. In order to establish the force in time it was necessary to move enabling units into theater by air (for example, communications and logistic units and HQ staffs) well before the Dayton signature. While several units were already in-theater as UN units, and overland was the best option for deploying other units, the UK deployment of heavy equipment and armor provided some interesting lessons for the future. The UK had sufficient military air assets to move its enabling units early into theater but would normally rely on the world shipping market to charter vessels to move heavy equipment.

For UK IFOR, there were two problems. First, the world shipping market needs some notice to come up with suitable specialized shipping (in this case, RO-ROs). To guarantee their availability, these would have had to be contracted well before the Dayton signature, for which the timing was by no means certain. Second, political approval to commit the extra costs is not usually given until firm justification exists, in this case a signed peace agreement. The solution proved the benefit of the very close working relationship that exists between the US and UK logistic staffs. The shipping availability problem was solved by obtaining, not for the first time, US agreement to use a couple of their short notice Military Sealift Command RO-ROs on contract. The difficulty of financial approval was solved by persuading the Cabinet to give financial approval in principle and to delegate authority to the Ministry of Defence to commit expenditure whenever necessary to meet deployment deadlines. The first RO-RO was already activated and at sea on the day the peace agreement was signed, and the deployment deadlines were met. Since then, following a careful assessment of the requirements of the UK's Joint Rapid Deployment Force, the UK is contracting a medium-size RO-RO on bareboat charter from the beginning of November and is considering a second one. If NATO is to be able to deploy a force rapidly in the future, it will need to carefully reconsider its reliance on the availability of world commercial shipping and on the US for heavy lift aircraft.

UN/MOA/SOFA

Three important building blocks had to be put in place during this phase. First, agreement had to be reached with the UN on the transfer of certain equipment, and its conversion from "white" to "green." This was fundamental to the effectiveness of some previously deployed UN units—for example, the Malaysians, most of whose vehicles were UN-owned. This worked quite well, although there were some last minute hiccups because UN officials on the ground had not been briefed by their HQ. Second, MOA had to be created to cover support arrangements between nations where one relied on another for specific services. (This applied within rather than across divisional boundaries.) Lastly, the SOFA had to be carefully written to guarantee freedom of movement for IFOR and cover other host nation issues such as use of buildings and a zero liability for airfield landing fees, harbor dues, and customs duty. This did not always work in practice but at least we had a principle to work from!
Chapter 5  The Challenge of Bosnia—The IFOR Experience

Phase 2

Command Structure

IFOR is ultimately accountable to the North Atlantic Council through SACEUR in his SHAPE HQ in Mons. The Commander IFOR is CINCSOUTH (initially Admiral Leighton Smith, now Admiral Lopez) in Sarajevo but with his parent HQ in Naples. Reporting to CINCSOUTH is COMARRC as Land Commander in Sarajevo, COMNAV SOUTH as Maritime Commander in Naples, COMAIRSOUTH as Air Commander in Vicenza, and Commander Support in Zagreb. Maritime and air involvement has been minimal but resources are available if needed. On the land side, the theater is divided into three divisional sectors:

- Sector North, with a US Division HQ in Tuzla.
- Sector Southeast with a French Division HQ in Sarajevo.
- Sector Southwest with a UK Division HQ in Gorni Vakuf.

The Dayton Agreement also provides for a High Representative and Joint Military Commissions. The High Representative, Carl Bildt, has the huge and unenviable task of implementing the other 10 Dayton annexes and answers jointly to the UN and EU through a Contact Steering Group with members from US, UK, France, Germany, Russia, and Italy. The HIGHREP and his team work between Sarajevo and Brussels and have close liaison, but no command relationship, with IFOR. The Joint Military Commissions exist at each command level from COMARRC down to Brigade, are chaired by IFOR, and include members from each warring faction and from the HIGHREP. The composition of each Multi-national Divisional Sector shows the impressive variety of nations involved. This structure did take a while to resolve, however. I can remember having the UK sector drawn on a wallboard in my office over the Christmas period as we were trying to contact the other nations to arrange MOA and support agreements. Nearly every day I had to wipe the board clean and start again. The roll of honor now reads: all NATO nations plus Austria, the Czech Republic, Egypt, Estonia, Finland, Hungary, Latvia, Lithuania, Malaysia, Morocco, Poland, Romania, Russia, Sweden, and the Ukraine.

Headquarters

The nature of CINCSOUTH’s HQ in Naples made its original staff composition very maritime- and air-dominated. This HQ therefore needed a major army augment and workup. In Sarajevo, political considerations had co-located the HQs of COMIFOR, COMARRC and MND(SE), leading inevitably to uncomfortable overcrowding and some blurring of the strategic, operational, and tactical levels of command. The blurring was compounded by COMIFOR needing to divide his time between Sarajevo and Naples. This condition persists to this day.

Phase 3

ARRC Factions Meeting

A key move occurred when ARRC senior staff invited military leaders of the three warring factions to a meeting about two weeks before TOA and provided each with translations of the Dayton Agreement showing clearly the Dayton instructions, signed as agreed by each political leader, with which they were required to comply. The factions clearly respected being brought “onboard” in this style and in some instances they possessed more accurate and up-to-date instructions than their immediate superiors.

ARRC Campaign Plan

The Dayton Agreement was an immensely valuable tool for the ARRC staff as it provided an amazingly precise timetable, plus a clear mandate for IFOR, on exactly what was to happen during the first 120 days.
IFOR strongly believes that the Operational Commander must be given command authority. A major limitation to COMARRC's flexibility was that he did not have the authority to move units across divisional boundaries, but could ask to do so in exceptional circumstances. On one occasion, to redeploy one artillery and mortar locating radar section of 10 personnel into the French Sector took three weeks and involved 47 stars, including the Chairman of the Joint Chiefs of Staff.

Political instructions are one thing, but relationships on the ground were excellent and each of the three divisional commanders gave their unofficial assurance to COMARRC that they would move anywhere necessary if a serious problem arose. This actually happened when three UK personnel were killed in a minefield and US helicopters were airborne and on their way within minutes. The lesson is to know well the people you are working with.

War Criminals
Handling of war criminals is always a sensitive issue, but it must be remembered that while the NAC could have amended the mission to include seizure of war criminals, it chose not to do so. The assessment on the ground was that it was correct not to go for seizure as this would probably have destabilized the process—which is perhaps what one of the factions was hoping for—and it could have been dangerous to personalize the matter.

Mission Creep
There was almost a paranoia about resisting this, but occasions when mission "development" would have been prudent. An example was transfer of suburbs to other factions when the leaving faction frequently looted and burnt the area being vacated while NATO troops looked on. Eventually, though not strictly within the mandate, NATO troops arrested looters, searched them, and turned them over to police custody, all without trouble. In fact, this earned NATO greater respect.

Mining
Mining is a huge and chronic obstacle to recovery and reconstruction. IFOR policy was to clear only those mines that threatened or prevented the military mission. General Delic, the head of the Bosnian Muslim Army, when asked how long it would take to satisfy the demining requirements of the Dayton agreement, replied "about 30 years." Any technical development that can speed the processes of detection and sweeping will not only be a humanitarian blessing and lifesaver, but also commercially very attractive indeed, worldwide.

Communications
No campaign debrief ever fails to mention this critical service. In IFOR the communications worked well largely because it was relatively uncomplicated, with UK communications equipment used at HQ level and US communications used outside the Corps HQ. The drive for UK/US interoperability made great strides and more progress in this was made in the three weeks before deployment than during the previous 40 years of NATO existence. This continues to be a mission-critical component and the drive for ever-greater interoperability must continue.

Transport
Roads in Bosnia are generally poor and difficult to maintain, and winter weather does not help. The ability to handle rough terrain and carry large loads, and the versatility, of specialist military vehicles such as the UK DROPS, and its French and US variants, made these worth their weight in gold.

This was the phase in which the bulk of the military tasks set by Dayton had to be achieved. That the highlights above contain no mention of firefightes and conflict tends
to mask the professionalism with which all tasks were calmly and competently carried out, and owes everything to the planning and success of Phases 1 and 2. IFOR has ensured the factions’ general compliance with all the key military requirements of the Agreement. Bosnia is now a changed country from a year ago. Fighting has stopped and the faction forces are separated, their heavy weapons and soldiers returned to barracks or demobilized. People are now walking streets they previously did not dare to cross, trams and buses are running again, utilities are being reconnected and people are beginning to return to work.

Phase 4

Reconstruction

With the military tasks largely completed, bar monitoring, there is some scope for assistance to civilian tasks. Reconstruction is a priority. For some nations, however, this raises a financial difficulty, since reconstruction is not a proper cost to their defense budgets. Nonetheless, some nations are funding military contributions to reconstruction and engineers are helping to rebuild schools, hospitals, bridges and roads, as well as helping to restore essential services such as electricity and water.

Joint Military Commissions

Military commissions have been a great success throughout Phases 2, 3 and 4, and are highly valued by IFOR Commanders for providing a regular forum at all levels in which problems can be identified and resolved without the use of force.

What Lies Ahead?

Phase 5 has not yet begun. Without any doubt the focus is now on the coming elections as the key to future success. In advance of this, the emphasis is on substantial visible reconstruction so that locals can see the benefits of peace if they are to vote for it. Seen from IFOR, the civilian process is much more difficult and diffuse, and had a slow start because of underfunding and understaffing. The various factions are not slow to exploit the many gaps in the Dayton Plan non-military annexes. UNSCR 1031, IFOR’s mandate, expires on 20 December 1996 and there is much speculation, and doubtless political debate, on whether a further military presence will be required after that date. At this stage, and seeing what has been achieved, it is difficult to envisage that some form of credible military force will not be needed for some time beyond the elections, if only to underwrite the fragile roots of a newly structured society. Any such force would almost certainly follow the “in together, stay together, out together” principle. In a discussion among IFOR staff and other politicians, the Deputy PM of the Republic of Srbska recently gave his opinion that the coming elections would, at best, introduce the beginnings of a democratic process and would start to open eyes to what could be possible—but that the first real signs of democracy would not appear until the elections in 1998.

One thing that is very clear is that many countries will be dining off the lessons learned from IFOR, and from UNPROFOR, for many years.

An optimist might just hope that we could see some signs of normality returning earlier than the gloomy forecast by the UK Consul in Split.

Meanwhile, IFOR continues to verify the withdrawal of forces, to patrol the 1000-km-long Inter-Entity Boundary Line, and to guarantee freedom of movement.
Note

1. The Stabilization Force (SFOR) was commissioned by NATO as a follow-on contingent to IFOR, albeit at reduced strength: SFOR's mandate has been renewed once. To promote civil reconstruction, SFOR's tenure has become open-ended under the terms of the renewal.
Humanitarian Relief and Post-Conflict Reconstruction
The field of international humanitarian assistance has undergone astounding changes in the past decade. New challenges and obstacles face responders at every turn. The tactics and policies of the relief community have changed dramatically, and the partners the international community works with are different. Relief workers face a world transfigured by the end of the Cold War. New nation-states have emerged, and simmering ethnic and religious disputes have erupted into violence. Civilians more often than combatants are the principal victims. Rapid population growth, urbanization, and environmental degradation exacerbate these pressures. To respond to this stew of tensions, the UN with increasing frequency solicits the participation of military forces in peace operations around the world.

All of these factors have combined to make a new type of man-made humanitarian disaster: the complex emergency. It is generally defined as a humanitarian emergency caused or complicated by civil strife that cannot be resolved simply by sufficient amounts of humanitarian assistance or a peace operation. A political resolution of the root causes is the only solution. Complex emergencies are the disasters of the 1990s, and they have appeared most often in Africa.

Responses to complex emergencies demand extensive coordination and rapid information exchanges between field and headquarters and among funding agencies. Because complex emergencies take place in conflict areas, organizations responding to them require increased attention to security requirements. The detection and disposal of antipersonnel landmines are high priorities. The technological requirements of the humanitarian-assistance community are modest compared with those of the military, but the UN, donors, and NGOs are adapting available technologies to make their responses in complex emergencies more integrated, targeted, and cost-effective.

* The views expressed herein represent the private opinions of the author and do not represent the official views of USAID.
The Evolution of Humanitarian Assistance in Africa

Through the mid-1980s in Africa, most national and multilateral relief agencies and NGOs responded to natural disasters and refugee emergencies. Agency mandates were clear, relief organizations were well-known, humanitarian assistance was sacrosanct, and national sovereignty was inviolable. With few exceptions, the international community did not provide assistance to victims of internal conflicts until they crossed an international border and became refugees.

The international community was structured at the multilateral and national levels to respond to these humanitarian needs. The UN Disaster Relief Office (UNDRO) responded to natural disasters; and the UN High Commissioner for Refugees (UNHCR), with its NGO partners, met the needs of the world’s refugees. In conflict situations, the ICRC responded. National structures generally mirrored the UN. In the United States, the Office of Foreign Disaster Assistance (OFDA) of USAID responded to natural disasters, while the State Department Bureau for Refugee Programs funded UNHCR to respond to refugee emergencies and ICRC to deal with victims of conflicts.

In the later 1980s all of this began to change. When famine conditions complicated the civil war in Ethiopia, some NGOs, backed by donor governments, entered the country cross-border from Sudan and provided assistance to famine victims in rebel-held areas. Other NGOs assisted victims in government-controlled Ethiopia. The assistance provided to beneficiaries in rebel areas was not openly discussed in deference to the sovereignty issue.

In 1988, the US and other donors began providing emergency assistance through NGOs to famine victims isolated in southern Sudan because of the war between the Khartoum government and the Sudanese People’s Liberation Army (SPLA). Most of this assistance was provided from Kenya and Uganda with the knowledge of the government of Sudan. The following year, in March 1989, the UN negotiated permission for UN and NGO relief agencies to work in government- and nongovernment-controlled areas of Sudan under the umbrella of a UN-led effort called Operation Lifeline Sudan (OLS).

In each of the succeeding complex emergency relief operations in Africa, sovereignty became less of an issue and humanitarian assistance was provided within the borders of the conflicted country. In Angola, Liberia, Somalia, Rwanda, and Burundi, cross-border operations into government- and nongovernment-controlled areas became an accepted tactic in the delivery of humanitarian assistance. Relief agencies argued that the provision of humanitarian assistance to victims of internal conflict from neighboring countries should not be viewed as a violation of national sovereignty. With the exception of Ethiopia, major cross-border relief operations all have been carried out by the international community under the auspices of the UN or regional bodies such as the Organization of African Unity (OAU) or ECOWAS.

This shift in tactics to assist victims of internal conflict in their own countries before they became refugees forced fundamental changes in all relief agencies. No multilateral agency, other than the ICRC, had a mandate to assist victims of internal conflict, and the ICRC did not have the capacity to meet the needs of all internally displaced persons across Africa. Within the UN, no agency had clear responsibility—as did the UNHCR for refugees—for assisting internally displaced people. Similarly, within the US, no bureau within USAID claimed the mandate to assist internally displaced persons, and the responsibility fell to OFDA. NGO governing boards had
to reexamine their charters and authorize their own organizations to assist displaced persons within the conflicted country.

The donor community insisted that some UN entity assume overall responsibility for coordination of assistance to the internally displaced, which led to the creation of the UN Department of Humanitarian Affairs (DHA) in 1992. DHA, however, was delegated no authority over other UN agencies and received no support from the Secretary General, so coordination within the UN remained problematic.

**Complex Emergencies in Africa in the 1990s**

The number of complex emergencies in Africa has grown from three in 1989 to seven in 1996. The international relief community is still in the process of sorting out how to deal with this new type of emergency. UN agency mandates are unclear and the role of DHA is uncertain. NGOs are being forced to become more politically sophisticated as all sides in these conflicts maneuver to use NGOs and their assistance to their political advantage. The neutrality of relief personnel and their commodities is no longer respected by warring factions.

The international relief community operates in dangerous situations for which it is inadequately prepared. Only minimal consideration has been given to renting houses and warehouses that are conducive to security for personnel and commodities. Organizations have been lax in developing and enforcing personal security procedures, especially for travel in remote areas.

Landmines are present to one degree or another in each of Africa’s complex emergencies, threatening to maim and kill local civilians and relief workers. The mines hold hostage valuable land and cripple any efforts to return these societies to normalcy.

Complex emergency responses are long and costly. Exit strategies are difficult to define because the level and duration of humanitarian-assistance operations depend on the consequences of political and military decisions of the warring sides. Relief operations in southern Sudan in 1991, for example, wound down as communities returned to self-sufficiency despite the conflict. But in 1992 the SPLA split into several factions and the intra-SPLA war forced most relief agencies to withdraw from the region for almost a year. Four years of relief and rehabilitation assistance to return families to self-sufficiency were squandered. Full-scale humanitarian-assistance activities resumed in southern Sudan in 1993, and they continue today. In Angola in 1991, elections were planned, relative stability marked the country, and relief agencies were shifting their programs to development organizations. In 1992 government forces attacked UNITA offices in Luanda, killing several senior commanders, and full-scale civil war resumed. In 1996, the relief community is approaching that same turning point in Angola and, in a political atmosphere charged with distrust, humanitarian-assistance agencies are again turning their programs over to development agencies.

Traditional relief agencies now work with more, and less familiar, partners. New and inexperienced NGOs spring up with each new complex emergency. The new partner with the greatest impact on the international relief community, however, is the military—in particular, the US military. The US military’s ability to provide rapid logistical and security support in humanitarian crises is unmatched. But, as one US general remarked, “the US military leaves a big footprint.” The US military, through no fault of its own, raises expectations in the host population, but departs before the complex emergency response is over, leaving UN agencies and NGOs to cope with unfulfilled expectations.

Responses to complex emergencies in Africa may or may not involve peace
These emergencies involve humanitarian and political components and, with increasing frequency, a military element or peace operation. Complex emergencies that have a military component may not involve US forces. The complex emergency responses under way in Burundi, Rwanda, Sierra Leone, Somalia, and Sudan do not have military components. A UN peace operation is under way in Angola without US participation, although the US military has provided equipment and technical assistance. The peace operation in Liberia without US participation is under the sponsorship of ECOWAS.

The End of the Cold War and the Rise of Peace Operations

While major changes were under way in the field of humanitarian assistance, the international community and the UN were expanding that body's role in responding to internal conflicts around the globe. Prior to the end of the Cold War, the most responsive agencies in the UN were those that provided humanitarian assistance (UNHCR, UNICEF, and WFP) and development assistance (UNDP). The international community relegated the Department of Peace-Kee ping Operations (DPKO), however, to a secondary role in the international arena.

With the end of the Cold War, the demand for UN peacekeeping operations ballooned. From 1947 to 1990, five UN peacekeeping operations were mounted. From 1991 to 1994, 14 new ones were undertaken. Of the five peacekeeping operations set up before 1990, all were traditional operations. The focus of these operations was to monitor cease-fires, control buffer zones, and prevent a resumption of hostilities. By contrast, 8 of 13 recent operations were initiated to assist in the implementation of a settlement already negotiated by peacemakers and took on a decidedly more humanitarian role.

The new relief tactics of the humanitarian-assistance community, the trend toward more UN peace operations, and a new openness of the US military to consider participating in OOTW converged in the complex emergency responses in Somalia and Rwanda. Below are brief summaries of the US role in these complex emergencies. The summaries are offered from and emphasize the civilian humanitarian-assistance perspective.

Somalia Response: 1991 to Present

The US response to the Somalia complex emergency began in 1991 shortly after the fall of Siad Barre and the departure of the US Embassy and USAID from Somalia. In early 1991, OFDA placed a humanitarian-assistance expert in USAID's East Africa Regional Office in Nairobi to monitor the deteriorating humanitarian situation in Somalia. By mid-year, USAID, through OFDA, began funding UN and NGO relief programs in Somalia. USAID's Office of Food for Peace provided food to WFP and to NGOs working in that country.

In August 1992, as conditions deteriorated rapidly and death rates began to climb, especially among children, OFDA dispatched a Disaster Assistance Response Team (DART) to Nairobi to coordinate the overall US civilian relief response. The mandate of the DART was to provide Washington with information on the humanitarian situation and to expedite US funding and technical assistance to the ICRC and to UN agencies and NGOs developing assistance projects for Somali victims. The DART was also responsible for coordination with the US military.

In the same month, the US military initiated Operation Provide Relief, a food air- lift from Mombasa into five towns in central and southern Somalia. The DART established a sub-office in Mombasa to work with the JTF. In the international airport at
Mombasa, the DART and JTF were co-located and closely coordinated. The role of the DART was to validate requests from the UN, ICRC, and NGOs for airlifting food and other relief commodities; once validated, the requests were turned over to the JTF's planners for review and implementation. This model, adopted in Mombasa, was one that was to be used effectively in Mogadishu in the coming months.

On December 9, 1992, US marines were the first contingent of Operation Restore Hope to land at Mogadishu. The US-led UNITAF coalition involved 37,000 troops from more than 20 nations. UNITAF, together with the international relief community, brought the humanitarian emergency caused by famine and warlord looting under control by the time operations were turned over to UNOSOM II in spring 1993.

Just prior to the arrival of UNITAF forces in Somalia, the DART moved its main office to Mogadishu. Sub-offices were established in Baidoa, Kismayo, and Belet Weyene. The Nairobi office remained as the administrative support hub of the DART operation, and the Mombasa office continued until late March 1993 when the military airlift was terminated.

Under the auspices of the UN, the DART initially provided the civilian relief experts who coordinated with UNITAF forces. Each morning at 0800 hours, a DART representative and the head of the UNITAF CMOC would convene a meeting of UN agencies, NGOs, and military representatives to discuss issues related to the delivery of humanitarian assistance in Somalia, security concerns and problems, and to request and arrange coordination meetings. Following the 0800 meeting, the NGOs made their requests for military escorts and other types of assistance from UNITAF. The requests would first be validated by the DART staff and, if supported, the requests would be passed on to the CMOC for consideration and implementation by UNITAF. This arrangement worked effectively through the UNITAF period.

Prior to the arrival of UNITAF forces, the offices of more than 50 international NGOs and UN agencies were located throughout Somalia from Kismayo in the south, to Mogadishu, Merca, and Galcaio in central Somalia, to the northern ports of Boasso and Berbera. DART offices were located in four sites in Somalia and two in Kenya. Communications among these distant locations and among agencies were difficult for all organizations. The DART's daily situation report to Washington from Nairobi and later from Embassy Mogadishu was a frustrating task involving continual calls to each DART sub-office for the latest information. Frequently contact with some of the sub-offices was interrupted for one or two days. Other agencies suffered from similar communications difficulties. When UNITAF forces arrived and spread across central and southern Somalia, communications among the players became even more complicated. Relief workers or CMOC officers often required three hand-held radios to communicate routine and urgent messages among the UN, ICRC, NGOs, DART and UNITAF.

Security for personnel and commodities was one of the issues that plagued the Somalia relief effort. Most relief agencies were unfamiliar with the types of security precautions and procedures that were required to combat the looting and extortion of the warlords. NGOs scrambled to find experts who could advise them on how to deal with the Somalis, but it was too late to make major changes in their operating procedures and physical locations. The security advisors they found were usually former military officers who were unfamiliar with NGOs and relief operations. These initial contacts between NGO staff and security advisors were complicated by misunderstandings and distrust.

Landmines were a pernicious element in the relief effort. Mines were abundant in
the northern parts of Somalia and exploded with tragic results all too often on the banks of the Juba river and along the roads of the Juba valley. These landmines limited relief efforts, crippled and killed Somali farmers and herders, and to this day deny valuable land for agricultural rehabilitation.

UNITAF concluded its mission in May 1993 and turned the task over to UNOSOM II, which departed Somalia in March 1995. The UN relief effort, however, continues. OFDA ended its DART presence in May 1993, but assigned two of its relief experts to manage the humanitarian-assistance portfolio out of the USAID Mission to Somalia. The last of the relief experts completed her assignment in July 1996. OFDA continues, however, to fund NGO, UN, and ICRC programs in Somalia.


OFDA began the US relief operation in Rwanda when civil strife erupted in late April 1994. An advance team was sent to the region in May 1994 and by the end of the month, as humanitarian conditions deteriorated dramatically, OFDA dispatched a DART to directly oversee the US civilian relief operation. Initially, because of a lack of security inside Rwanda, offices were established in Nairobi, Kenya; Bujumbura, Burundi; and Kabale, Uganda. In late May, the DART leader, along with NGOs, held meetings with the Rwandan Patriotic Front (RPF) to work out the modalities of providing humanitarian assistance in Rwanda.

The mandate of the DART was to report to Washington about the humanitarian situation; to establish relief priorities and fund appropriate NGO, ICRC, and UN relief activities; and to support UN leadership of the international relief effort. The DART mandate was later expanded to fund relief programs in Goma, Zaire, and to coordinate with the US military.

When Hutu refugees fled to Goma in July 1994, the DART immediately established an office there and coordinated with NGOs, UNHCR, UNICEF, and the US and French militaries. Funding was provided to NGO and UN agencies to address urgent health requirements. In Washington, OFDA and the Joint Staff arranged for the US military to fly a water-purification system to Goma and, with DART technical assistance, US forces on the ground created a water-distribution network that met the water requirements of the Goma refugees.

As the US military arrived in the region and established its headquarters in Entebbe, Uganda, OFDA opened an office at the US Embassy in Kampala and co-located with the CMOC on the roof of the international airport at Entebbe. As in Mogadishu, DART representatives served as the interface between the relief community and the military. An OFDA humanitarian-assistance advisor was assigned full time to the force commander.

When security conditions permitted, OFDA moved its main office from Nairobi to Kigali and set up sub-offices in southern Rwanda. DART officials coordinated closely with UN Rwanda Emergency Office (UNREO), with the UN Assistance Mission in Rwanda (UNAMIR) and with the French Operation Turquoise. The DART focused the bulk of its assistance efforts on the needs of displaced persons inside Rwanda. The State Department’s Bureau of Population, Refugees, and Migration (PRM) funded programs to care for the refugees. At the height of the response, USAID’s DART operated from seven locations in five countries. As in Somalia, the DART leader had approximately $30 million at her disposal for funding NGO, ICRC, and NGO activities. To respond quickly to emergency needs, the DART leader kept Washington informed of funding decisions, but Washington clearance or approval was not required.

Surpassing Somalia in complexity, the humanitarian response in Rwanda involved more than 200 NGOs and UN agencies. The
international relief community responded to urgent needs inside Rwanda and to refugee requirements in the neighboring countries of Tanzania, Burundi, and Zaire. Relief providers faced the dilemma of assisting Hutu refugees who led or actively participated in the genocide against Tutsis inside Rwanda. The politicization or manipulation of the relief community by the factions to the conflict was intense.

The visibility of the Rwanda emergency drew an unprecedented number of new and inexperienced NGOs. They brought unskilled workers who were unfamiliar with working in conflict situations, and their country directors were untutored in the politics of relief. More often than not these organizations complicated relations with the new government for all NGOs because of their lack of understanding of the way international relief agencies operate in host countries. These inexperienced organizations often confused coordination efforts among the NGOs by not understanding the basics of how to rent property and hire staff in such a politically complicated and economically depressed relief environment.

Coordination was difficult because of the number of organizations, with varied levels of experience and different objectives, that were assisting displaced persons inside Rwanda or refugees in the surrounding countries. Communications among and within the various agencies did not improve significantly over the Somalia experience. The advent of the popular use of the Internet in the years between the Somalia and Rwanda responses only served to complicate information sharing. Interested individuals, Hutu and Tutsi partisans, and relief agencies flooded the circuits with interesting but often unnecessary and inaccurate information, forcing beleaguered relief experts to work even longer hours scrolling through screens of data.

As in Somalia, security issues troubled the international relief community in Rwanda and in the Hutu refugee camps. In Kigali and in Rwanda’s border areas with Zaire, security incidents were frequent and landmines took their toll of local farmers and relief workers. Aid providers were regularly threatened in the Hutu refugee camps in eastern Zaire, and relief supplies were diverted to Hutu combatants.

US forces left the region in September 1994, and UNAMIR concluded its mission in April 1996. OFDA terminated its DART presence in Rwanda in February 1995, but left two humanitarian-assistance experts in the USAID mission in Kigali. A small OFDA relief program continues in Rwanda.

The Challenge of Responding to Complex Emergencies and the Role of Technology

New complex emergencies appear far more often than they disappear. Since the mid-1980s, only Ethiopia (including Eritrea) and Mozambique have been removed from the relief community’s ledgers. And Rwanda, most fear, is only temporarily off the books. While this article has focused on Africa, most relief agencies’ budgets are worldwide in scope, and complex humanitarian emergencies suffer no geographic limitations. The costs of these emergencies continue to climb, and budgets have not been able to keep pace.

While the technological requirements of the international relief community are humble and must be economical, new and improved technologies are critical to meeting today’s humanitarian demands. To facilitate relief efforts, improved field communications systems are essential; more generally, enhanced information-management technologies are critical to ensure an informed and coordinated relief effort. Security precautions are becoming standard procedure, and more effective training and equipment are essential. Finally, effective and inexpensive techniques for detecting, mapping, and disposing of
landmines are without question a high priority in the international relief community.

Field Communications

The relief community works in isolated environments and requires the flexibility to move quickly among several locations. NGO and UN communications experts are searching for field communications systems that are small and easy to operate and maintain. WFP and UNHCR, for example, are adapting existing technologies to improve their communications capacities to meet the information needs of their field staffs. WFP’s AFRNET project links very-small-aperture satellite terminals and high-frequency radios into a communication network through which food-aid delivery information can be transmitted to the most remote sub-office rather than via the unreliable fax and phone connections of the war-torn countries. UNHCR is taking similar steps to upgrade its communications capacity with technical assistance from the US Department of Defense.

Information Management

Donors and donor funding must be coordinated and targeted to ensure that all needy populations are assisted—but without costly duplication. To maximize coordination, information sharing is essential. In Somalia, information was scarce. In Rwanda (the first regular use of the Internet in relief operations) information flooded in and clogged the system. In response, OFDA created a Rwanda Information Center (RIC) to manage the information flow and get the right information to the right people.

Based in part on the Somalia and Rwanda experiences, DHA has two information-sharing activities under way. The Integrated Regional Information Network (IRIN) based in Nairobi provides daily information to individuals on events surrounding Rwanda and Burundi and the refugees these events have generated. DHA’s ReliefWeb has begun to deliver up-to-date information from a wide variety of international disaster-response sources on current and pending complex emergencies through its Internet World Wide Web site. ReliefWeb is becoming the first stop for assessments, map information, and other data for humanitarian-assistance reporting and planning. The information from ReliefWeb and most of the information available from IRIN are directed toward the needs of capitals and the donor community.

Disaster managers in the field require different information than headquarters. Organizations have been attempting to develop information systems that serve the needs of relief managers in the field as well as meet headquarters requirements. These efforts have not been successful. Information-management systems are needed that distinguish between the needs of the field and headquarters and channel the information accordingly.

Security

Responses to complex emergencies almost by definition are carried out in conflict areas. The international relief community, however, has limited knowledge of the appropriate security measures to be undertaken. Residences and warehouses are usually not selected with security considerations in mind. Equipment that might enhance security, such as lighting and sensors, is not used. Most organizations do not adequately train their staff in security procedures.

Training in the full range of security precautions is a priority of most humanitarian-assistance organizations. This training must be provided, however, by the rare individuals who know the security field and are sensitive to the NGO culture. One without the other is not effective. Finally, security-enhancing equipment would be welcomed by relief providers as
long as it is of modest cost and unobtrusive in the field.

### Landmines

Millions of antipersonnel landmines mar the African landscape. Each country suffering from a complex emergency will require demining assistance. Experts estimate that in Angola alone there are more than 10 million landmines. The technologies available to the civilian international community for the detection and disposal of landmines are expensive and slow. The international community and the countries themselves do not have the resources to fund these expensive activities. Societies attempting to rebuild after a complex emergency cannot afford being denied access to valuable agricultural lands for extended periods of time while demining operations take place. The international community needs inexpensive, reliable demining techniques that can be used quickly.
1. UNDRO has been incorporated into the UN Department of Humanitarian Affairs.

2. The Bureau for Refugee Programs is now the Bureau of Population, Refugees, and Migration.


4. The Somalia airlift began in four towns: Huddor, Baidoa, Bardara, and Belet Weyne. Mogadishu was added later in the airlift. When the airlift began, it flew food to Wajir, Kenya, to assist Somali refugees.
Introduction

There are two strands in the current vibrant debate on peacekeeping:

- A primarily military focus with a strong stress on command and control, intelligence, communications, etc. Lessons learned from Former Yugoslavia and Somalia, for example, tend to highlight the importance of a strong military component, prepared for any eventuality. The NATO-led mission in Bosnia, IFOR, is seen as a model.
- A recognition that peacekeeping is not only multinational but multifaceted and multidimensional. At the most sophisticated end, the military component is but one element, albeit often among the most important, of an operation that has many sides.

Aims and Mandates

Lt. General John M. Sanderson, former Force Commander of UNTAC, set out some years ago the three core aims of peacekeeping as: unity of purpose; unity of understanding; unity of command. Today, the first two can be seen as critical while the third remains aspirational and largely unachievable, at least by direct means.

In any given theater today, where there has been, or is, conflict, we are likely to see the most remarkable number of players. Complex emergencies generate complex responses from the humanitarian community. Peace negotiations can generate peacekeeping missions to add to an already full field of players. In Rwanda from 1993 through 1994, there was a UN peacekeeping force, an OAU observer mission, a UNHCR effort, DHA (UNDP) effort, human rights monitors, and over 131 NGOs, together with the ICRC. There was also a French-led military contribution (Operation Turquoise) and a US-led logistics effort (Operation Support Hope). The British deployed in support of an expanded UNAMIR and the Japanese in support of UNHCR, but only in Zaire. Over one billion dollars were expended in humanitarian assistance for the outflow of refugees. A new government struggled to find its feet and provide

* Former Head (1990-1996), United Nations Department, Foreign and Commonwealth Office, London. The views expressed herein represent the private opinions of the author and do not express the official views of the United Kingdom Government.
elementary security. How many of these various players were familiar with the aims, purposes, objectives, training, and mental cultures of each other, or indeed of the complex roots of the Hutu/Tutsi conflict? One UN battalion commanding officer was alleged to have gone out there without knowing what an NGO was. Were there any common aims or principles or matrix to bind together the international response?

Rwanda was an extreme case in every way:

- Extreme in the violence of the conflict between ethnic groups.
- Extreme in the confusion in the Security Council and at the UN and indeed the OAU.
- Extreme in the conflicting aims of an infinite variety of players.

There was no unity of understanding, no unity of purpose. As well, there was a lack of preparedness to link together all the facets of the international response. There was a failure to understand the aims and limits of peacekeeping from New York corridors to editorial chairs, a failure of analysis, and an international reaction more geared to create alibis for the failures than to provide answers. Randolph Kent, an experienced UN practitioner from the DHA, touched on some of the problems:

“...In the final analysis, for the NGOs at large as for UNAMIR and the humanitarian community, there were two issues that profoundly affected their relations with the Government (of Rwanda). The first was the genocide; the second was what might be described as contending mandates. As for the former, the genocide, like the slow unfolding of a horrific nightmare, began to be understood—slowly, painfully. This understanding brought with it a host of emotions: a sense of guilt that one was part of an international community that had shied away from this abominable event; a certain unease that a proportion of the IDPs and the refugees whom one was assisting might indeed have been killers; and an inclination to support in any way possible all those who had survived the appalling tragedy.

“And yet, with all the inclinations to make common cause with the survivors of the genocide and their Government, even in seeking ways to make amends for deeds that were almost incomprehensible, the reality of contending mandates more often than not set the course of relations between the Government and the humanitarian community. No issue reflected the tension between the two issues—the genocide and contending mandates—more than that of IDPs.”

In recent UN missions from Angola, Cambodia, El Salvador, Mozambique, Namibia, Somalia, Western Sahara to Rwanda, and indeed Bosnia and Haiti, the military component was one of a number of elements. UNTAC had seven facets—of which the electoral component was greater even than the military. In the case of UNOSOM, “it was assumed that peacekeepers were the right tool for the task; it was never asked whether the involvement of the military in humanitarian assistance programs could be counterproductive.”

But only some elements of the international community, particularly the humanitarian world, are drawing out the lessons. Indeed, in some military circles (and even some diplomatic) the disposition is to argue always in favour of a Chapter VII mandate to be on the safe side “as a deterrent on all parties.” This would appear to marry the two main strands of debate in the most unproductive and dangerous fashion—with declaratory policies not matched by dispositions on the ground. Lessons-learned studies, e.g., by UNHCR from their experience in working with the military from Former Yugoslavia to Rwanda, tend in the opposite direction with a strong emphasis on the need to recognize the impact of military actions on other core activities.
Chapter 7  The Challenge of Integrating Civilians and the Military  |  73

Unity of Understanding

An essential precondition for successful civil/military relations in peacekeeping operations must be a clear understanding at the political and diplomatic level of the practical implications of mandates involving use of the military and the projection and use of force and the impact on other players. There must be common awareness of peacekeeping doctrine and a unity of understanding at UN headquarters (or any other enabling authority) among troop contributors and their political leaders and diplomatic representatives. Resolutions that are declaratory and cannot be implemented on the ground are dangerous to the mission in terms of both credibility and security. And the trend in recent years in the Security Council has been to create a “gray area,” in the words of one distinguished international lawyer (Professor Christopher Greenwood), even as the doctrine writers are seeking to establish doctrinal clarity.

A common approach to doctrine among the UN and troop-contributing nations is essential for successful peacekeeping operations. The doctrinal approach must be agreed upon and understood at the political/diplomatic level by military participants on the ground, as well as by humanitarian organizations. Clarity between peacekeeping and peace enforcement is essential, not in terms of Chapter VI or VII, but as regards aim and approach. The aim of the operation has fundamental implications for the structure and equipment of the force and the manner in which it is deployed, as well as for other players.

In most emerging doctrine, peacekeeping operations are based on the core principles of consent and impartiality. The UN’s most successful peacekeeping operations have been deployments in support of a previously agreed-upon peace settlement (Mozambique, Namibia, El Salvador, Cambodia, and now Angola). Actions are impartial and forces use techniques that promote and sustain consent. In principle, force may be used only in self-defense. In practice, this need not preclude the robust use of force, provided it is proportionate and allows for the maintenance of rebuilding of consent and the implications for all civil and military entities on the ground are taken into account.

Nonconsensual peace support operations, such as peace restoration/peace enforcement, involve an approach and techniques distinct from peacekeeping. This may require the coercive use of force in favour of the desired outcome. At the lower end of the scale, peace restoration could involve the use of force to put an end to fighting or disorder or in order to create specified conditions, e.g., a secure environment for the operation of humanitarian agencies or the restoration of law and order. Forces deployed on peace enforcement missions need to be equipped, commanded, and controlled in a manner that provides them with the capability to use warfighting techniques and to impose their will. These distinctions need to be understood by all players and at all levels. Humanitarian agencies need to make their plans accordingly. The impact of contradictory mandates or mandate slide has been demonstrated all too clearly in Somalia and the Former Yugoslavia.

The criteria established by the Security Council on May 4, 1994 provide a useful framework for decisions on new peacekeeping missions, with the emphasis on a ceasefire and the commitment of the local parties to a peace process intended to reach a political settlement, the need to establish a clear political goal susceptible of being reflected in the mandate, as well as sufficient (effective) guarantees as to the security of UN personnel. As argued by the British Government, the Security Council needs to be made fully aware of military realities before making its decisions. The Council should be briefed regularly in
informal consultation with the Military Adviser to the Secretary General and with force commanders where appropriate. The UN Military Adviser, who should have the rank and clout on his own behalf and give impartial military advice, should also be able to draw on military expertise from leading troop-contributing nations where necessary.

In parallel, UN military and civilian officials should continue to brief the Council and potential troop-contributing nations on the military aspects and implications of Council decisions before the adoption of new mandates and when major change is in prospect. A new, more transparent relationship between the key players is essential to make these procedures work. The UN should also be able to brief key opinion-formers (editors/leader writers), not through artificial, little-value daily press conferences, but via backgrounders. And beyond this, the mandate as formulated in a Security Council endorsing a UN report must then be translated into a Directive to a Head of Mission, whether civilian or military (Special Representative or Force Commander). These are solid lessons for all enabling authorities from NATO to OSCE.

Unity of Purpose

In UN operations, there has historically been an animus by civilian UN employees against the military. The former serve for long periods of time, up to two years. They become familiar with the problems and with their environment. They are generally antagonistic to the use of force and they control expenditures on logistic and administrative support. Without exception, all UN military commanders have complained about their inability to control their administrative and logistic support and expenditures on it, while the UN civilians see the military as “Johnny-come-latelies,” who come unprepared, are often unfamiliar with a complicated environment, and whose horizons are limited to the period of their own, often-limited, deployment (six months). They are task-driven and they have little sense of accountability to the constant cash-flow problems of the UN. Hardly perennials are complaints about the large number of four-wheel-drive vehicles made available to civilian personnel, sitting comfortably in cities, while most armies never have enough. Add to this the different culture represented by the humanitarian community, and the opportunities for friction increase.

In the words of the commander of the first British deployment to Bosnia “the military are hierarchical, authoritarian, centralized, large and robust, while UNHCR is flat, consensus-based with highly decentralized field offices which rely on a centralized logistics base. Hence while UNHCR could move their point of main effort with speed and ease, the military on less light scales found once they were bedded down that was it less easy if not impossible to match such change.”

UNHCR’s answer: “Most United Nations agencies tend to devolve authority to decisionmakers in the field. By comparison, the military tend to be well established but comparatively lacking in local experience (being deployed for short duration tours) and accustomed to a more centralized system of command and control. Misunderstandings may arise . . . .”

Even at the most simple level, the civil/military relationship can be antagonistic and create failures of understanding. Military tend to find diplomats obsessed with process and presentation; diplomats can find the military so task-oriented as to underestimate the need for talking things through. Hitherto there has been little preparation to equip key actors to cope with the huge circus of civilian lead, “comprimario,” and bit players to be found in any complex emergency or peace support operation. The range of activities in any given theater of operations in and around
a peace support operation may now include many elements of the following:

- peace negotiations
- humanitarian assistance
- policing
- ceasefire monitoring
- election preparation
- supervision of vulnerable groups
- protection of refugees
- human rights monitoring
- rehabilitation
- reconstruction preparation
- demobilization and disarmament
- sanctions monitoring
- demining

The list continues. And the tools of response to establish coherence appear weaker rather than stronger. Too often in-theater there has been unseemly competitive bidding vis-à-vis the media or indeed even local parties. And a first lesson of any deployment following an intrastate conflict is that all the local parties will seek to play external players off against each other: OSCE versus UN in the Caucasus, UNPROFOR versus UNHCR in the early days of Bosnia, followed by UNPROFOR versus NATO in later stages, and IFOR versus High Representative more recently still.

There are the beginnings of praiseworthy efforts to build if not coherence, then a certain minimum understanding. UN task forces that bring together Department of Peacekeeping Operations, Department of Political Affairs, and DHA at HQ are a step in the right direction. (But why not UNDP, WFP, UNHCR, and even the World Bank?) The UN and OAU have a sporadic dialogue. NATO and the UN held a series of meetings in the autumn of 1995 to prepare for the transfer of authority in Bosnia. The UN DPKO is slowly drawing out the lessons from previous missions and organizing publication. More ambitiously, the London Peace Implementation Conference on Bosnia—organized by the British Government in December 1995 as a followup to Dayton and a prelude to IFOR deployment—sought to bring together all the key players in implementing the peace settlement, including governments, UN, NATO, future High Representative, OSCE, UNHCR, EU, and ICRC. The primary aim was to promote understanding between key governments and to create an overarching mechanism for sustaining a political strategy in support of the Office of High Representative. A subtheme was the organization (by British officials) of quiet preconference background meetings between representatives of the resolutely independent international organizations involved from NATO to UNHCR. The intent of these meetings was to give some practical meaning to statements about in-theater cooperation uttered by the principals. Both aims recognized the problems posed by competing chieftains and overlapping mandates.

There is more than an element of “needs must” cobbling together about these arrangements rather than a systematic and coherent approach. Nor do headquarters’ meetings or the bringing together of a few representatives address the real problems of transparency, constant dialogue, or the cultural differences at theater level. A real step forward was the insistence of the UN SRSG for UNMIH (Brahimi) and the force commander (a US Major General) on in-theater training for all the key mission players—military, civilian, logistics and administrative—before the mission went active, which was regarded by all concerned as invaluable and essential for future missions. (And the later addition of a UNDP representative as Deputy SRSG helped a coherent approach to peacebuilding).

Doctrine today (as in the British Army’s Wider Peacekeeping and the useful manual on Peace Support Operations edited by Dr. John Mackinlay) makes clear that peacekeeping doctrine must not only address the conceptual approach and tactics, but must also address wider relationships. UNHCR—the UN agency that has been pitchforked into close partnership with UN
military in Bosnia by virtue of the original mandate for protective support of humanitarian operations and has seen this as a feature of its operations in many conflict zones from Georgia to Rwanda—has held a series of in-house seminars and workshops and drawn up guidelines from the lessons learned.5

DHA, which lacks the field experience of UNHCR, is similarly seeking to draw up principles and so is the ICRC. For example, Akashi, the USG for Humanitarian Affairs, issued Principles and Protocols for Humanitarian Operations in Liberia, aimed at ECOMOG and UNOMIL as well as the humanitarian community.6

Logically, core principles along these lines should be incorporated into the predeployment training not only for all complex emergencies, or operations where humanitarian and peacekeeping worlds coincide.

I Orientation and Training

On the assumption that the intellectual groundwork has been prepared in terms of mandate and doctrine, the key task for future peace support operations is to break down barriers and promote understanding between military and civilians. National and multinational training needs to bring understanding of the complex environment and role of the various players down to HQ/battalion/field office level. There needs to be an understanding of mandates, operational capabilities, guidelines, logistics systems and cultures as well as of the day-to-day pressures before they arrive in-theater. Ideally, they should know at least some of the personalities. Exchanges at conferences are useful, as are predeployment contacts between principals and heads of agencies, but they only go so far.

The British Government recognized early on that lectures on peacekeeping doctrine did not meet the need, and that conferences largely preached to the already expert. Doctrine and the in-theater complexity of peacekeeping operations had to be made real. Working in tandem, the Foreign Office and the Army Staff College at Camberley adapted traditional military exercises to the new environment. The aim was to replicate a peace support mission environment with all the inherent difficulties of multinationality and multiculturality. A wide range of participants would be subjected to a complex and realistic scenario in a residential environment under pressure. Participants would track a mission from the creation of a mandate (with its flaws) to its implementation on the ground.

These mapexes, or map exercises, involved scenarios that drew on experience and used geographical and cultural data drawn from a real country (though often the country may be translated from one side of a continent to another and be subjected to radical cultural and geographical changes). Up to about 21 countries are invited to send two participants (respectively military and civilian) for a residential weekend, with NGOs and UN agencies also invited to contribute personnel. The participants are formed into syndicates of 10 or 11 each according to the classic Camberley approach to game the scenario, and they work with a panel of expert practitioners (former heads of mission, force commanders, diplomats, eminent journalists and senior representatives of UNHCR, ICRC, NGOs, etc.).

Recent scenarios have included a collapsed state in Africa with a heavy humanitarian presence before arrival of the military, or a Northern European state with ethnic divisions, a fragile democracy, and domineering neighbours. The exercise has three or four stages, reflecting the strategic, operational, and tactical levels. Participants are asked to draw up a mandate for a mission based on a UNSG’s report, with material available also, for example, from NGOs or humanitarian agencies and/or a NAC decision sheet. They are asked to draw up a mission plan bringing in all facets of the
mission—from military, to civilian, to administrative, to logistics, to humanitarian, and to public information, which includes the core aim of identifying the mission’s center of gravity. And finally, they address either tactical problems or a series of concurrent crises. Many variations are possible. A Central European scenario had some syndicates following a UN approach and others an MNF approach, with different political and military inputs accordingly. And participation can be adapted according to circumstances. An African exercise has been adapted and used with the support of the OAU in an exercise for 15 African nations in Addis Ababa.

Each syndicate is attended by a member of the Camberley directing staff to ensure that all participants contribute in the syndicates and timetables are adhered to. The panelists roam between syndicates to be available for advice or to question the viability of an approach, e.g., in public relations or legal terms, as appropriate. Each stage would end with a report back to plenary with one syndicate required to present its solution, another to comment, followed by an open debate and commentary by the panelists (who have the self-denying task of contributing from their experience and drawing out lessons, without dominating the proceedings). Their different perspectives and occasional disagreements are part of the learning process.

Key elements identified from the outset were to encourage “bonding within syndicates,” to replicate the experience of a multinational, multicomponent headquarters used to working together. This was not merely an exercise designed to produce solutions. These were the exercises where the process was an essential element, in particular working with other nations and other cultures under time pressure and media pressure.

The response has surpassed expectations. A number of participants have commented that “it was the best training exercise I have ever attended.” Some of the traditional boundaries and misconceptions between the military and civilians and NGOs broke down. The NGOs have been fascinated, and one leading NGO asked if we could not train all their personnel. The military as well as diplomats have begun to appreciate the courage and knowledge of the NGO and humanitarian community. The mental archetypes of NGOs and military respectively (wooly-minded, bearded do-gooders versus thugs wanting to fire guns) disappeared.

The implications of the use of force during in-theater operations became apparent and the enthusiasts for Chapter VII and an aggressive approach in the mandate-setting stage were infinitely more cautious by the time they came to the tactical level. The value of the training exercise has been registered internationally and the Camberley exercises are being played at a variety of training centers. Most important, the pattern of bringing together civilians, NGOs, the media, etc., is also followed. Ideally, when a new mission is in prospect, such training exercises should be organized for the new HQ, whether a “pick up” HQ or a UN rapidly deployable HQ. It should involve the head of mission, force commander, and key staff officers, as well as all relevant civilian players, NGOs, etc. At the very least there should be parallel workshops for the logistics/administrative element, where so many misunderstandings occur.

But one key lesson is taking time to absorb. Any military officer worth his salt talks wistfully of “coordination” in order to achieve the point of main effort. Some officers like to believe that all players from humanitarians to the media share the same objectives, will cooperate, and will be subject to coordination. These presumptions are vigorously rejected by the NGOs and by the media in these exercises. Media representatives rebut any assumption that they might cooperate in sanitizing an area in a
hostage situation: their duty is to report. NGOs and humanitarian agencies will not be “coordinated.” But the importance of communication at all levels on a constant and transparent basis as a means to that same end is well-taken. Unity of command may be a chimera in peacekeeping given all the players, but unity of understanding and a certain amount of applied psychology in predeployment training and post-deployment practice may offer the best that can be attained.

II Coherence of Effort In-Theater

There are techniques and structures that can promote a coherence of effort, even if unity of command is not feasible other than on paper. The UNPROFOR/UNHCR effort in Bosnia during 1992–93 proved to be something of a laboratory. By virtue of the mandating resolution (SCR 776), UNPROFOR provided protective support for the UNHCR-led humanitarian effort. Mrs. Ogata asked the British Government for a military logistics officer to help with convoy planning as early as August 1992. The Lieutenant Colonel, operating in civilian clothes as a UNHCR seconded officer, brought all the traditional military logistics skills in planning for large scale movements and become a core member of the UNHCR headquarters in Zagreb, acting additionally as the military adviser to the Special Envoy and liaison with UNPROFOR HQ in Zagreb and in Bosnia. (He was later joined by Canadian, Dutch, and French military liaison officers.) The occasionally fretful relationship between the two organizations was smoothed over by individuals with the same culture and background providing the interface. The pattern continued to the present day, with a expanded network of UNHCR liaison officers to NATO and IFOR. (UNHCR never returned the first Lieutenant Colonel, who left the army and is now UNHCR Head of Office in Mostar.) Between 1992 and 1993, there was an interminable debate about collocation. UNHCR, whose remit operated across the former Yugoslavia (while UNPROFOR was limited in its reach in Bosnia), refused to move its HQ to Sarajevo. But by November 1993, a joint Civil Military operations center (CMOC) was established at UNPROFOR Bosnia HQ at Kiseljak. The effort was well-intentioned rather than effective, since UNHCR decisions were still taken in Zagreb, but given UNHCR’s excellent communications system, there was greater transparency. The presence of the well-informed EC Monitors with their excellent capsat communications was a bonus.

Liaison officers, CMOCs, and collocation are all practicable options to promote coherence of effort in a multifaceted operation. Both the Americans and the French argued in favour of CMOCs during and after the Rwanda crisis, but notably failed to provide other than liaison officers to UNAMIR. When Operation Turquoise deployed to Goma, even the French NGOs complained that the media were receiving more information at the press briefing than the NGOs and agencies at the official French CMOC briefings. The British insisted on a Civil Military Operations Coordination Center (CMOCC) in planning for any potential WEU humanitarian operation. The CMOCC would integrate the civilian and military use of resources and allocate tasks as well as providing a focus for information collection and distribution between the agencies in-theater, but it would not have a command function. The HQ structure can and indeed should be cascaded down to subordinate HQs, particularly when dealing with a likely widely dispersed humanitarian effort. Within UNPROFOR, the British battalion HQs in Bosnia operated on the basis of open house briefings for NGOs, agencies, the media, etc., providing information on security of routes, weather, and military traffic. This was not coordination, but pragmatism or applied psychology. Because the service was welcomed and indeed necessary for survival, all
the players in the Vitez area attended. A CMOC in Rwanda bringing together all the players might have avoided the nonsense of 30,000 tonnes of emergency medical supplies sitting in UNICEF stores in Copenhagen because there were no in-theater arrangements to decide on air lift priorities—the Geneva Air Operations Cell only decided on slot timings. It could also have provided some degree of coherence between the UN effort, the US mission, and that of the French.

An acknowledged weakness of these various efforts has been the miscellany of communications and IT systems in play. Even at the most basic level of need, there were no communications between a UNHCR humanitarian convoy and their military escorts into Sarajevo in 1992–93. The different budgetary systems made it near-impossible to provide even Motorolas for all. And UNHCR’s communications, while effective, were also transparent. They found that their couriers carrying funds were regularly hijacked on the ground. The ECMM’s capsat, albeit without voice, were probably the most effective and relatively secure, and operated across front lines without the difficulties that the mountain ranges of Bosnia posed to some military systems. In technology terms, there is a crying need for a low-cost, all-terrain communications system that can be used by all players in a theater to communicate with each other. Standardization of IT systems for liaison purposes would also be valuable.

But despite all these structural weaknesses, there have been a number of remarkable examples of practical, innovative, and indeed heartwarming collaboration. The UNHCR Air Operations Cell in Geneva ran the Sarajevo airlift from July 1992 to January 1996, and helped organize lift into Rwanda in 1994. It operated again on the basis of seconded air force personnel representing the countries providing the lift. The British RAF and UNHCR established something of a mutual admiration society in the process.

From January 1993, the UNHCR Head of Office in Sarajevo asked the British for the loan of a team of officers and NCOs to supervise the distribution of humanitarian assistance in the city and the communes. Two officers and three NCOs (eventually rising to seven) were supplied and continued in place from January 1993 until February 1996. They were assigned to UNHCR and worked under the orders of the Head of Office. They had a number of specific tasks: escorting fuel convoys from the coast; taking logistic convoys to out of the way areas such as Goradze (including UNHCR funding for its local staff); and providing a logistics management structure in Sarajevo for the distribution of aid. Under the system devised, they felt confident that they could account for the distribution of about 75% of the aid entering the city. They added their own tasks such as bringing in wheat flour and providing practical help to restart the bakery, providing support for the beleaguered UNHCR-led MEDEVAC Committee in Sarajevo, which was subject to endless threats and pressures concerning decisions on who was appropriate for medical evacuation.

During the crisis of summer 1995, Britlogdet provided the only international staff available to the head of UNHCR Sarajevo. The day after the final NATO air-raids on the Bosnian Serbs in the summer of 1995, one of the officers, unarmed but in uniform, took a UNHCR humanitarian convoy into Grabivca and the Serb areas. He was greeted open-mouthed by the Bosnian Serbs. He turned around and went back and collected another convoy. His departure was lamented by Bosnian Muslims and Bosnian Serbs.

A regular feature of the successive British assignments to UNHCR was the wish of at least one member of the team to leave the army and work for UNHCR. All found the experience rewarding. The soldiers were independent, on the front line, they could use their skills, and their work made
a direct and visible contribution to saving lives. Mrs. Ogata has been in the forefront of promoting practical and valuable links between UNHCR and the military, where individuals can make a major difference, and she has had the confidence of contributing states in carrying this out. UNHCR recognizes that seconded individuals at key points can make a major difference. The more ambitious claims of DHA in their program for the use of military and civil defense assets in humanitarian operations have yet to be proven.

A different example comes from the UN Mission in Haiti, where the enlightened SRSG and US Force Commander developed a program of hearts-and-minds policies using military assets. US reservists and civil affairs specialists were working on 853 "hearts-and-minds projects" earlier this year, with 108 awaiting completion before the US forces left. These were funded with "OPM" (other people's money). The US army provided seed money of $1000 per project but the rest had come from local fundraising from embassies, NGOs, and even the World Bank. The priorities were set by the Haitian Government in a consultative framework and a Humanitarian Assistance Center provided coordination with other organizations. Morale among the US specialists was high; among the regular infantry battalions, less so.

IFOR in Bosnia, or at least the engineering assets assigned to HQ ARCC, have also undertaken a series of projects to open up the country and restore normality. Repair of roads, bridges, railways, and mine clearance have been priorities. This has been undertaken by proving, filling craters, repairing and maintaining roads, replacing or bypassing bridges, maintaining locomotives and seeking to restore the system to a minimum low capacity operating standard, repairing electricity and water and gas structures, demolishing dangerous buildings, etc. These projects have been funded under a NATO engineering and logistics budget as contributing to the overall IFOR objectives and end state. (Another IFOR success story in terms of military/civilian cooperation has been their "parish pump" press conferences. These bring together the IFOR and UNHCR, as well as OSCE and UN IPTF spokesman at a single press briefing. They are clearly well-prepared and the spokesmen speak in support of each others' efforts).

Within IFOR, there has also been an innovative program of collaboration between the British ODA and the British framework division (MND(SW)), with aims similar to the UNMIH program. British units have rarely deployed overseas on peacekeeping missions without finding schools or orphanages to repair in their own time and at their own expense, from Angola, to Rwanda, to Bosnia. (The Indian army does the same; the Indian battalion in UNAVEM III has created a marketplace and school for the locals at their location—Gandhi Market and Gandhi School—and planted 1500 trees—Gandhi Forest—one for each UNITA soldier in the quartering area.) The novelty in the MND(SW) program is that the ODA are directly funding military imprest accounts with set limits per project. The military are not doing the work, but managing the projects, recruiting local labor, monitoring the work in keeping with an ODA strategy and under their supervision. Morale among those involved was high.

The key to these two separate exercises lies in funding. Neither the UN nor NATO fund "reconstruction." The Americans have a particular aversion to the concept of "nation-building" post-Somalia. But peacebuilding through coherent and well-designed hearts-and-minds projects, drawing together military and civilian expertise and "OPM" can play a crucial role in consolidating the achievements of a peacekeeping mission, and in helping to fill the gap before the serious funds (provided by the World Bank, for example) are made available. The greater the level of dialogue and
thus coherence between the players in any given theater, the greater the chances of synergy of effort. An effective mission plan, discussed with all players, can help identify the opportunities for mutually reinforcing action.

Conclusions

Peacekeeping today is complex and multifaceted and likely to remain so. For success, there needs to be a degree of common understanding between key players, military/civilian/NGOs/UN agencies, not least in responding to media pressures, before and during deployment. While unity of command and true coordination may be unattainable, effective cooperation leading into a peacebuilding stage is not. UNHCR and DPKO are in the vanguard in drawing out the lessons. Governments need to follow. A starting point is a clear strategic vision of the various stages involved:

- Clarity in mandate setting, responding both to the needs of the situation and the resources available.
- A common doctrinal understanding.
- Regular dialogue between the principal players—UN, UN agencies, troop contributors, and the new organizations involved from OSCE to ECOMOG and NATO. A dialogue purely between military participants is old-fashioned and not attuned to the times.
- The horizons of training for peacekeeping need to be expanded from conferences among the experts to training exercises and workshops to bring in all players, military and civilian, not just from ministries of defense and foreign affairs, but to include those who will be directly involved on the ground—from staff officers to NGOs. Such exercises can usefully include draft mandate, setting and preparation of a mission plan and could be used to prepare a new mission HQ and key outside players predeployment.
- A Head of Mission needs a directive derived from the mandate which will be the basis for the mission plan.
- A mission plan is an essential tool for a successful mission. It needs to integrate all facets of the mission as well as give guidelines for relations with other key players.
- In-theater structures are necessary. For example, establishment of a CMOC provides for effective cooperation and liaison.
- A public information strategy is an essential element and every effort should be made to ensure that press briefing of the various players is mutually reinforcing rather than competitive.
- Assignment of liaison or seconded officers between key players can help promote understanding and effective cooperation; personal relations count.
- Well-considered "hearts-and-minds policies" can contribute to the overall mission effort; if they are substantial they need to be developed in cooperation with the agencies and with an eye to peacebuilding objectives.
- And finally, the host government/local parties should not be forgotten. Unless missions develop better coherence, the capacity of local entities to play off different agencies against each other, to the detriment of all their missions remains high. Sanctions (for example, joint commissions) need to bring in the parties—sustaining consent still remains critical.
Notes


5. ibid.

After almost five decades of relative inaction and inertia, the UN Security Council established a post Cold War precedence to utilize coalition military forces to support the humanitarian relief operation in southern Turkey and northern Iraq. The Kurdish refugee crisis of 1991 in many ways signified the end of the Cold War and heightened expectations of a world community willing to share resources for a common good. Unfortunately, Cold War technology has found itself caught between those expectations and the new reality of post Cold War conflicts. “Complex emergencies” is but one of numerous titles used to characterize these political crises. Since the Kurdish experience these complex emergencies (e.g., Somalia, Rwanda, Bosnia) have proven to be more dangerous, frequent, longer lasting, and regionally more widespread. Such crises halt those functions in developed countries that allow a community, a nation, a region to function and be viable. More developmentally fragile areas see actual slippage of services.

Complex emergencies are often resource wars, precipitated by a natural disaster or human-generated famine, with cultures, minorities, and religious groups at risk of extinction. These situations require, once the free world decides to intervene, a massive logistical response of food, medical care, water, shelter, fuel, and a cushion of hope. To better understand the requirements of these complex political emergencies, we have been forced to understand a political climate foreign to our Cold War thinking.

The form and character of war itself has changed. Conflicts are now 95% internal wars beyond the reach of UN authorization-to-intervene. Data from 40 conflicts over this last decade reveal 1.1 million military deaths and 5.2 million civilian deaths, mostly children, women, and other vulnerable populations.

The challenges of the post-conflict phase of complex emergencies concern the entire world. Southern Somalia, if it ever has the opportunity to reconstruct itself, will need to begin from scratch with assurances to its neighbors that the “Somalia disease of 1992,” as it is called, will no longer spread. Anthony Zwi and others have mulled over the problem of defining when a conflict is over and rehabilitation of a society begins. It appears to begin formally with the signing of an agreement, one which has the appearance, to national and international
groups, of providing an opportunity for peace and recovery. The challenge is to consolidate the peace and prevent slippage back to violence and humanitarian crisis. Researchers have found that this post-conflict phase, which we have had little experience with since the post World War II Marshall Plan 50 years ago, is a highly unstable process—especially after internal conflicts. Political settlements occur incrementally if at all. Post-conflict success is difficult to measure. In Haiti, success of any elected government will be measured by a return of the democratic process, rejection of reprisals, respect for national institutions, and a state of stability worthy of international investment. In sub-Saharan Africa, such criteria are impossible. These traditional approaches do not work; supporting communities in constant crisis appears to be the norm. The cessation of massacre and rape and the occasional closing of a refugee camp are landmark events.

Three issues emerge: What are recognized threats to international order worthy of intervention? Who will intervene? How will it be done? Prevention is unarguably the critical catalyst in any disaster-to-recovery-to-development continuum. The strategic question becomes: is it in our best national interest to be involved in crisis prevention, mitigation, and sustainable development? Does the post-conflict phase deserve as much or more of our attention than the conflict itself? Have the Somalia, Yugoslavia, and Confederation of Independent States crises extended tentacles to each and every region of the world? Does the loss of 60% of the homes, 50% of the schools, and 33% of the hospitals in Bosnia make the rest of us symptomatic?

Sustainable development, as benign as it may sound, must also engender inherent risks and levels of violence. What are we willing to pay to attain it? Mother Nature, in the last analysis, may dictate our national interest to intervene. The startling media event of this next decade will not be a display of dead and nearly dead Somalia children; instead, it may be a plague with its origins in the squalor of a refugee camp, transported by commercial plane to the developed world. How do we monitor and weigh these risks?

Success in recovery and rehabilitation, which gives society a foothold in crisis prevention, comes from resilience of key infrastructure. Characteristics of success include community-based peacemaking among disparate groups, imbalance correction in the macro-economy, revival of the judiciary and national police (the latter being the most likely role for demilitarized troops), and attention to correcting those features which caused the instability (inequalities, militarization, and proliferation of weapons).

The professionals of the post-conflict and prevention phases are those with expertise in demobilization, demining, policing, constitutional development, and rehabilitation of key infrastructure. These peacebuilding priorities, described by Bell and Halevy, are a framework for the post-conflict Former Yugoslavia:

- Government capacity
- Population return
- Rejuvenation of household economics
- Community recovery
- An economic infrastructure
- Internal security
- Financial institutions
- Rehabilitated and stabilized currency
- Ability to respond to conflict-exacerbated needs
- Landmine removal
- Willingness to address causes of conflict
- National reconciliation

Professionals most capable of understanding these challenges to the Former Soviet Union are those who recognize the dangers in rapid decentralization in societies unfamiliar with a private sector. In the post-conflict phase, much caution is re-
quired to ensure that the right to vote is a
time-healed privilege and not to be rushed.
If conditions for democracy are not present,
then any elections will be discredited and
hope will suffer.

Many countries need to be proactively
monitored. This process will demand, as
Gene Dewey reminds us, both civilian and
military tools, some yet to be invented. This
will involve a rapid technologic commit-
ment to the recovery of those basic needs
that societies can embrace, support, and
defend for themselves. This will also in-
volve transferring First World, Cold War
technology and new sciences to support the
organizations ultimately having the respon-
sibility of dealing with ongoing chaos and
conflict.

These new military and civilian profes-
sionals will be required to: trespass profes-
sional boundaries; be negotiators as well as
technicians; understand international relief
organizations, international humanitarian
law, the military, and political climate; and
have personal security skills. Wherever
technology can be a tool for enhancing this
responsiveness, its value to the individual
and the organization will increase.
Bibliography


The Role of Regional and Emerging Powers
A Commander’s Perspective on the Role of the Developing States in Peace Operations

Lt. Gen. Satish Nambar
Former Force Commander and Head of Mission
UNPROFOR
Former Deputy Chief of the Army Staff, Indian Army

Introduction

What follows is based on my experiences as the first Force Commander and Head of Mission of the United Nations operation in the former Yugoslavia, set up in March 1992. In that capacity I had the honor and privilege of commanding military contingents and personnel from about 34 countries around the world. Also in my command were civilian police personnel, international UN civil affairs, information, and administrative staff; and a number of local staff. I also had the privilege and pleasure of working closely with some highly dedicated personnel from the United Nations High Commission for Refugees, the International Committee of the Red Cross, NGOs, and monitors from the European Community (EC). To this memorable, exciting, and unforgettable experience, I am able to add some insight on the subject from a developing country’s point of view. On my return to the rolls of the Indian Army on completion of my one-year contract with the United Nations (having declined an offer of extension), as the Deputy Chief of the Indian Army, part of my duties entailed monitoring our contributions to the United Nations. In that capacity, I was able to visit the Indian Brigade Group in Somalia in May 1994. On that occasion I was also able to visit contingents from other countries.

I cannot help but state that the categorization of the theme for my presentation appears to presuppose that the capabilities of countries of the developing world in undertaking peacekeeping operations are at variance with those of contingents and personnel from the so-called “developed world.” My experience reveals that such a presumption is not only totally invalid, but absolutely presumptuous. The role of countries from the “developing world” is no different from that envisaged for countries of the “developed world.” In fact, there are many from the developing world who can more than match the competence of peacekeepers from some of the countries of the developed world, particularly countries such as India that have so much experience in United Nations peacekeeping. Of course, this is not to suggest that there is no more to learn or prepare for, nor to deny that there are many countries from the developing world who could do with assistance in the equipping and preparation of
personnel intended to be deployed on United Nations peacekeeping operations. It would be only honest to admit that there are more cases of severe deficiencies in the performance of contingents and personnel from some developing countries on peacekeeping missions, due to inadequate preparation and training or comprehension of tasks. More importantly in the context of the present deliberations, such deficiencies are due to inadequate equipment and application of available technology.

Shortcomings Highlighted by the UNPROFOR Experience

As UNPROFOR was being set up, a number of inadequacies became evident. Needless to say, these caused us immense problems. But to the credit of all, the problems were recognized, the underlying causes appreciated, and intense efforts made to rectify them. In fact, before I go on to make my comments, observations, and recommendations, I must make the point that, while I am highlighting the inadequacies in order to identify areas in which modern technology could assist, there is much that all of us associated with the mission can be proud of. A striking feature of the operation was the tremendous sense of dedication and selflessness displayed by all who served with the mission. So much was this so that for me, the command of the mission was an experience that gave me a great sense of achievement and satisfaction, particularly in regard to the unreserved response from all components to the heavy, and often dangerous, demands placed on them.

There were significant variations among the contingents—both military and civilian—in understanding the local situation in Former Yugoslavia. Some arrived with unconcealed bias; others, with total ignorance. This posed problems in regard to formulating a common and cohesive approach for dealing with the parties to the conflict. These variations in understanding and approach were exploited by the parties to the conflict. That we were largely able to contain the adverse effects of this serious deficiency is a tribute to the efforts of the senior staff and the dedication of the contingents to the United Nations effort.

Some of the contingents did not have adequate knowledge of the geography and climatic conditions. As a consequence, their personnel were not properly equipped. For instance, the Kenyan Battalion did not have winter clothing. They had to suffer considerable inconvenience until the United Nations bureaucracy purchased and provided warm underclothing and other essentials, such as jerseys and gloves.

Inadequacy of equipment was not only caused by the lack of knowledge of local conditions, but by other factors. For instance, the Nepalese Battalion did not have armored personnel carriers (APCs), because the Nepalese Armed Forces do not have this item in their inventory. While the United Nations requisition for battalions from various countries did specify APCs as essential equipment for the mission, the UN Secretariat was aware that Nepal does not have APCs and had apparently planned to procure them for the Nepalese contingent and deliver them in the mission area. Needless to say, this meant some of the Nepalese drivers had to be trained. Therefore, in the midst of the hectic activities of the operation, the Canadian contingent was tasked with training the Nepalese. Because of the pace at which the United Nations bureaucracy moves, the first APCs for the Nepalese Battalion arrived only a few days before I relinquished command after a year at the post. By that time, the Nepalese had also effected their first rotation, which means that the Nepalese Battalion that had arrived when the mission began had gone through its tenure without the equipment. Similarly, the Nigerian Battalion arrived without its complement of essential transport. The Egyptian Battalion for the Sarajevo sector—
whose deployment together with battalions from France and Ukraine had been mandated to assist in the delivery of humanitarian aid after heavy fighting in and around Sarajevo—arrived in the mission area without flak jackets.

While some of the developing countries arrived with inadequacies in requisite equipment, some of the developed countries’ contingents came in with excess numbers of specified items and with some items that had not been specified. For instance, the French brought in about 75 APCs, against a requisition of about 15 or 20. While my Deputy, Major General Phillipe Morillon, was subjected to much ribbing for the ruse resorted to by the French in calling the APCs “armored trucks,” we were eternally grateful to the French for the subterfuge. When things became really difficult, within days of our arrival in the mission area, the additional carriers were in the literal sense life-saving. Observation devices, including night vision devices, not listed by the UN but brought by some contingents, also served us well. The aspect that merits attention is that the inadequately or under-equipped contingents were not able to undertake tasks that the better equipped contingents were able to carry out with a greater degree of effectiveness. This induced a “complex” that needed much patience and tact to overcome.

In a large mission such as UNPROFOR, with many countries contributing troops for the first time, the lack of knowledge of basic concepts of peacekeeping and the working of the United Nations proved to be a great handicap, particularly in the initial stages. Equally, inadequate knowledge of the working language of the mission (English), variations in standard operating procedures, and the inability of some members of the staff to communicate with one another were debilitating in many ways. This situation would have been painful in the best of circumstances, but in the explosive environment of the former Yugoslavia, it was absolutely disastrous. It is to the credit of one and all that these limitations were largely overcome by sheer dedication and hard work. I cannot help but recall my first reaction on seeing the staffing pattern of my mission headquarters—I was convinced that we were overstaffed by almost 30%. Two weeks into the mission, I became aware why so much redundancy was built into the organization—30% of my staff were “good guys,” period. Inadequate knowledge of operating procedures and poor knowledge of the working language of the mission made these otherwise excellent professionals ineffective. Many of them went through their tenure with UNPROFOR as passengers. Added to this was the intense distrust of the Russians (both contingent and staff) by many of the personnel from the NATO countries. All of one’s capacity for coaxing, cajoling, and persuasion were needed to make the staff work despite the severe handicaps. Let us be quite clear, in dealing with such matters there is no guidance or assistance forthcoming from New York.

There was considerable variation in the standards of competence in the conduct of various basic activities such as manning checkpoints, searching vehicles, manning observation posts, maintaining convoy discipline, escorting humanitarian aid convoys, dealing with refugees, and so on. In this regard, whereas the West European and Canadian contingents had been well trained and equipped to undertake such tasks, as were some contingents from developing countries such as the Argentineans and the Jordanians, other contingents, such as those from Czechoslovakia, Poland, Egypt, Kenya, Nepal, and Nigeria, had not achieved the standards of training in these vital peacekeeping functions. The contingents from the Russian Federation and Ukraine were also seriously deficient in this regard. However, to the credit of the commanders and personnel of these contingents and the respective national authorities, within a reasonable period their
performance caught up with that of the others.*

Many of the contingents, including some from developed countries, did not have a clear comprehension of the roles, functions, and responsibilities of other elements of the mission, such as military observers, civilian police, and civil affairs staff, and of other agencies such as the United Nations High Commissioner for Refugees, the International Committee of the Red Cross, and NGOs providing assistance in the mission area. This caused considerable misunderstandings, to put it mildly, that might otherwise have been avoidable. Cohesion and coordination of operations were adversely affected, particularly at the lower levels. It took a great deal of patience, time, and effort to work through this clouded environment: patience, time, and effort that could have been better applied to the primary task at hand.

The application of standards of discipline and the code of conduct, unfortunately, were not uniform across national contingents. This reflected differences in both value systems and conditions in home countries. Pay and allowances granted to personnel varied considerably, leading to some most unhealthy practices, such as the unauthorized sales of goods and equipment, smuggling out of locals through front-lines, and the sale of humanitarian flights/convoys for a "price." While demeaning in the extreme, the problems had to be dealt with and controlled to the extent possible.

*My comments are based on the composition of UNPROFOR while I headed the mission. Battalions from countries such as Bangladesh, Malaysia, Pakistan, and Turkey joined UNPROFOR after I had relinquished command. I did have military observers and civilian police from Bangladesh when I was in command.

The Relevance of Technology in the Preparation for and Conduct of a United Nations Peacekeeping Mission

Above, I have tried to highlight some of the major aspects of our experiences in UNPROFOR. Many of the other aspects that have been highlighted by the experiences in Kampuchea, the Former Yugoslavia, Somalia, Rwanda, and many others being attended to by the United Nations Secretariat. There is, therefore, cause for some satisfaction in knowing that there is a recognition of the inadequacies. Hopefully, action is being taken to attend to them. Based on my command experiences in UNPROFOR, I can offer some suggestions on the use of modern technology in peacekeeping missions.

While many of the points made would be primarily applicable to the training of peacekeepers from the developing world, a number of them would also be useful for contingents from the developed world. Personnel earmarked for United Nations peace operations, particularly commanders at all levels, must be made aware of the provisions of the United Nations Charter in general, and the chapters and articles dealing with the maintenance of international peace and security in particular. This is essential in promoting an understanding of Security Council resolutions pertaining to a mission, as well as the directions that emanate from the headquarters in New York. They must also know the outline organization of the United Nations, the role and functions of major organs such as the Security Council and the General Assembly, and the detailed organization and functions of the Department of Peacekeeping Operations and the Field Operations Division. This does not require modern technology, but certainly requires application on the part of national authorities.
Modern technology in the form of audiovisual coverage would assist prospective peacekeepers in making them aware of the manner in which peacekeeping operations evolved over the years, the types of operations undertaken in today’s environment (with particular emphasis on the vital aspects of impartiality in the conduct of operations), and the use of force in self-defense—the awareness of which should include an understanding that it extends not only to threats to peacekeepers, but also to the equipment, stores, supplies and civilian personnel entrusted to the care of peacekeepers under the mandate, humanitarian aid, and so on. All of this is under the cloak of legitimacy, as long as the principle of impartiality is maintained. Such coverage would obviously need input from and coordination by the UN Secretariat.

Contingents and personnel earmarked for United Nations duties should be made aware of the various types of peace operations and the detailed nuances of each: in particular, the evolution of concepts in the context of changes in the environment in which these are inserted today. To assist their comprehension of such operations, they should be presented with case studies on peace operations conducted over the years in the Congo, Namibia, Kampuchea, Former Yugoslavia, and Somalia, in which lessons can be highlighted, analyzed, and discussed, using audiovisual presentations. The vital aspect of the command and control of forces in a mission area needs to be explained and understood by all ranks. Similarly, the principles that particularly apply to United Nations forces—such as discipline, honesty, integrity, impartiality, cooperation, respect for local customs, unity of effort, and minimum use of force when required—need to be emphasized through the same medium, as well as every now and then during the conduct of operations in the mission area.

Contingents and personnel should be well briefed on legal aspects of their operations, particularly in regard to the provisions of the Status of Forces Agreements, the applicability of International Humanitarian Laws to United Nations peacekeeping operations, the provisions and importance of the Geneva Conventions of August 12, 1949 and the protocols thereto, and so on. Within the framework of these legal requirements, personnel should be made aware of the manner in which the rules of engagement for a mission would be framed and implemented under various sets of circumstances. The nuances of different scenarios against which the status of these rules are to be related should be made clear, preferably by those who have prior experience in peacekeeping operations.

As soon as a contingent or a group of personnel is set for deployment into a particular mission area, detailed preparations for that specific mission should commence. Here are some suggestions on the major aspects that need to be covered in this context. The first is that of understanding the political and military situation in the proposed mission area. To this end, persons conversant with the area and the government—such as historians and other academics—should brief personnel and to give their views. It would be useful to have the United Nations’ perception of the situation conveyed to the contingent in some detail. Efforts should be directed to obtain, study, and analyze details, such as the political groupings of the parties to the conflict; their composition in terms of tribe or clan affiliations; where applicable, the strengths of the armed groups and the types and quantities of weapons and equipment they hold; personality sketches of political and military leaders; details of negotiations held and the outcome thereof; and so on. Together with this, factual details of the mission area—such as geography and climatic conditions; access points by air, sea, and land; road and rail communications; medical facilities available; and the extent to which all of these are functional—need to
be ascertained and studied to ensure effective staffing and inclusion of essential items of equipment in the inventory of the contingent.

Briefing on local customs, etiquette, economic conditions, educational levels of the population, their means of livelihood, and so on would be of great value in promoting a better understanding of the society in which the contingent will be required to operate. It is vital for the contingent to include some personnel who have a working knowledge of the local language and, if necessary, to hire trained interpreters. The United Nations arrangement in this regard is quite poor: the bureaucratic procedures connected with deciding pay scales and physically hiring personnel are so drawn-out and cumbersome as to cause frustration. As a result, contingents are saddled with local staff who, for all their competence, are biased one way or another, and therefore cannot always be relied upon.

The points made imply that there is a need for the creation and maintenance of a comprehensive database in United Nations HQ in New York, easily accessed by contributor countries, either directly from their national capitals or through their missions in New York.

Preparatory training of contingents, commanders, and other personnel should obviously be directed at, first, fine-tuning military skills and ensuring physical fitness and, second, re-orienting such skills to other levels demanded by the scope of United Nations operations. Such preparation would obviously be undertaken at national level on some of the more important aspects noted below. Such training can only be meaningful if it is recognized that there is an imperative to apply available modern technology to the conduct of operations in the field. The details presented below are based on my experience.

- Manning and establishment of checkpoints to control the movement of personnel and vehicles, including searches where necessary. For this purpose, it would be necessary for the contingent to have equipment that facilitates the organization of such checkpoints. With the sophisticated level of weapons and equipment available to the belligerents in a conflict today, United Nations troops undertaking such tasks must be equipped with electronic detection means to supplement physical search. Equally, there is a requirement for more effective movement-control measures than the antiquated arrangements now resorted to by most contingents, particularly those from developing countries, which cannot afford the more sophisticated means. These will need to be provided by the United Nations to the contingents.

- Interposition of detachments or personnel between belligerents to prevent or contain conflict, establishment of buffer zones, and surveillance of the activities of different factions. These are easier said than done. If interposition is to be effective, the United Nations force must have the surveillance capability to monitor the movement and activities of opposing forces. This will, of necessity, require an airborne capability, manned or unmanned, integrated into the overall command, control, and communication system. Second, the United Nations forces or observers being interposed must have sufficient protection in the form of armored vehicles for troops, or bullet-proof vehicles for observers. Third, and most important, unless one is dealing with a “failed-state” scenario, the ability to transmit visual proof of what is transpiring on the ground live to UN HQ and to the members of the Security Council could be a great catalyst for moderation by belligerents.
• Conduct of patrolling to monitor agreements or to preempt the development of conflict situations and counter-ambush drills. In this context, it can only be stressed that an airborne surveillance capability (manned or unmanned) is vital, as is the capacity to locate the source of direct and indirect fire.

• Escort and protection of convoys, both those for the administration of contingents and for humanitarian aid.

• Disarming segments of the warring parties and monitoring demobilization of armed elements.

• Protection of United Nations property, refugee camps, United Nations protected enclaves, and management of refugee movement.

• Countermine measures by all sub-units and personnel and demining operations by specialized units or personnel.

In addition to the above military skills, contingents and personnel earmarked for United Nations peace operations need briefing, guidance, and training on subjects that are peculiar to peace operations. These subjects are as follows:

• How negotiations and mediation are conducted. This is an important aspect of any peacekeeper’s duties, particularly of commanders at various levels. Training on this should include briefing on the subject by experts if possible, or at least by those who have previous experience in peacekeeping, particular stress being laid on the need for perseverance, patience, evenhandedness, understanding, firmness, adherence to assurances given, follow-up measures, and so on. Briefing on and discussions of case studies of previous operations would be invaluable.

• How incidents are reported and investigations are conducted. In this sphere, the main aspects to stress are truthful reporting, honest and impartial investigation, and transparency.

• How refugees are dealt with. Stress that compassion, understanding and sympathy are important considerations. At the same time, commanders and other personnel need to be made aware of the plethora of aid agencies and associated personnel they will encounter in the field, the importance of understanding their role and capabilities, the requirement of cooperating with them, bearing with their different approach to problems, based on their respective agendas (which may not always be the same as the agenda of the United Nations), and providing protection and other assistance to them when the situation demands.

• How effects of media presence, reporting, and consequent perceptions of the reading and viewing public are handled. This is a major factor that has entered the peace operations scene in recent years. Besides the effects the perceptions have on the conduct of operations, the more important consideration is the use of the ubiquitous media by the belligerents to propagate their cause by influencing their own people as well as the people in other countries, particularly decisionmakers. This vital subject must form part of the training curriculum inasmuch as commanders and personnel are made aware of the dimensions of the problems they may face with the media, how they should cope with it, and, even more importantly, how they can use it to good effect. Obviously, this requires coopting the services of trained media persons and those who have experience in handling media from earlier peacekeeping operations.
A major item associated with modern technology that is essential to the effective preparation for and conduct of United Nations peace operations is a good database in United Nations HQ in New York, easily accessed by all contributor countries. This includes well-prepared and documented audiovisual coverage of facets of United Nations operations, including its organization and charter, case studies of past operations, manned and unmanned aerial reconnaissance capability, state-of-the-art communications, and dependable locating and observation devices.

Selection of contingents and personnel is a matter of national prerogative. There can be no two opinions on the importance of this. Given that they are representative of their respective countries, every effort must be made to ensure that only personnel with the highest standards are included. In this context, a few points may be made on the basis of my experience with UNPROFOR. Some of the contingents comprised properly organized units in that, other than a few additions or subtractions, they retained their pre-deployment character. Cohesion, esprit de corps, and understanding were significant features of such contingents. Other countries selected groups of personnel or subunits from larger bodies, put them together as a contingent within an organizational framework, had them trained together for a period of time, and sent them to the mission area. One such contingent formed its battalion solely from personnel of noncommissioned rank and above, as the national authorities felt that national-service conscripts, with their short period of training and intended duration of stay in the service, might not be responsive enough. All of these were workable arrangements and did not pose any problems to the operations of the mission as such.

Insofar as equipment is concerned, in the light of recent experiences, one can suggest that it is preferable to be overequipped than to be underequipped. This confers greater flexibility in dealing with escalated threat levels and gives greater confidence to personnel. As regards equipment that has to be taken over from the United Nations or other sources (because the type of equipment required for the mission is not on the inventory of the armed forces of the country concerned), this must be done well before deployment in the mission area, and requisite training of personnel must be carried out. It is essential that national authorities ensure that adequate spares back-up is provided to the contingent. Good communication equipment, both within the contingent and to national headquarters, must be ensured. If necessary, United Nations HQ assistance may be sought, and it should be readily forthcoming.

Some Finer Nuances of Peacekeeping Operations and Use of Modern Technology

Recent experiences have shown that on the ground there is a growing “gray zone” between the two well-defined responses of traditional peacekeeping and that of collective enforcement as defined in Chapter VII of the United Nations Charter. This gray zone is, in effect, the space between traditional peacekeeping (including an appropriate application of force for self-defense) and all-out war. Situations encountered in the gray zone often require responses that are neither traditional peacekeeping nor full-blown enforcement action, but something in between. Confusion between peacekeeping and enforcement action, including the tendency to slide from peacekeeping to enforcement, and then back again, has proved to be very dangerous. This is essentially what has been witnessed in Somalia, Liberia, and Former Yugoslavia, with disastrous consequences in all three cases. This confusion has arisen precisely because no effective mechanisms have been
devised for responding to the challenge of the gray zone.

Some examples of contingencies that may arise in the gray zone are as follows:

- When an armed faction in a conflict unilaterally blocks the route of a relief convoy, preventing it from gaining access to a population in distress. While it may not have resorted to the use of weapons, it has effectively blocked the route. A variation of this situation occurs when the route is blocked by unarmed women and children.
- When an area deemed to be under the protection of a United Nations force is attacked or overrun by a party to the conflict.
- When a group or detachment of United Nations peacekeeping troops comes under attack from a faction with superior fire power.
- When peacekeepers are taken hostage.
- When a “no-fly zone” is violated.

These developments in the gray zone place peacekeepers in an untenable position, in various ways. At the practical level, because they are lightly armed, peacekeepers usually lack the capacity for escalated armed response. The effectiveness of peacekeepers is dependent not on their ability to impose their will by overwhelming force, but rather on the moral authority conveyed by their presence. Even so, if we are to go by recent experiences, it would be prudent for all future peacekeeping contingents to be equipped for the worst-case scenario, so that they can respond with force in self-defense when attacked. The predicament of peacekeepers is further compounded by the sentiment of public opinion, which does not always appreciate why peacekeeping military contingents seem powerless to respond to force by force, especially in the face of aggressive actions or atrocities. The fact that peacekeepers are there to play an essentially diplomatic rather than a military role is little understood by the public at large.

Modern technology has a role to play in such situations, but the scope will be limited by the mandate of the international community and by its capacity to accept responsibility for the use of technologies that may seem to impinge human rights and international humanitarian law. For instance, in dealing with passive resistance to the movement of humanitarian relief convoys, there is scope for the use of agents such as tear gas, nerve gas with temporarily incapacitating capability, sticky fluids that prevent movement, and so on. Personally, I would find it very difficult as a commander to authorize such use, but in certain circumstances it may be the only peaceful way.

For the security of United Nations designated protected areas or safe areas, some electronic measures could possibly be deployed to preclude attack from outside or violation from inside outwards, at least in terms of giving some early warning so that preemptive measures may be initiated.

In instances in which there is a danger of United Nations peacekeepers being attacked, there should be no hesitation in ordering the use of an appropriate level of force to deal with the belligerent group or party. Provided that such action is taken without discrimination or bias, the credibility of the operation can remain unaffected.

To ensure the safety of peacekeepers, particularly unarmed observers, when there is a possibility of their being taken hostage in an adverse situation, it may be desirable to provide them with devices such as transmitters to provide location information. Such devices may be hidden in their boots or stomachs, as considered appropriate. Needless to say, should it become necessary, operations must be launched to rescue them without any hesitation.

Many of the countries of the developing world that provide contingents for United Nations peace operations do not have the infrastructure and facilities for the effective conduct of training and
preparation of contingents and personnel. Therefore consideration should be given to the desirability and feasibility of setting up regional training and preparation centers that could better utilize available expertise within various regions. Besides being cost-effective, such an arrangement would also ensure a degree of standardization and coordination, and promote better understanding.

Conclusion

The proliferation of conflicts in many parts of the world, all of which call for some form of United Nations involvement, stands in sharp contrast to the limited capacity and resources of the United Nations. In view of these contradictory pressures, the United Nations will have to determine more systematically where, when, and to what extent to get involved. In general, the United Nations should invest its political and material resources where they are needed most and where they are likely to make the greatest difference. Notwithstanding what may be perceived as a "deathblow" dealt to United Nations peacekeeping operations by the manner in which the US and some West European countries have assailed the United Nations for what it was attempting to do in Bosnia-Herzegovina and Somalia, such operations will continue to be required in the future, perhaps with some modifications to traditional methods evolving over the years. It is in recognition of this need that contributor countries must direct greater efforts at the proper training and preparation of peacekeepers, including for those aspects that may fall in what I have termed the gray zone.

In doing all this, it is vital that due attention be paid to the utilization of modern technology to enhance the effectiveness of peacekeeping operations. This aspect is already stressed by contingents from developed countries because the technology is reasonably available at the national level. However, there is an imperative need for a degree of institutionalization of this process to enable developing countries to also be covered by this umbrella. There is, of course, the question of costs; modern technology does not come cheap. The United Nations will therefore need to acquire the financial resources for this purpose. Such investment is, in any case, preferable to the consequences of unresolved conflict.
Regionalism, Peacekeeping, and Australia’s Experience

Ambassador David Reese
Deputy Director General
Office of National Assessments
Australia

The Concept of Regionalism

During the Cold War, competition between East and West was seen as limiting the scope for regions to resolve their own problems—and limiting the Security Council’s role in UN peacekeeping under Chapter VIII of the Charter. With the ending of that era, regionalism has been revived as a means of addressing security problems and deploying peacekeeping forces.

Regionalism is a loose concept—like other “isms,” it suffers certain shortcomings, since the definition needs to be broad to encompass all its permutations. Essentially, the concept of regionalism means countries in a geographic area cooperating to achieve agreed-upon outcomes. The term can be used to characterize cooperation for economic outcomes, but this paper focuses on security outcomes and particularly those involving a peacekeeping or peace-enforcing element.

Former United Nations Secretary-General Boutros Boutros-Ghali articulated the hopes for regionalism in his Agenda for Peace (1992), in which he envisaged regional arrangements and agencies contributing to security in the form of preventive diplomacy, peacekeeping, peacemaking and postconflict peacebuilding. Nonetheless, Boutros-Ghali also made a point of stating that under the Charter the Security Council would continue to have primary responsibility for security—that the Security Council could authorize a regional arrangement or organization to take the lead or to work with it in complementary efforts.

The scope for a regional approach to security problems was recognized much earlier by the international community, in the covenant of the League of Nations and again in Chapter VIII of the UN Charter. The Charter itself avoided a precise definition of regional arrangements and agencies to enable flexibility of approach. And Boutros-Ghali acknowledged in his Agenda for Peace that no two regions or situations were the same—so that each case could be approached with “flexibility and creativity.”

Regionalism During the Cold War

The peacekeeping record of the major regional organizations through the era of the Cold War was not impressive. The organizations most likely to lend themselves to peacekeeping operations, by virtue of
their size, scope, comprehensive memberships, and charter, have been the Organization of American States (OAS), the Organization of African Unity (OAU), and the League of Arab States. The OAS and OAU have engaged in peace missions that could be described as preventative diplomacy. Each of the organizations has undertaken a peacekeeping operation to deal with internal unrest in a member state, but none has been an unqualified success.

- The OAS put together an Inter-American Peace Force (IAPF), which intervened in the Dominican Republic in 1965, but only after US armed forces had already quelled the civil unrest. The IAPF was withdrawn the following year, but the OAS never developed a consensus on the operation. Some states viewed the action as a legitimizing vehicle for US intervention.

- The OAU’s involvement in peacekeeping was more disastrous. In 1981, a force was sent to Chad to intervene in the civil war that had broken out there. The force was attacked by both parties to the conflict and withdrew in less than a year. The OAU had to appeal to the UN to cover most of its costs.

- The League of Arab States’ record in peacekeeping is equally thin. The League could be said to have helped resolve a crisis in 1961 in Kuwait, when the newly independent state came under pressure from Iraq. But League forces only arrived in Kuwait three months after British forces had deterred the threat. In 1976, the League authorized a peacekeeping force to intervene in Lebanon’s civil war, but the force was dominated by Syria, which used the intervention to further its own interests. The action also brought only temporary respite and involved enforcement actions that carried it beyond the traditional meaning of peacekeeping.

### Regionalism in the Post-Cold War Era

The regional peacekeeping record since the end of the Cold War has been little better. Intervention by the Economic Community of West African States (ECOWAS) in Liberia could not secure a permanent ceasefire; exceeded the traditional bounds of peacekeeping; was dominated by Nigeria, whose actions drew criticism from other members; and led to the introduction of a UN monitoring force to oversee the conduct of the regional force.

Newfound superpower cooperation in the Security Council enabled the UN to assume a greater role in conflict-resolution and peacekeeping. The UN engagement in Somalia—another case of nation-state disintegration—occurred when the OAU and the Arab League showed they were incapable of responding to the crisis. The extent of a regional response was the participation of individual African states in UNOSOM and UNITAF. In the Iraq-Kuwait conflict, the Arab League and Gulf Cooperation Council failed to provide a regional response. Regional states participated in resisting Iraq’s aggression only through the coalition force formed by the United States under Security Council resolutions.

In the former Soviet Union, crises in the new republics were beyond the peacekeeping or peace enforcing capacity of the UN or the inclination of the Security Council. The Commonwealth of Independent States (CIS)—principally Russian troops—undertook peacekeeping operations in South Ossetia, eastern Moldova, and Tajikistan. The UN’s role has been confined to monitoring and observing these operations, wary of legitimizing such actions but trying to ensure that the peacekeeping forces observe neutrality and UN standards.

And in Europe, the absence of the Cold War has enabled NATO and the European Union (EU) to play a support role to the UN in peacekeeping in the former Yugoslavia.
Neither of these organizations was able to intervene without the UN: indeed, EU members were unable to agree on their approach in the early stages. And the only Europe-wide security organization, the Organization for Security and Cooperation in Europe (OSCE), has neither the authority, despite its charter, nor the infrastructure to mount peacekeeping operations. The Yugoslav conflict demonstrated that no coordinated European security policy exists.5

This series of examples points to the limitations of regional organizations taking responsibility by themselves for peacekeeping operations—the assumed benefits of a regional solution have generally not been realized. Regional organizations have not achieved consensus for their actions any more effectively than has the UN. Nor have regional groupings shown that they are able to relate to the disputants any more than has a UN-organized operation. Peacekeeping forces with the same language as and cultural similarities to the disputants may have an advantage, but forces from a neighboring state can be suspected of pursuing their own interests, as has been the case with Nigerian forces in Liberia. If states have a vital national interest in a dispute, they are not likely to exercise the impartiality a UN peace operation requires.6

Regional peacekeeping forces thus have several inherent problems. In general, a regional organization is not necessarily homogeneous and is likely to have fewer resources and funds than a properly-backed UN force would have available to it. Moreover, most regional organizations are not structured for a peacekeeping role. Finally, regional peacekeepers may have difficulty meeting the UN’s neutrality standard.

Although much depends on which regional organization is involved and what circumstances are in play, there are severe limitations to regional peacekeeping operations.7 UN peacekeeping will have a comparative advantage in most cases, and regional peacekeeping operations cannot be regarded as viable substitutes—though they may be helpful supplements.

Both UN and regional peacekeeping have their limitations when attempted to the exclusion of the other. Boutros-Ghali has made clear that the financial costs of recent peacekeeping to the UN impel the organization to look to regional groups to share the burden.8 In his “Supplement to Agenda for Peace,”9 Boutros-Ghali followed up his earlier initiative and tried to breathe life into his proposal for greater cooperation between the UN and regional organizations. These proposals were:

- Consultations between the UN and regional organizations on conflicts in which they both might have an interest. Formal arrangements between the UN and regional organizations for participation in each other’s meetings, and the exchange of information to contribute to this link.
- Diplomatic support to the UN in conflict prevention or peacemaking activities where diplomatic initiatives or technical assistance might help.
- Operational support, such as NATO air power to support UNPROFOR. UN provision of technical advice to regional organizations undertaking peacekeeping operations of their own.
- Co-deployment, in which the regional organization is given the main burden with a small UN operation to monitor it and provide support. Examples are ECOWAS in Liberia and the CIS in Georgia, but the Secretary-General acknowledged that these operations needed further consideration to determine the value of co-deployment.
- Joint operations, in which the UN and a regional organization share the staffing, direction, and financing of an operation, such as in the UN mission in Haiti, which was shared with the OAS.
Nonetheless, the Secretary-General's view of the capacity of regional organizations is heavily qualified. He noted that none of them has developed a capacity matching that of the UN. Because of regional organizations' varied capacity, as well as their structural and operational differences, he thought it inappropriate to try to establish a universal model for their relationships with the UN.

The Secretary-General suggested several principles which might be applied to cooperative arrangements:

- Agreed mechanisms for consultation.
- The primacy of the UN.
- Division of labor to avoid overlap and institutional rivalry.
- Consistency by members of regional organizations, such as in maintaining standards for peacekeeping operations.

While the framework exists for cooperation between the UN and regional organizations, the division of responsibilities between them (and analysis of what each does best and should expect from each other should conflict occur) is largely an unpainted canvas.

In “An Agenda for Peace,” Boutros-Ghali noted that regional organizations might be best suited to handle conflict at its earliest and nascent stages, that is, to do peacemaking. A year later, in his “Report of the Work of the Organization, 1993,” he again highlighted how regional organizations can contribute to peacemaking but had little to say of the other phases of peace operations. The “Supplement to an Agenda for Peace” can be interpreted as recognition that regional organizations are needed, particularly because of the UN’s financial circumstances, and that they can play a helpful role in peacemaking, but beyond that, to be successful, the regional organization’s role must be very carefully managed with the UN.

**Regionalism in the Asia-Pacific Area**

Has regionalism worked any better in Australia’s region of strategic interest? I have defined Australia’s region broadly as the Asia-Pacific area for the purposes of this paper. In terms of formal structures, the Asia-Pacific region has been slower than other parts of the international community to develop regional structures. Security has been attained in the region principally by bilateral treaties between the US and its allies—Japan, Korea, Thailand, the Philippines, and Australia—through what Former US Secretary of State James Baker described as a hub-and-spokes approach to security.

The only regionwide structure to emerge has been APEC—the Asia Pacific Economic Cooperation grouping. APEC is only in its ninth year and has as its objective the advancement of economic cooperation in the region. While such cooperation may enhance security, it would be premature to foreshadow that APEC will develop into an organization concerned directly with security matters.

The ASEAN organization has been the most successful grouping of states in the Asia-Pacific region. ASEAN was formed in 1967 to build cooperative relations among Southeast Asian states in the aftermath of Confrontation, when Sukarno’s Indonesia was in conflict with Singapore and Malaysia. The members were Indonesia, Malaysia, Singapore, Thailand, and the Philippines. Brunei joined in 1984, and in 1995 Vietnam became a full member. Cambodia, Laos, and Burma are likely to join in the next few years, bringing the association to the ten-member grouping its founders envisaged.

ASEAN’s early emphasis was on economic cooperation, but to date economic cooperation has been less significant than the development of political dialogue among its members. This, along with rapid economic growth, has resulted in its evolv-
Chapter 10 Regionalism, Peacekeeping, and Australia’s Experience

In the 1970s, the greatest threat to the security of ASEAN states was seen as coming from Soviet-backed North Vietnam’s victory over the South. Thailand found itself on the frontline when Vietnam occupied all of Cambodia in 1979. Its border was violated by Khmer Rouge (KR) and Vietnamese forces, and some 370,000 displaced Cambodians sought refuge in Thailand.

ASEAN condemned Vietnam’s invasion of Cambodia in the UN and put diplomatic pressure on Vietnam for a decade. During 1988 and 1989, when Vietnam was becoming overstretched as a consequence of the contraction of Soviet support, Indonesia convened meetings of interested parties to the dispute. Vietnam’s announcement in January 1989 that it was prepared to withdraw its troops from Cambodia led, in July-August 1989, to the first Paris Conference on Cambodia, which was co-chaired by France and Indonesia. Participants included the various Cambodian factions, Vietnam, the ASEAN states, the Five Permanent Members of the UN Security Council (P5), and Australia.

Negotiations were deadlocked on the role of the KR in a transitional government. In late 1989 Australia sought to break the impasse by proposing that the UN be directly involved in the administration of Cambodia during the transitional period. This would be added to a UN presence to monitor the ceasefire and cessation of external military assistance, and a UN role in organizing and conducting elections. This was the first occasion on which, in a peacekeeping endeavor, the UN would oversee the civil administration as well as organize and conduct elections—as distinct from monitoring them.13

The proposals were carried forward in further negotiations with P5 support in Paris and Jakarta in early 1990 while Australia developed detailed working papers for implementation of the proposals—papers published as “Cambodia: an Australian Peace Proposal.”14 The UN Secretariat assumed the central role in developing the plans while the Cambodian parties continued to haggle with each other. Final agreement was reached at the second Paris Conference in October 1991.

Implementing the Paris Accords was a big task for the UN, and one for which it was not well-prepared. UN administrators who were superimposed on the State of Cambodia administration provided little more than superficial oversight of the administration. The UNTAC military component was slow to be put in place and equipped, and was not able to enforce the cantonment and disarmament of the Khmer Rouge forces. Nonetheless, UNTAC proceeded with the elections and enabled Cambodia to form an elected government. The civil war resumed but at a lower key and without the international involvement that characterized the earlier conflict. The UN did facilitate the return of displaced Cambodians from Thailand and the flow of international aid to help rebuild Cambodia.

The regional contribution to this effort involved troops from 11 Asia-Pacific states...
contributing some 5,500 military personnel—about one-third of the military component. All six ASEAN states contributed, with Indonesia, Thailand, and Malaysia providing battalions. Australia provided the Force Commander, Lieutenant General John Sanderson, and more than 500 soldiers, mainly communicators, for the period up to the elections, along with a further 115 troops and 6 helicopters for a 3-month period after the elections to wind up the operation.

Japan, for the first time, sent uniformed personnel to participate in peacekeeping—some 600 troops and 75 police. And the UN’s Special Representative in Cambodia, Yasushi Akashi, was Japanese. For Japan, as for the region, this was an important first test of Japan’s ability to deploy peacekeeping forces in a region in which the legacy of World War II was still alive. ASEAN states publicly supported Japan’s presence in UNTAC, but a certain hesitancy could be sensed. Nonetheless, no major opposition arose, and the deployment was judged a success by Japan and the region.

For the ASEAN states, the Cambodia outcome was a successful consequence of persistent diplomatic effort, within the limits of their leverage. In other words, ASEAN action was helpful at the peacemaking stage, but the engagement of the P5 was necessary to push the process forward, and the resources at the disposal of the UN were critical to implementation of the Accords. The scale of the task was beyond the capacity or experience of ASEAN. ASEAN coordinated its diplomatic effort, responsive to the concerns of its frontline state, Thailand. But ASEAN members committed their forces to UNTAC on a national basis—not as an ASEAN regional force.

ASEAN and Regional Security

ASEAN’s growing self-confidence following the Cambodia settlement, and its readiness to take an inclusive approach to regional stability, opened the way for Vietnam’s membership and, in time, for the membership of Laos, Cambodia, and Burma. This self-assurance has also enabled ASEAN to address other issues bearing on the security of ASEAN members and the wider Asia-Pacific region. Concerned that conflicting territorial claims in the South China Sea might lead to regional tension, Indonesia, with the backing of other ASEAN members, has held regional workshops on South China Sea issues. These have been held annually since 1990. ASEAN also made representations to China when it occupied Mischief Reef, claimed by the Philippines (as well as China and Vietnam) in 1995. Despite China’s action on Mischief Reef, regional efforts, including those of China, have avoided further confrontation.

ASEAN foreign ministers, confident of the level of dialogue they developed with regional states, extended this dialogue to include security matters by establishing the ASEAN Regional Forum (ARF) in 1993. The objectives for ARF were appropriately modest, focusing on confidence-building measures and greater transparency. However, in its few annual working sessions, the forum has covered issues such as Cambodia, the Korean peninsula, proliferation (including nuclear testing), and the South China Sea—despite China’s preference that this issue be dealt with bilaterally.

The ASEAN management of ARF provides an odd locus to a body that looks at Asia-Pacific security issues broadly. Nonetheless, Japan, China, Korea, the US, Australia, New Zealand, Russia, the European Commission, Burma, and, most recently, India have been willing participants. After all, there is no other show in town. ARF is in its infancy and should not be overloaded with expectations. It is clearly a forum for discussion and has not attempted to get into the business of dispute mediation.

Peacekeeping is on ARF’s agenda, to be addressed in intersessional meetings of officials. Malaysia and Canada have
co-chaired this group, which has essentially sought to exchange views on peacekeeping doctrine, practical experiences, and training facilities. No specific lessons for regional application were agreed upon before the meeting adjourned sine die. Australia and Canada, which both have peacekeeping training centers, have made courses available for ARF participants, and ASEAN states have discussed establishing such a center in an ASEAN state.

**North Asia**

The Asia-Pacific sub-region of greatest current security concern to Australia is North Asia. While North Asia is more distant from Australia than Southeast Asia, instability there may have greater consequences. As about half Australia’s trade takes place with North Asia, conflict would have direct consequences for Australia.

From the time of the Korean War, Australia has remained a member of the UN Command in Korea. As long as North Korea observes the armistice, the UN Command has little to do. Although there have been periodic incidents across the demilitarized zone, prospects of a renewal of conflict do not appear very high at present. Nevertheless, we know little about the closed society of North Korea, and US and Republic of Korea (ROK) forces retain readiness. North Korea’s declining economy appears to have pushed the regime towards greater engagement with the outside world. The Framework Agreement concluded with the US in 1994 freezes North Korea’s plutonium production and may provide a basis in time for North Korea’s opening-up. But there is also the possibility of economic and regime collapse, and, in those circumstances, there may be a need for extensive UN-directed assistance.

The other area of uncertainty in the region is China-Taiwan. The tension that developed prior to Taiwan’s elections, when China conducted extensive military exercises close to Taiwan, has eased for the moment. But the uneasy relationship existing between them is likely to continue for the foreseeable future. With China regarding the issue as one of sovereignty, no obvious role for the UN in this dispute can be identified.

**The South Pacific**

Another Asia-Pacific sub-region that engages Australia is the South Pacific—sometimes unflatteringly described as our backyard. The region has not faced external threats of any magnitude since World War II. In particular states there has been some instability, and a few instances of low-key friction between states—as is currently occurring on the Papua New Guinea (PNG)/Solomons border. Peacekeeping in this environment has been low-key and to date has not required the region to look for a peacekeeping force under UN auspices.

Within the region, the principal organization is the South Pacific Forum (SPF), which, along with the South Pacific island states, includes Australia, New Zealand, and the northern Pacific states, formerly dependencies of the United States. The SPF has a permanent secretariat, and members’ heads of government meet annually, but it has no security role.

The first occasion when a regional state sought assistance was 1980, when newly independent Vanuatu sought outside help to put down a secessionist movement on one of its islands. Papua New Guinea readily responded to Vanuatu’s call for assistance and provided troops but aircraft and communications assistance were needed, which Australia agreed to provide. The rebellion was quickly put down.

Other instances of instability have been two coups in Fiji in 1987, riots in Vanuatu in 1988, and the insurgency in Bougainville, West Irian. Periodic tension also has arisen between Indonesia and Papua New Guinea, due to dissident groups in Irian Jaya.
seeking safe haven in PNG. External troops have neither been sought nor proposed in any of these situations, except in a limited way in Bougainville—an island province of PNG where insurrection against the central government has involved bitter low-level conflict for seven years.

In 1994, PNG sought help from Australia and Forum members to provide a secure environment in Bougainville to enable peace talks to take place. Australia provided logistic support and command of the operation, while Fiji, Tonga, and Vanuatu provided some 400 troops. The deployment, which lasted less than a month, is a modest example of a regional peacekeeping operation that did not require direct UN involvement, although the approval of the UN Secretary-General was obtained. Unfortunately, the talks were not successful, and the conflict in Bougainville continues, widening to involve cross-border excursions by PNG forces into the Solomons, where PNG believes support is being provided to the insurrectionists. The Solomons have sought the good offices of a UN high commissioner, but at time of writing, it was not clear what kind of assistance the Solomons was seeking and whether that assistance might be provided.

Since the Vanuatu incident in 1980, PNG’s Prime Minister has periodically proposed that a permanent peacekeeping force be established in the region for ready dispatch to any crisis. This has not found support in Australia or among the other states because of the infrequency with which it would be needed, the cost involved, and the lack of certainty about the circumstances in which it would be deployed. Australia has not wanted to be put in the role of regional policeman.18

The South Pacific is a region where, with isolated states having small populations, regionalism can play a useful role and not necessarily require the direct engagement of the UN.

**Conclusion**

Australia has been an active participant in UN peacekeeping as well as in other non-UN operations such as the Multinational Force and Observers in the Sinai. We have been involved in 13 UN operations. At the time we contributed to UNTAC, we already had a battalion in Somalia with UNITAF, and were engaged in UNFICYP, UNTSO, and UNSCOM.

For a nation with a relatively small armed force, we were at risk of overreaching ourselves. The increased need for peacekeeping since the Cold War, and the changes in the peacekeeping role involving peace enforcement in disintegrating states have led to reevaluation of the role which Australia could play.

Australia’s approach to peacekeeping is to consider requests for contributions on a case-by-case basis, with particular attention to its own region. Australia believes it can contribute most effectively by providing needed technical capabilities and high-quality participation rather than raw numbers. Australia will act in its national interest, but will look for a mission which has a good probability of success, adequate resources to achieve the objective, and recognition of a limited duration and scope to the mission.

Australia is also interested in promoting more effective command, control, and intelligence facilities within the UN. As a member of the Friends of Rapid Reaction Group, Australia put to the UN Secretary-General last July a proposal for a mobile military headquarters that would be able to send advance command teams into a country within days of a Security Council decision.
Notes


3. *Ibid*.


8. UN staff paper, “The United Nations, Regional and Sub-Regional Organisations,” p. iv.


Part II: Role and Relevance of Technology
Key Technologies
Overview of Key Technologies for Peace Operations

Remote Sensing, Mine Clearance, and Less-than-Lethal Weapons

Dr. Anthony Fainberg
Federal Aviation Administration
Former Project Director, Congressional Office of Technology Assessment
and Xavier Maruyama
Naval Postgraduate School, Monterey, CA

Introduction

Following the end of the Cold War in the late 1980s, a series of international peace operations, led by the United Nations, took place in diverse parts of the world, including Somalia, El Salvador, Cambodia, Bosnia, Angola, and Mozambique. Earlier, superpower tensions had frequently acted to prevent international interventions (Angola and El Salvador are clear examples). Conflicts were often "sponsored" by a major power that preferred to wage a surrogate battle for influence rather than to resolve the matter through international consensus and a compromise peace. Through the mechanism of the Security Council veto (or, more generally, the threat of a veto), the United Nations was effectively prevented from taking decisive action in nearly all cases, except for those in which there already was an agreement between the United States and the USSR that an internationally brokered effort was desirable or, at least, not objectionable. Examples of UN missions undertaken in this period from the 1950s through most of the 1980s are those in Cyprus, Lebanon, Western Sahara, and a small observer group in Kashmir.

The UN missions from the earlier era were nearly all true peacekeeping ones. That is, they acted with the consent of all parties to the conflict, and their goal was to maintain a cease-fire or truce (usually just by observation and reporting to the parties) that had already been agreed to. The UN operations in the new era, in contrast, have sometimes taken place in areas or countries in which conflicts were not resolved. While an initial agreement of the parties was generally obtained, at times the situation rapidly evolved into one in which at least one party was not in agreement with the UN presence or activities (e.g., Bosnia, Somalia, Cambodia). Further, in these sorts of operations, the role of the UN extended well beyond observing a truce. The international force also engaged in humanitarian relief operations, in postconflict rebuilding of a nation's infrastructure (including holding elections, frequently a nontrivial effort—e.g., Cambodia), and, most significantly, in attempting to enforce rather than to observe compliance with a truce among warring parties.

The traditional early peacekeeping operations are still referred to as "peacekeeping." Complicated and conflicting taxonomies have been invented to describe the newer, broader
efforts, using descriptive terms such as “ex-
tended peacekeeping,” “peace enforcement,”
“humanitarian operations,” “peacemaking,”
and others. For the purposes of this paper, and
for simplification, we will use only the terms
“peacekeeping” (for cases in which the inter-
national effort is undertaken with the ongo-
ing consent of all the parties) and “peace
enforcement” (where such agreements are not
obtained).

Because the United Nations (and, indeed,
the international community in general) was
unused to mounting “peace” operations in
the face of resistance by local parties, severe
difficulties were encountered in a number of
cases. In some of these, problems were suc-
cessfully overcome, at least in the short- to
mid-term: in Cambodia, for example, elec-
tions were held despite attempts to prevent
this by one party, and an elected government
of sorts was invested with power. In other
cases, such as Somalia and Bosnia, bad deci-
dions by the UN and by states participating
in the intervention force resulted in serious
losses among the force and partial failure of
the missions.

The purpose of this article is to examine
the supportive roles that technology may
play in future peace operations of both the
traditional peacekeeping and the new peace
enforcement varieties. In the former case,
where force protection is not a principal con-
cern, remote-sensing technologies could play
an important role in rendering international
forces more efficient and effective. In fact, it
is possible that in some instances the intro-
duction of new technical approaches could
be decisive in permitting the attainment of a
more permanent agreement. In such a case,
for example, it may be possible to report to
both parties on the deployment of forces and
weapons on both sides of a cease-fire line in
real time, thus assuring each side of the
other’s compliance with a truce. Further,
such technologies could greatly reduce man-
power requirements of the international force
and, plausibly, of the parties to the conflict
as well. Costs on all sides could be reduced.

Remote-sensing capabilities may also be
important in the case of peace enforcement,
e.g., in perimeter defense of facilities used by
the international force, in protecting against
snipers, and in patrolling lines of demarca-
tion between parties. In these peace enforce-
ment cases, which are akin to low-intensity
conflict, the so-called “less-than-lethal” tech-
nological approach, allowing one to impose
force in manner that does not (at least, which
is not intended to, and usually does not) kill
could be as valuable as remote sensing. The
availability of such a potential would give
military and political commanders of the in-
tervention force more options than currently
exist in terms of protecting the force and non-
combatants. While technology never can sub-
stitute or make up for poor political decisions,
it might help avoid bad decisions by provid-
ing more options to decisionmakers.

In all cases involving international forces
and in many others, mine-detection and
-clearance are vital. During peace enforcement
operations, these are necessary to protect
forces and civilians, and after conflicts they
may have a major role in national reconstruc-
tion. Cambodia, Angola, Mozambique, and
Bosnia all furnish obvious examples in which
the ability to find and remove mines quickly
and at reasonable cost would be of the great-
est use to the force and to the nation. The pres-
ence of mines, especially in agricultural zones,
inhibits food production and in many cases
retards the ability to reinstitute economic de-
velopment and progress after a protracted
conflict.

This chapter examines current and near-
term abilities in three areas: remote sensing,
less-than-lethal weapons, and mine clearance,
with a view to presenting technologies that
are being developed to these ends. Nearly all
techniques described here also have potential
roles in straightforward war, as well as in
peace operations.
Remote Sensing

Sniper and Countersniper Technologies

During peace operations, the adversary danger arises not so much from well-organized combat units, as from individuals and ad hoc units. Unfriendly fire may be caused by snipers hidden in an urban environment. In Bosnia, more than 200 sniper casualties have resulted in nearly 30 deaths. These snipers are often not professional military snipers, operating with great stealth and marksmanship, but rather individual mobile riflemen using available cover. In Somalia, armed tribesmen were reported to act as snipers using the cover of crowds containing women and children. The French, because of their experiences in the Former Yugoslavia, consider anti-sniper technology development as their highest priority and are pursuing efforts similar to those in the United States.

The first step in sniper neutralization is sniper detection. Without sighting the sniper or the muzzle flash, a soldier can find it impossible to locate the place from which a bullet has been fired. The source of a rifle report cannot be identified because of multipath reflections from the ground, trees, buildings, and other structures. A supersonic bullet presents a shock wave that is directional, but because the bullet speed is changing, the shock front changes direction continuously along its flight path. The source of the shock front becomes the flying bullet, not the rifle.

DARPA is pursuing a three-phase program for countersniper system development. The short-term goal is a low-cost acoustic system (25,000/unit) to locate the sniper within a 25-degree field of view, which would allow for visual localization. If the sniper can be seen, return fire is possible. Longer-term goals are aimed at more precise and more expensive products. This program has not yet produced equipment that is field operable. However, the French have developed their own acoustic detectors for use in Sarajevo with some apparent success. Earlier this year, several snipers were detected by the French acoustic system and were neutralized, either by return fire or by capture.

Both infrared and acoustic approaches are being pursued. Acoustic-detection techniques rely upon characterizing the bullet's shock wave using arrays of multiple microphones. A bullet traveling faster than the speed of sound creates a shock wave similar to the bow wake of a ship traveling through water. The direction of the shock-wave front depends on the ratio of the speed of the bullet and the speed of sound in air. In one configuration, bullet-path determination is accomplished by detecting acoustic signals in three linear arrays of three microphones each. Limitations in this technique come from several sources. The shock-wave signature degrades when the acoustic sensor is far from the bullet flight path. Also, the shock wave is generated only when the bullet is supersonic. This implies that for different weapons the detection range differs substantially. Multipath effects, which arise from sound bouncing off the ground and from structures, change the sound intensity and the direction of the shock wave. The challenge in developing acoustic-detection methods is in miniaturizing the microphone array.

Following another approach, if the general direction of the sniper is known, the muzzle blast can be seen. Approximately 90% of the energy contained in a muzzle-blast flash lies in the IR portion of the electromagnetic spectrum. A strong IR line, from the molecular excitation of CO$_2$ at a wavelength of 4.5 microns, persists for several milliseconds. For an M16 rifle, this flash extends in front of a weapon and can be as large as 1 m in diameter about the bullet path as it emanates from the rifle. With such a large flash signature, even a muzzle hidden from direct view might reveal its location. The infrared signature is not attenuated very much in the air (i.e., absorption from airborne water is not a significant problem) and can be observed even at long distances. It comes from the hot exhaust...
gases rather than the thermal signature of the heated muzzle. By using optical filters, false signals caused by other hot objects can be eliminated.

A promising sniper detection and response capability has been developed at LLNL. This system, called Lifeguard, detects the IR signature of a bullet in flight heated by friction with the air. In the Lifeguard system, a two-dimensional staring detector array of indium antimonide, InSb, is sensitive to 3- to 5-micron mid-wavelength infrared (MWIR) radiation, which corresponds to the peak radiation for objects at a temperature of 580 to 966 Kelvin (307 to 693°C). The commercial availability of detectors for radiation at these wavelengths makes the detection of bullets in flight possible. MWIR propagates better in haze, fog, and smoke than long-wavelength infrared (LWIR), visible, and ultraviolet (UV) radiation.

Lifeguard consists of an IR sensor and a computer. An image of a hot bullet in flight is captured by the IR sensor. Improvements in computation speed with small personal computers make the tracking of a single bullet possible with a frame rate of 20 Hz. The origin of a bullet can be determined even before the bullet reaches its target (in substantially less than a second.) The key innovation making this possible is proprietary software that distinguishes the bullet signature from the environmental noise clutter. The system is capable of concurrently running different software to differentiate between a bullet and a slower mortar or artillery round and therefore can be used for artillery fire detection.

Such a system might be configured for automatic response with either deadly force or dazzling light. Automatic response may be required for maximum effectiveness in situations in which a sniper fires a single shot and hides too quickly for a human to respond. However, this automatic-response process has the possibility of violating rules of engagement that are typical for international peace support operations.

### Unattended Ground Sensors

Unattended Ground Sensors (UGSs) are detector systems that can be used for surveillance. They usually consist of a suite of detectors, a preprocessing transmission unit, and a data-reception system. UGS detectors generally include acoustic, seismic, optical, IR, and magnetic means of detecting the presence of people and vehicles. They could, in principle, be used for surveillance within hostile regions instead of placing personnel at risk. One application by peacekeeping forces might be to monitor the movement of belligerent forces. Such a system might be configured for automatic response with either deadly force or dazzling light. Automatic response may be required for maximum effectiveness in situations in which a sniper fires a single shot and hides too quickly for a human to respond. However, this automatic-response process has the possibility of violating rules of engagement that are typical for international peace support operations.

Unattended Ground Sensors (UGSs) are detector systems that can be used for surveillance. They usually consist of a suite of detectors, a preprocessing transmission unit, and a data-reception system. UGS detectors generally include acoustic, seismic, optical, IR, and magnetic means of detecting the presence of people and vehicles. They could, in principle, be used for surveillance within hostile regions instead of placing personnel at risk. One application by peacekeeping forces might be to monitor the movement of belligerent forces.

The detectors used in UGSs incorporate several means to locate and discriminate among various types of traffic. The use of multisensory detectors considerably diminishes the problem of false positives. The processing units can include a neural net capable of "learning" from prior detection of traffic patterns. A difficulty is the limited range of these sensors when vehicles are not used.

Magnetic anomaly detectors sense the presence of ferromagnetic materials such as iron. They cannot distinguish between a small magnetic source near the detector and a larger magnetic source much more distant; thus, they are not suited for providing range-to-detector information. These detectors are very good, however, for indicating the presence of large amounts of ferromagnetic metals such as those found in large military vehicles. A single detector is not very good for indicating direction of motion, but several detectors working in conjunction can indicate direction and speed of motion by measuring the rate at which the signals increase or decrease in an array of detectors. Because range cannot be determined, the source of the magnetic signal can be indicated on a monitor screen with a ray drawn from the detector toward the detected object.

IR detectors can capture a thermal image of the detected object. These detectors have short detection ranges, on the order of 50 m, but, coupled with a telescopic lens, may be
able to detect humans at a distance of up to a kilometer or so. They have a narrow field of view (4 degrees). Non-imaging IR detectors show the presence of an object whose temperature is different from the ambient background. A focal-plane array of IR detectors has the capability of imaging a detected object. IR cameras would be extremely useful for UGSs, but they are currently limited by available battery power. Batteries can last a month or more for conventional UGSs, but the use of more sophisticated cameras would require the development of suitable extended-life power sources, including batteries and solar cells.11

Seismic and acoustic sensors detect vibrations in the ground and air. The sensors are able to discriminate among foot, wheeled-vehicle, and armored-vehicle traffic. Detection ranges vary, with foot-traffic detection being achieved at the shortest range and armored-vehicle detection at the greatest. Timing is a consideration with these sensors. They collect data over a specified period of time (50 seconds, for example), process data for a few seconds, and then transmit a report. If something is detected during the period, no report is made until the detection event ends. If the event does not end by the end of the report period, then a report is made. The detection can be indicated by an appropriate symbol on a monitor screen.12

In traditional peacekeeping operations covered by the provisions of Chapter VI of the United Nations Charter,13 one might conceive of an arrangement in which information concerning the movement of military forces would be made available to all belligerent parties, perhaps in real or near-real time, to diffuse tensions.

The potential effect of the deployment of UGSs on the behavior of opposing parties has been studied at LLNL using a combat-simulation computer model, called the Joint Combat Model (JCM). Deployment of a constellation of UGSs to provide warnings of troop movements in the UN-patrolled DMZ between Israeli frontier forces and Syrian forces in the Israeli-occupied Golan Heights was demonstrated to be effective in reducing the size of frontier forces.14 In principle, reducing presence of armed forces can enhance the potential for diminished probability of armed conflict in areas of dispute. Other areas of UGS application may be in the Siachen Glacier in Kashmir and in the DMZ between North and South Korea. In the case of Kashmir, both LLNL and Sandia National Laboratories have studied the possibility in some detail, designing sensors that could, in essence, substitute for the deployment of division-sized troops on both sides, at altitudes on the order of from 5000 to 6000 meters. Unofficial contacts have been made with academic experts from India and Pakistan. At least at the nongovernmental level, there is some interest in substituting remote warning systems for personnel: much money and many lives could thereby be saved, and a contribution would be made toward a reduction in tensions, if both sides could stand down under such an arrangement.

Among the considerations in the use of UGSs is a cost comparison with active surveillance. A study by the US Institute for Defense Analyses concluded that geophones (seismic sensors) need to be placed 60 meters apart. Taking into consideration the hilly terrain, about 500 geophones would be required to establish a linear 30-km keep-out barrier around Sarejevo, for example. These would be interlaced with non-imaging IR detectors and magnetic and tree-mounted acoustic sensors. Software allows for radio transmitters and battery operations. The sensors are buried in the ground. Only the antenna is visible above the ground; the transmitter is about a foot away. The transmitter unit does preprocessing to make the data transmission rate manageable.

The present US Army UGS is the REMBASS system,15 which costs about $13,000/unit. Even amortizing the costs of the UGS, simple arithmetic shows that to surround a region with UGSs is expensive. UGSs are more cost-efficient in a linear array separating two armed factions. However, this cost
must be compared with the cost of deploying
troops to patrol an area. Helicopters are ex-

pensive, costing $1 million/year to operate
and about $500/hour. Technology can contrib-
ute to increasing UGS capability, but atten-
tion must also be given to cost reduction.

I UAVs

Remotely piloted vehicles with reconnais-
sance capabilities have been successfully de-
veloped over the past few decades. There are
a number of varieties, produced by many
countries, for both commercial and military
purposes. Israel has been one of the pioneers
in such development, but France, Canada, and
the US, among others, have all produced such
equipment. Some versions are in helicopter-
like form, but most are large-winged gliders.
For the purpose of surveillance, it is useful to
have a large payload (several hundred kilo-
grams), several sensing systems, and long loi-
ter time over a target.

One system that fits this description is the
US Predator, which can survey from an alti-
tude of several thousand meters for longer than
a day, using IR, optical, and synthetic-aperture
radar sensors. Excellent resolution is obtained
in all three regimes. This system has been used
successfully in support of the current truce in
Bosnia (although earlier, two units were lost
in the same theater, at least one through me-
chanical malfunction). The technique is clearly
applicable to both traditional peacekeeping
and other peace operations.

I Remote Sensing in Support of
Confidence-Building Measures

A Cooperative Monitoring Center (CMC)
has recently been established at Sandia Na-
tional Laboratories. The center is sponsored
by the Department of Energy's (DOE's) Office
of Nonproliferation within the Office of Arms
Control and Nonproliferation with an FY94
funding level of approximately $2.2 million.
Among its functions are promoting commu-
nications between political and technical ex-
erts and serving as a forum for international
collaborations on monitoring applications.
Resident experts interact on an ongoing basis
with participants who arrive with questions
about confidence building or monitoring as
applied to their particular region.

Although the CMC was originally con-
ceived as a center to encourage confidence-
building so that the proliferation of
uclear-weapons materials could be con-
trolled, it has great potential for application
to peace operations. The center is unclassified,
and foreign visitors are encouraged to partici-
pate. The center's emphasis is on encourag-
ing cooperative monitoring and helping
international and regional participants in the
design, evaluation, and testing of sharable
monitoring systems for regional confidence-
built.cking. Observers from disputant parties to
conflicts such as on the Golan Heights and
on the Siachen Glacier could use the CMC to
test and simulate use of UGSs to gain confi-
dence in their use in place of troops.

Hardware items from commercial sources
and from the DOE national laboratories are
available for inspection. They include ground-
based devices such as surveillance cameras,
acoustic and seismic sensors, and more pro-
saic equipment such as alarmed barbed-wire
barriers and security lock systems. Addi-
tionally, the center has access to unclassified sat-
ellite imagery and data taken by airborne
ensors, such as Open Skies synthetic aper-
ture radars. Computer simulations can be ex-
perimented with and used to train
participants in employing sensors to monitor
potential agreements and to assist them with
applications that fit their specific needs.

I Maps

For military operations, knowledge of lo-
cation is critical to coordinate one's own forces
as well as to monitor the movements of ad-
versaries and allies. In principle, aerial pho-
tography and satellite imagery, coupled with
the global positioning system (GPS), provide
the capability to make maps with sub-meter
resolution. Such accuracy may be necessary for some precision targeting requirements. In practice, however, digital mapping, charting, and geodesy (MC&G) data, even at 1:50,000 resolution, is not available for most of the world. Peace operations arise in locations for which a military, whose main preparedness is for major regional conflict contingencies, may be ill-prepared. Mapping for peace operations is a distinct field, which is not sensing per se (although it incorporates the results of sensing), and which merits more consideration in the future. In Somalia at one point, old commercial maps from Esso gas stations were used because nothing else was readily available.

Commercial firms such as DeLorme Mapping have made CD-ROM computer disks with maps covering many parts of the world. In these, the United States has been well covered, but many Third World regions still have little coverage.

### Less-Than-Lethal Weapons

With the hope of providing military and political commanders with more options for force protection and protection of civilians in peace enforcement operations, there has recently been significant activity in the field of “less-than-lethal” weapons in the academic/analytic sector. In the US, this has occurred at some US national laboratories and within the DoD. The purpose is to examine the possibility of using weapons that are not intended to inflict deadly injury (although in some circumstances they might do so), but that nevertheless can apply coercive force when needed. Some advance the more generalized notion that in wars in the future, there will be many reasons, ranging from the humanitarian to the purely pragmatic, to avoid killing people when at all possible. The more optimistic consider that there now exists the possibility of changing the nature of war for all time, reducing casualties to the minimum. In the view of some American experts, the technologically more advanced nations (especially the United States) will then easily win military engagements relatively bloodlessly to advance their international agendas.

Less-than-lethal weapons might be used in support of normal military operations, international peace operations, or even for domestic law enforcement. Within the military, this class of (mostly) hypothetical equipment is usually referred to as “non-lethal” weapons. Various other names have been used by other sources for the category; we will use what we consider a more correct term, “less-than-lethal.”

Many questions naturally arise in attempting to understand the importance and usefulness of this approach to bringing novel ideas and technology both to the battlefield and to peace operations. For example, what are these weapons and what purposes are they meant to accomplish? How realistically can they fit into real-life military operations, as opposed to laboratory demonstrations of feasibility? How non-lethal are they actually? Is there any conflict with international treaties or other commitments? How close are they to realization? This chapter attempts to present the beginnings of a rational and factual analysis of these issues, while outlining “less-than-lethal” options that have been widely discussed in the past few years.

There are many categories of such weapons. The first step in the typology is to separate antipersonnel from antimateriel weapons. Some weapons are meant to prevent people from functioning in the military sense, while others are aimed at disabling equipment. The following list is not meant to be exhaustive, but does give an idea of the types of technologies usually referred to in discussions of “non-lethal,” “limited lethality,” or “less-than-lethal” (or other similar modifiers) weapons.

Antipersonnel weapons may include the following:
- Intense light sources, meant to dazzle or disorient.
- Acoustic weapons that disorient and cause severe gastrointestinal discomfort.
Meeting the Challenge of International Peace Operations

- Calmative agents.
- Nets and entanglers.
- Sticky foams.
- Superlubricants ("slick'ems").
- Superadhesives ("stick'ems").
- Supercaustics (corrosive chemicals that attack metals and natural or synthetic organic compounds far more rapidly than "normal" corrosives).
- Electromagnetic pulse generators for disabling electronic equipment at a distance.
- Embrittling agents.
- Fuel additives that greatly increase viscosity (gelling agents).
- Nets and entanglers.
- Disablers of internal combustion engines.

Several objections have been raised to the employment of less-than-lethal systems. One set of objections is the general one that a force that relies on sub-lethal devices will ipso facto be at a disadvantage if the adversary is aware of this: the opposition will simply use lethal methods first and cause serious damage. The obvious response, is first, that less-than-lethal weapons will be backed up by lethal ones, so that any enemy illusion of an advantage would be quickly corrected. Second, it would generally be useful for the international force's rules of engagement to be kept as secret as possible from the adversary to create an ambiguity that would redound to the advantage of the force.

A more serious objection concerns the proliferation of some of these newly developed techniques to the opposition. Countermeasures and resistance to countermeasures must be examined carefully before going ahead with the development of this set of new ideas. Beyond this, there may be some classes of weapons that might better remain undeveloped. Some argue that lasers for use against human eyes, for example, should not be developed by the United States for battlefield use, at least not unless others do so. This argument is based on the assumption that, first, if the United States does not develop these weapons, no one else will (which is a highly speculative and questionable assumption) and, second, that the use of these weapons against US forces would be very difficult to deal with. Such objections must be considered in detail for each specific case.

Another objection is that use of these weapons may actually lower the threshold for military action, making such involvements easier to undertake and leading to more military involvement overseas. The objectors consider this a generically bad thing, even if undertaken by international consensus. A further set of objections, for some technologies, revolves around the proscriptions of various international treaties (such as the Biological Weapons Convention [BWC] or the Chemical Weapons Convention [CWC]). Calmative agents, for example, could well violate the CWC, even in the case of peace operations or managing civil disorder. Moreover, some fuel additives of a biological nature would violate the BWC, even though they are aimed at materiel rather than people.

In many cases, there is the final objection that a proposed technical idea will simply not work or not be useful operationally. This article will touch upon some of these objections, in turn, when they are relevant to the particular class of items being discussed.

I Antipersonnel Weapons

I Intense Light Sources

There are several types of light sources that may be of use in various circumstances. Lights may be used to blind, dazzle (prevent normal vision for a limited period of time), or possibly to disorient. The main issues are technical feasibility, operational use, and potential conflicts with possible future international treaties.
Non-Lasing Optical Munitions

"Flash-bang" grenades have been used for at least a decade to deal with the taking of hostages by terrorists in confined areas. These devices produce a large concussive noise with a blinding flash of light. Their sudden detonation is meant to divert the attention of the terrorists and dazzle them, rendering them incapable of effective action for a few seconds. Such devices have been successfully used on a number of such occasions. It is less clear what use they would be in peace operations, unless there were a similar case of kidnapping in a confined area.

More intense light sources have been developed by a number of researchers, some at Los Alamos National Laboratory. The Los Alamos sources were originally for diagnostic purposes in developing nuclear weapons. These use entirely different technical approaches from flash-bang grenades. They employ a small shaped explosive charge to produce a very-high-velocity shock wave, which compresses a gas adiabatically. If the shock wave is on the order of 30 km/s, the compressed gas acts as a blackbody radiator characterized by a temperature of 20,000 to 50,000 K. The resultant light output is very broadband, peaking in the far UV, but with intense output across the visible spectrum and into the IR. Conventional flares produce flames of some 6,000 K. Given the fourth-power dependency of radiative output, this novel technique clearly produces energy intensities hundreds of times that of a flare. Demonstrations have shown the ability to disable heat-seeking sensors and night-vision electrooptics.19

If used against military personnel, such as snipers, especially at night, one might imagine that such weapons could produce a temporary disabling capability. The most effective utilization would be under dark conditions. Because the radiation is omni-directional, one obvious operational constraint would require not dazzling one's own forces (appropriate goggles and warning might be provided). The magnitude of the dazzling ability needs to be demonstrated, as do the range and long-term harmlessness. Demonstrating the latter is a problem common to many less-than-lethal weapons: to demonstrate harmlessness or non-lethal capability, careful animal experiments need to be done and the results then extrapolated to humans or, possibly, eventually tested on humans. This is expensive at best, and dealing with protocols surrounding animal (let alone human) experimentation is time-consuming and increasingly difficult.

Lasing Munitions

A laser version of this technology is quite conceivable: if a lasing rod is placed in the vicinity of the intensely radiating gas, a directed, single-pass laser beam, excited by the conventional radiation, can be produced. This can be aimed, although the military application would depend on how large a solid angle can be practically illuminated. Further, the use of such a pulsed laser could cause permanent eye damage. While this might be militarily acceptable in some contexts, it is unlikely to be a clever tactic in most peace operations, in which the whole objective of less-than-lethal weapons is not to inflict death or serious suffering, especially among noncombatants. Both the laser and conventional versions of intense light sources could be placed in shells and launched against opposing forces out of the line of sight of friendly forces. The friendly forces, in principle, have to be warned of the timing of a shot to protect their own vision. In addition, if a laser were used, they could wear goggles that protect users at the laser wavelengths. Of course, it might be easier to simply use classical lasers directed at opposing personnel.

General Arms Control Issues Concerning Lasers

A further consideration is the possibility of a future international convention outlawing the use of laser weapons against personnel. Such an agreement is now being proposed by the International Committee of the Red Cross (ICRC), which argues that the use of
even dazzling weapons should not be countenanced, allegedly because a weapon that dazzles could, under some circumstances (mainly, closer range), cause permanent eye damage, including blindness. One might ask why it is better to kill than to blind, but this is a subjective issue beyond the scope of this technical discussion.

The United States DoD decided in 1996 to stop the development of laser weapons that are intended to blind personnel, although it still considers counter-optics weapons to be acceptable. Weapons developed under the rubric of electrooptics countermeasures might sometimes be extended to antipersonnel uses, perhaps only by appropriate aiming.

In the context of peace operations, an interesting issue would be the use of dazzling lasers, especially at night, against snipers who are targeting civilians. A large number of women and children were murdered by partisan snipers in Bosnia, particularly in Sarajevo, between 1992 and 1995. A good question is: would the use of dazzling lasers against such snipers be so immoral that they should not be used to prevent these atrocities during a peace operation? A sniper might be even more susceptible to a dazzling light when looking through a magnifying eyesight, and permanent damage might be inflicted if the laser source were within the field of view (generally unlikely from the operational point of view, but not excluded). However, only one eye would be affected, so total blinding would not then be an issue. Once one eye were damaged, a sniper would be unlikely to continue this line of endeavor for a variety of reasons. Easily controllable use of laser intensity, given the range, should avoid blinding under most circumstances. Moreover, the deterrence value of such a weapon would probably have a salutary effect on snipers attacking civilians or international forces. The view of at least one of the authors (Fainberg) is that such use is well justified morally, if it were operationally useful. He would hope that such matters would be taken into consideration by the negotiators of any final agreement on laser weapons.

A more operative question is, if such weapons are used by the United States and its allies, how easy would it be for an adversary to use them against our own forces? The possibility of theft is one means of proliferation, although it would not guarantee the opposing user an equivalent military effectiveness. A stolen optical munition would also provide the possibility of reverse engineering in some international arenas (e.g., perhaps not Rwanda, but possibly Bosnia). For laser weapons, the provision of goggles that protect against the specific wavelengths would be an effective countermeasure. Such would not be rapidly available, even to a sophisticated adversary, except for a small number of units that might be stolen.

Continuous-Wave Laser Dazzlers

To avoid the possibility of blinding, one investigator has suggested a continuous-wave laser that can dazzle, even in daylight, but would produce radiation substantially below the maximum permissible exposure levels in the United States. Pulsed lasers produce on the order of 1 mJ/cm² at nominal range and will exceed this standard for pulses of 20 ns or so, which is a usual pulse length. Laser power (energy per unit time) causes permanent eye damage when it is delivered within a very short time. Meier claims that daylight dazzling has been produced by less than 1 mW/cm², which is below the ANSI standard. Further, the natural avoidance reflex results in the rapid directing of the eye away from the light source, which would sharply reduce exposure and also achieve the aim of the use of the laser: to deny observation in a particular direction. Of course, this could have a lethal effect if the pilot of an aircraft were subject to such an attack. However, at ranges discussed (about 3 km), it is easy to imagine a number of peace operations applications that would be non-lethal, including crowd control.

This type of laser, pace objections by the ICRC, can apparently not blind under any imaginable circumstance and should thus not be the subject of any rational arms-control
treaty aimed at preventing the use of blinding weapons. Author Fainberg, having exposed himself to a demonstration of this laser, can vouch for the lack of blinding capability. However, he cannot vouch for its effectiveness. Costs are estimated at $25K to $73K, depending on configuration.

II Clever Use of Standard Low-Power Lasers

When United Nations troops were withdrawn from Somalia in March 1995, the Marine Expeditionary Force in charge of covering the withdrawal and ensuring the safety of personnel discovered that the use of visible red lasers to target infiltrators at night was particularly effective at causing them to retreat, sometimes leaving their assault weapons behind. The fear that, once targeted by the visible laser, a real bullet would follow was enough to cause this effect without the actual use of a bullet. This tactic, clearly non-lethal, may well be effective in other venues as well, although if frequently utilized and never followed by lethal action, could eventually lose effectiveness.

II Acoustic Weapons

For several years, there have been vague reports to the effect that high-powered infrasound (<5-Hz) acoustical energy could produce severe intestinal discomfort, through resonant effects on the human abdominal cavity. (Although some disorienting effects may be produced up to 500 Hz and higher, the disabling gastrointestinal effect is an infrasound phenomenon.) Severe nausea and other forms of gastrointestinal discomfort are said to ensue, but the duration of the effect is supposed to be limited to a very few days, with no permanent ill effects. Development of this concept has been hampered, as in the case of intense lights, by difficulties in carrying out either animal experiments (which suffer in extrapolation to humans because of different geometries and therefore different active frequencies) or experimentation on humans. It appears that effects are largely anecdotal, and the repeatability of these effects and their parameterization have not yet been studied.

Work on acoustical weapons has been pursued under a number of auspices in the United States. One initial problem with these devices, presuming that the effect is real and useful, has been that a large amount of energy was required because of the inefficiency of transferring energy from a source to the acoustical mode. A Los Alamos proposal uses a coupling effect between a flame front and an acoustical resonator, in this case a device shaped rather like an organ pipe. Combustion instabilities of this sort have been known to arise spontaneously in rocket motors, destroying them through intense waves of acoustical energy. For the purpose envisioned, a propane flame provides the input energy and combustion front. The result is very energetic acoustical output, which permits the use of a power source of manageable size. One problem is that for very low frequencies the radiation pattern is omni-directional, causing the obvious operational problems that the user may be affected as well as the target population. Preliminary efforts to phase-lock two resonators have been successful in a laboratory setting. This provides the possibility of achieving some directionality.

If the acoustic energy is severe enough, it is not necessary to operate at infrasound frequencies to have an effect. Very loud acoustic noise can, in principle, act as a barrier against intruders. The Los Alamos sonic gun can produce acoustic energies in the range from 160 to 180 dB at a range of a few meters, which is a level that produces severe discomfort and even death over a range of sonic frequencies.

The operational use of such weapons would depend on their being deployable in a way that would not affect the user. Possibly such a weapon could be mounted on a vehicle to disable hostile actions by crowds of women with children or to deal with situations that include armed adversaries mixed in a crowd with noncombatants. The occupants of the vehicle would have to be protected from the acoustic energy in some way:
this might be possible by means of acoustic insulation and/or by using directionality, if this becomes possible. Another option might be to use a robotic vehicle to carry the device; but this carrier would have to be protected from hostile action as well, and would itself need to be resistant to the acoustic energy.

The impression of the authors is that substantial development work, both in terms of understanding the physiological effects and determining operational employment, will be required for this line of research to become useful, whether for peace operations or for other military or law enforcement purposes.

I Calmative Agents

In cases in which crowds largely composed of noncombatants are attempting to frustrate the efforts of the international peace forces, it would be useful, in principle, to be able to incapacitate actively hostile members of the crowd without causing permanent injury, especially injuries to women and children who may be present. In Somalia and, to a lesser degree, in Bosnia, one side in each conflict did use the tactic of massing large groups of noncombatants to oppose the aims of the forces of intervention. In Somalia, often a few armed individuals within an organized crowd of women and children attacked UN forces, eliciting return fire that sometimes killed civilians. This result was the goal of the tactic, which succeeded in arousing the local populace against the UN and its aims. If acoustic weapons worked, they might have a role in countering this tactic. So might tear gas, although its effects against armed and protected personnel could be quite limited. However, if it were possible to administer the equivalent of “sleeping gas” to a crowd without harming individuals permanently, this could be a very attractive option to give military commanders when they are faced with such difficult situations.

Many drugs render humans unconscious, but there are two difficulties. First, there is the problem of finding a chemical that has the desired effect at doses that are far below fatal doses, so that accidental overdoses would not kill. The second problem is to find a means of applying the agent so that a relatively predictable dose is administered to individuals. Both problems are quite challenging. Finally, there is the legal issue of whether the use of such chemicals would violate the CWC, which is not yet in force, but has been signed by many nations, including the United States.

A good candidate set of chemicals is the fentanyl group, some members of which are used as anesthetics in surgery. Their safety in well-defined doses is fully established. However, like most other calmatives and sedatives, although the ratio of lethal to effective dosage may approach 1000 or more in more primitive mammals, this safety margin shrinks as one climbs the evolutionary scale, often reaching only a factor of about 10 in primates, and less still (although experiments obviously cannot be done, so only rough numbers are known) in humans. A nonclinical but persuasive example of the tenuous nature of this approach was demonstrated recently in New York, where a medical student administered a dose of a fentanyl drug to herself for its intoxicating effects, but unintentionally gave herself an overdose and died. It is unlikely that the use of such a chemical against a rioting crowd would be safer than the case of a medical student administering the chemical to herself. Also, if given through the air as a gas or aerosol, dosages would be virtually impossible to control adequately, resulting in many deaths, especially to older, younger, less healthy, and lighter individuals.

An alternative approach would be to use darts to administer tranquilizers or anesthetics, as we have all observed for decades in nature programs. This approach has the advantage of dose control, but requires the identification of individuals to target while dealing with hostile acts from a large crowd. Once the targets are identified, they have to be struck with a projectile fired from a gun. This is rather difficult to achieve, although by no means impossible. Even if a wrong person
were hit, there might be the possibility of administering an antidote in time to prevent serious injury. However, this option certainly could not be counted upon in a chaotic situation.

The issue of violating conventions against the use of chemical weapons is somewhat murky, but would probably militate against the use of such chemicals, unless the chances of death from an overdose were demonstrably small. The use of a wide variety of specific chemical agents (all of them poisonous) is specifically proscribed by the CWC. Fentanyls are not on this list. The use of any chemical agent in war is prohibited, but gases (such as various types of tear gas) are permitted for control of riots in non-war situations. There is some question whether the use of nonstandard riot control agents would be permitted in peace operations. For example, oleoresin capsaicin spray (derived from the pepper plant) was used by UN forces in Somalia. However, fentanyls, being potentially far more lethal, would probably not be acceptable in this context.

The current US position on this matter is defined by a letter from President Clinton to the Senate on June 23, 1994, stating current US interpretation of the CWC with respect to riot-control agents. The letters assesses “current international understanding” as holding that the use of any riot-control agent is precluded, “even for humanitarian purposes, in situations where combatants and noncombatants are intermingled . . . .” The statement goes on to add, however, that “were the international understanding of this issue to change, the US would not consider itself to be bound by this position.” Clearly, some ambiguity remains, depending on the assessment of what the “international understanding” actually is. As previously noted, capsaicin was occasionally used in Somalia against individuals, but in situations where combatants and noncombatants were comingled. This may indicate some flexibility in the matter.

### Entangling Devices

These devices are more applicable in the law-enforcement arena, although there are potential scenarios within peace operations that may be susceptible to this type of tool. Nets that can be launched by a standard grenade launcher or from a specially equipped hand baton are under development. This tool is meant to envelop fleeing individuals at a range of a few meters and disable them without causing permanent physical damage. These devices are in the early stages of development and show some promise, but they do not yet function effectively on every attempt. Variations include use of sticky chemicals to help immobilize victims and even use of electric shocks administered by the net, although this latter option appears to the authors to be potentially lethal under a variety of circumstances. In principle, some similar mechanisms, appropriately scaled up, might be used against vehicles instead of individuals. If successfully developed, both the antipersonnel and antivehicle versions might be useful in certain situations that might arise during peace operations, but these would mostly be of a police nature, in which individuals on foot or in vehicles are attempting to run checkpoints or attack force members or civilians in order to disrupt the goals of the intervention by the international forces. Such situations, of course, did occur in Bosnia.

### Sticky Foams

Sticky foams, an antipersonnel version of so-called “stick’ems,” have been used for decades as part of the protective system for storage and transport of nuclear weapons in the United States. They have been part of static perimeter defenses, in which intruders in a confined space are surrounded by a fast-deploying foam, which is sticky and partially hardened, and which immobilizes the victims long enough for security forces to respond. This foam has an expansion ratio of up to 40:1 and is nontoxic. It may be dispensed by a lone soldier, who can carry the storage tanks and
dispensing apparatus. The foam is composed of various hydrocarbons, including resins (for stickiness), an elastomer, a plasticizer, fire retardants, and foaming agents. Although non-toxic, toxic solvents are needed to clean up the foam from the ground on roadways, buildings, and furniture after use. Mineral oil cleans the foam from human skin.

The foam may be dispensed at a distance of a few meters, but in the open air, effective use would be complicated by mundane factors such as wind. It is hard to see how this technology would be effective as an antipersonnel tool in outdoor environments during a peace operation. It may be useful against some materiel, however (see the following section).

Another version of antipersonnel foams is aqueous foam, which can envelope individuals, inhibiting vision rather than mobility. This weapon may be made more effective if irritants are added to the mix. It can be dispensed in units small enough to be worked by a single operator. These foams are composed of silicone-based chemicals mixed with water. They are of low toxicity, easily cleaned, and have expansion ratios of up to 1000:1. Aqueous foam has been successfully used in one peace operation (see section on antimateriel weapons below). It may be cleaned with nontoxic agents such as honey or corn syrup. Although this foam is environmentally benign, it may be necessary to clean up the corn syrup.

Superlubricants or Antitraction Compounds

In general, compounds designed to reduce friction are intended mostly for use against vehicles and will be discussed in the following section for that reason. However, if effective, they could be of use in reducing the ability of a crowd to offer resistance to authorities. One type of “slick’em” was used in Northern Ireland by the British authorities; the results there may serve as a warning against the too-rapid embracing of new ideas: the chemical washed away in the rain. Different types of antitraction chemicals are said by their developers to be immune to this problem. Clearly, however, the operational problems attendant on use of novel techniques need to be carefully thought out and tested in advance. In particular, environmental issues of temperature, humidity, wetness, etc., need careful consideration.

Antimateriel Weapons

Foams and Superadhesives (“Stick’ems”)

Sticky foam has already been discussed in terms of antipersonnel uses. For use against vehicles, one might imagine tactics such as coating optics for tanks and artillery, coating windows on vehicles (including aircraft), blocking air intakes on combustion engines, etc. The operational utility of these techniques needs careful testing. It would be necessary to approach the target with a dispenser (perhaps restricting use to Special Forces-type operations) or develop a clever munition that could properly aim and dispense the foam in a satisfactory manner.

As noted above, during the withdrawal of UN forces from Somalia, the US First Marine Expeditionary Force used an aqueous foam. This was done in conjunction with “jacks and tacks” (small spikes arranged to point upwards and capable of deflating tires) to keep large parts of the Mogadishu airport off-limits to hostile militias. The foam, laid down on the tarmac, kept people on foot away (at least during application and shortly afterwards), while the jacks and tacks immobilized vehicles. This application shows the utility of aqueous foam in peace operations. The likelihood, however, is that this example was a special case and that the use of this and other novel tools in peace operations will need to be determined on a case-by-case basis. The success may depend strongly on the creativity and imagination of the command of each specific operation.

Real adhesives might have a different mode of utilization. Polymer adhesives, such
as “superglue,” if strong enough and susceptible to application on a variety of surfaces, could, in principle, be used to immobilize equipment. It is hard to imagine the use of such chemicals against most vehicles, but they might be used against other equipment or even against people (say, an adhesive on a paved surface that would adhere to shoes). This could force people to remove shoes to walk, but then layers of skin would be stripped from their feet. There are obvious countermeasures, such as using layers of newspaper on one’s feet, so that each step would remove only the bottom layer, but this would become unwieldy. A more likely tactic might be to coat and recoat the affected surface, which is unlikely to be very large (vehicular choke points would be a likely target of such weapons) with sand or ash. Even assuming that a super superglue was manufactured, it is difficult to envision operational conditions in which the use of such an asset could not be countermeasured with relative ease.

Superlubricants or Antitraction Compounds (“Slick’ems”)

Chemicals that make surfaces slippery by rejecting adhesion from other substances that may be in contact with them are lubricants. There is a class of antitraction compounds called superlubricants because of their low coefficients of friction when they are paired with most materials. The superlubricants are a class of water-based chemicals containing self-assembling and -binding polymeric surfactants. Chemically, these compounds have perfluoralkyl groups that orient themselves in such a way at surfaces that the surface energy is very small, allowing them to reject binding to adhesives with which they may come into contact. The polymeric chains crosslink to provide a toughness that allows the surface to stick together. Teflon (polytetrafluoroethylene), an example of such a compound, may be applied to surfaces as a film. These compounds also resist wetting and are hard to dissolve.

The use of such superlubricants might be imagined in some scenarios in which peace forces wish to prevent the transit of vehicles of a hostile party at a certain place or time. Their success would depend on a number of obvious factors, such as length of persistence, resistance to environmental degradation, choice of venue, and the context of use (that is, exactly what goal of the peace force is achieved by delaying a particular convoy of vehicles, how much delay is required, and whether the agent can succeed in producing this delay).

Supercaustics and Superacids

Caustics generally indicate strong bases, such as the alkali metal hydroxides, which can attack rubber, glass, concrete, and asphalt. These chemicals are far from new, and their use would clearly pose environmental issues. The same may be said of very strong acids, such as aqua regia, used by alchemists many centuries ago to dissolve noble metals such as platinum and gold. More recent proposals are to create corrosives that increase reaction rates by several orders of magnitude (although this increase in rate may not necessarily confer operational advantages) over classic strong acids or bases. Modern superacids use a mixture of a strong mineral acid with an inorganic fluoride. The corrosive quality may be enhanced by means of an oxidizer. Advocates estimate that thick acrylic sheets may be dissolved in seconds, whereas a quarter-inch-thick plate of aluminum would require several hours to penetrate. Military uses for this approach are manifold, and munitions could be designed for the application of the supercaustic directly to a target from a distance.

An example of a plan to develop a tactical supercaustic is a Los Alamos proposal to use olefin metathesis to degrade both natural and artificial rubber, which is a polyolefinic material. A catalytic depolymerization of the long molecular chains has been achieved. Olefin metathesis is a relatively new technique that is generally used for creating new polymers.
rather than for degrading existing ones. However, versions of the technique have been proven to accomplish the latter as well. The Los Alamos proposal looks to the technique for developing waste management for old rubber products as well as for military purposes. The author cites an experiment using transition metals to catalyze the depolymerization. The science behind the effect is not well understood theoretically, but in the experiment a catalyst of tungsten hexachloride present in solution with tetramethyltin and a solvent was able to depolymerize rubber from a molecular weight of more than 1 million to a liquid oil polymer with a molecular weight of about 6000. The process took 3 hours at 80°C. This approach is in early laboratory verification stages and will take a number of years to demonstrate in a form practical for application in quasimilitary operations.

- **Obscurants**

  One kind of obscurant, thick heavy smoke dispensed in a large quantity to prevent observation of detailed positions of vehicles by the enemy in battle, has been used for decades. A more subtle application is extremely lightweight paint (to optics and windows) or the use of very fine dust, emitted at high speed, to pit optics used for vehicles or target sensing.

- **Embritting Agents**

  The idea here is to degrade metals so that they are seriously weakened, perhaps without the effect being visible. Targets might include aircraft, bridges, storage tanks, and vehicles. The embrittlement agents generally are metals in a liquid state near room temperature that form alloys or amalgams with the target material. The product has significantly less tensile strength than the original material. Some obvious agents include mercury, gallium, and rubidium. A less obvious candidate might be an indium-gallium alloy. The technical issues include determining how much of the agent needs to be applied to disable the vehicle or structure that is targeted, determining how much time is required to accomplish the weakening, ensuring the effectiveness of the application, and finding an operationally feasible scenario in which the agent can be applied.

  The use of such techniques, like several others noted in this article, may be more applicable to war than to peace operations, although in cases such as Somalia and Bosnia, where one of the parties acts in a hostile fashion toward the forces of intervention, this technique may provide the commander with nonviolent options for disarming adversaries and protecting his own forces.

- **Electromagnetic Pulse Weapons**

  The use of a direct, high-energy electromagnetic pulse could permanently disable a number of vehicles, including aircraft and ground vehicles, especially those using computer-controlled systems. High electric fields (of up to tens of thousands of volts per centimeter), generated for a millisecond or so, could disable limited sections of power grids or could destroy many types of electronic equipment, including computers. The technology to accomplish these goals is here and not particularly new. The difficulty lies in ensuring the operational utility of a particular approach against a given target set. The applications of this capability are clear, ranging from disabling fleeing cars, to crippling command-and-control centers, to detonating munitions. There are several difficulties, including the limited range of such devices (generally not more than a very few hundreds of meters or so) and the need for large amounts of power or, in some cases, the employment of large chemical explosions. In the latter case, the chemical energy is partially converted to a directed electromagnetic pulse. Further, in many cases the targeted equipment or vehicle may be hardened against a current surge from an electromagnetic pulse. Often, surrounding the sensitive electronics with grounded electromagnetic shielding (thin conductors that form a protective “Faraday cage” around the object) or isolating the
grounds of the power supplies protects the device to a high degree. Then the process becomes one of measure/countermeasure.

A variant would use contact strips placed on a roadway over which a vehicle is expected to pass to apply a strong electrical pulse capable of halting a vehicle that uses electronic ignition. This conventional approach has been developed and does function, but some further operational tests in military situations would be useful.

### Fuel Gelling Agents

If a small amount of chemical could be introduced into a fuel tank (either of a vehicle or, more likely, in a storage tank) and could viscosify the fuel to a degree that would render it useless in the engine, this would be a useful less-than-lethal approach for many purposes that may be imagined in peace operations. The agent might block the fuel-injection system or rapidly cause serious engine fouling. One possibility is to turn the fuel into a gel. Some research has been done along these lines for fire-prevention techniques.

Scientists at Los Alamos have proposed a viscosification element that increases viscosity exponentially with concentration. This effect is reversible and produces a solution that appears unchanged to the eye. The difficulty is that an addition of one part per thousand is needed to increase viscosity by a factor of ten. Warmer temperatures (above 50°C) make the required quantity larger. A 10,000-gallon storage tank would then require 60 pounds of additive, which may be hard to arrange in a military situation, unless emplaced by special forces. Larger tanks would be virtually impossible to deal with using this method. The goal is to reduce by an order of magnitude the amount of viscosifier that must be added. At least a few years of research would be required to produce such a result. However, even with current capabilities, it might be possible to disable single vehicles at a time, if surreptitiously disabling a small number of vehicles would have an operational utility.

Another possibility might be to try to develop or use anaerobic bacteria that digest hydrocarbons and produce byproducts that cannot be processed by the engine. This would be similar to the use of microbes to help clean up oil spills. This option would take several weeks to have an effect on a tank. Worse still, use of such agents would violate the biological weapons convention, as it is currently written and understood.

### Nets and Entanglers

These have been mentioned in the antipersonnel section, although similar techniques employing far more robust retaining materials might be considered for some vehicles and artillery pieces. Some projects in early stages of development involve strong nets or plastic wrap. Clearly, there are difficulties in applying the devices, especially if a vehicle is very heavy or is moving rapidly.

The recent attempts to forbid certain types of artillery within a few kilometers of Sarajevo gave rise to an interesting concept—a variation on the theme. If a net could be dropped over a prohibited piece by aircraft, it could be possible to attach small explosives to many of its parts, which would have the effect of denying the use of the piece to its owners. Such a device would be within the reach of today’s technology.

### Engine Disablers

One possible way to disable internal-combustion engines has already been noted: the use of agents to block the air intakes of the engines. This can be envisioned by such a use as sticky foams, provided that they can be dispensed accurately to the required location either by special-operations forces or by precision munitions. One proposal is to aerosolize a material (actually two, used as a binary agent) that polymerizes on contact with an air filter. One chemical has been tried that appears to work on many filters, although not on high-volume ones. It also functions over a broad temperature range. However, the approach would be hard to apply to airplanes
and helicopters unless they were stationary with the motors running. The method has the advantage that the engine is not harmed but, once the filter is changed, it will work again. Of course, for some military purposes, this is a disadvantage. The same approach may be used to temporarily disable command centers, underground facilities, and any situation or machine requiring filtered air.

Yet other possibilities for different engines could include dispersing ceramic chaff, which could destroy turbine blades or pistons in an internal-combustion engine, or pyrophoric particles, which could overheat a combustion chamber if injected into it. These possibilities would all require a number of years of development to demonstrate operational feasibility.

### Summary of Less-than-Lethal Weapons

There are serious issues raised by each of the proposed less-than-lethal technologies. The first is to understand the operational utility of each technology. The second is to determine whether the proposed approach is feasible. Following this are questions about compliance with international agreements, effects of proliferation of the technology, vulnerability to countermeasures, and cost. Each technology must be analyzed on its own merits: no generalization can be made about the worth of the field as a whole, beyond the general statement that it would be nice to wage peace (not to mention war) in a way that is less deadly than current methods and that, at least at first glance, some of the technologies appear promising in a number of respects.

### Mine Clearance

The magnitude of the demining problem is reflected in the estimates that there are some 65- to 110-million uncleared landmines in 56 countries around the world. The military has understood the issue of dealing with mines for years and is able to handle it in the field, but just in a military context: minefield breaching, not area clearance. The military goal is to clear lanes through minefields so that troops and equipment can pass. Demining is generally left as a task for local authorities or private contractors after a battle is over.

In the context of peace operations, demining is important in the field under combat conditions (peace enforcement as in Somalia and in the early and middle phases of Bosnia) and under truce conditions after a conflict (as one hopes is typified by the current stage of the Bosnia situation). It is also vital in postconflict nation-building, as in Afghanistan, Cambodia, Mozambique, and Angola, where national recovery from debilitating conflicts is held back by the effective denial of large areas of land for civilian purposes, chiefly agriculture.

US military equipment currently is intended to breach a vehicle-wide lane for mechanized forces. Standard breaching techniques call for a mine-clearing line charge to be discharged, followed by a tank using a track-width mine plow or rake. The plows and rakes dig the mines out of the ground and move them, along with large quantities of soil, off to the side of the cleared lanes. Plowing and raking typically detonate only those mines with antihandling devices or unusually sensitive fuzes, and the unexploded mines are buried in the mounds pushed to the side. However, the inability to withstand multiple detonations makes rakes and plows generally unsuitable for area clearance. In the next phase, a tank using a mine roller proofs the lane to check for mines missed by the line charge or plows; then a safe lane is marked.

In humanitarian assistance and many peacekeeping operations, operational success can often not be achieved by simply clearing a path for military movement. Because of the need to ensure almost complete elimination of landmines, restoration of an area for civilian re-occupation constitutes a considerably more difficult task than that required for military breaching.
Current Mine Detection Techniques

The most prevalent technique in the world is primitive manual demining, in which the ground is probed, centimeter by centimeter, with a narrow wooden or plastic stick. Dismounted mine detection is extremely slow and dangerous. A somewhat more sophisticated approach is the use of hand-held metallic mine detectors. These are metal detectors that function by emitting a time-dependent magnetic field, which, in turn, induces an eddy current in a metallic object. The eddy currents themselves set up a magnetic field, which is then detected. The strength of the signal from the metallic object is dependent on the amount and shape of metal and the distance between the object and the detector. Many antipersonnel mines contain only very small amounts of metal in the firing pin, making their detection very difficult. A few contain no metal at all.28

Another approach is to use dogs, which have a sense of smell many times more sensitive than humans.29 They are more sensitive than machines (by two to three orders of magnitude, by most estimates). Dogs can be quite effective in locating unexploded ordnance and mines. They are trained to detect explosives and such exotica as trip wires for booby traps using their acute senses of smell, sight, and hearing. Once the dogs have detected the explosive, the human deminer pinpoints its location using detectors and prods and disposes of it by detonation. Dogs have the advantage of being able to locate landmines whether or not they contain metal. They also have the advantage of finding mines in areas where the presence of metals would create a high false-alarm rate for metal detectors.30

In addition to the removal of landmines, demining also addresses the problem of removing unexploded ordnance. Although unexploded ordnance does not present quite the same magnitude of immediate danger as do landmines, after a conflict UXO still presents a considerable danger to the population.

In humanitarian and peacekeeping operations, it may not be the actual presence of mines that inhibits the use of a roadway or area, but the perception of the presence of danger. For example, in Mozambique, in a particular demining operation, some 16,000 pieces of UXO, consisting mostly of grenades and rockets, were found along with only 30 to 40 landmines.

After detection, of course, comes the problem of mine removal. In the military, detected mines are generally exploded, usually in place. Other possibilities would include explosive-laden nets that would detonate mines over 1/4 hectare at a time. While such a method is technically possible, it would be prohibitively expensive for most purposes. Also, fuel-air explosives could be used, but these are highly disruptive and cannot always be relied on to cause detonation.

A refugee population characteristically refuses to enter areas that are thought to contain mines even if they actually do not. A demining operation’s certification that an area is free of mines releases the area for productive use. Consequently, measuring the cost of demining in terms of cost per mine found is misleading. If there is no mine in an area perceived to contain mines, the cost of demining is infinite, measured as the cost per found mine. However, demining returns the land to productive use because the population now has assurance that it is a safe area. Measured in terms of cost of demining per population favorably affected, it is estimated that demining costs are on the order of $3 per capita.31 Another measure of the cost of mine removal is in terms of the ability to clear routes of transportation. In this context, the mine-clearance rate was about $1600 per kilometer in Mozambique. The oft-quoted cost of $300 to $1000 per removed mine is obtained by taking the world-wide demining budget and dividing by the total number of mines found.32 Comparing the cost per mine removed with the nominal $3 to $75 cost of antipersonnel mines is not meaningful. These comparisons can make the removal cost appear dramatic,
but also seriously distort the reality. Considering that 26,000 deaths were caused by landmines in 1994, with some 20,000 in Afghanistan alone, the total expenditure of funds for mine clearance could even be considered small. Moreover, it must be recognized that while landmine removal is expensive, slow, and dangerous, serious consideration requires an objective comparison taking into account not only the purchase cost of the mine, but the cost of the armed forces laying the mines as well.

I Detector Technologies in Development

Mine detection technologies include techniques that show near-term applicability and those that have been demonstrated in a laboratory environment, but that need further work to become operational. The former include uses of infrared cameras and improved metal detectors. Ground-penetrating radar, x-ray imaging, the use of gamma rays for detection of explosive signatures, and advanced chemical detection sensors mounted on unmanned platforms require further development. Less glamorous, but important, improvements are being made in extending the battery power capability for metal detectors, creating a computerized database of worldwide mines, etc.

Mine detection is a difficult task. No single detector applies for all situations. The challenges in the jungle differ from those in the desert. Detection along a roadside requires different capabilities from that in a field with high grass. Even in a given environment, several different methods may simultaneously be required to overcome the problem of false alarms.

I Infrared Detectors

During the Gulf War, some tank crews reported that they were able to “see” antitank mines in the desert through their forward-looking infrared (FLIR) detectors. Some dismissed these reports because mine detection using IR cameras had been tried unsuccessfully during the Vietnam war. However, the Night Vision Electronic Sensors Directorate in Fort Belvoir pursued this line of approach and identified several commercial IR cameras that are able to detect buried mines. These cameras have been used commercially to detect thermal losses from buildings. Since the Vietnam war era, these cameras were improved with infrared detectors sensitive to shorter wavelengths with better noise suppression.

IR imaging of the different heat-retention and -emission characteristics between undisturbed soil and soil that has been disturbed by mine burial can be exploited. The feasibility and maturity of this method depend, in part, on the availability of new thermal detectors that operate at 3- to 5-micron wavelengths, rather than at 10 microns. At the shorter wavelength, if clutter (noise) can be suppressed, the thermal signal from disturbed ground can be differentiated more effectively from the signal from undisturbed ground.

These detectors were deployed in Somalia and were useful in curtailting the use of command-detonated mines. The ability of US forces to locate mines buried the previous night deterred Somali factions from deploying them along the roadways. IR cameras were useful in clearing roadways of antivehicle mines, but they were not sensitive enough to detect the much smaller antipersonnel mines. The IR technique works best for recently buried mines, where the surface is observable from a distance (which rules out areas with heavy foliage or high grass).

I X-Ray Backscatter and Nuclear Techniques

Explosives are rich in nitrogen and oxygen. So too are many common organic and inorganic materials, but these are differentiated from explosives by the presence of higher concentrations of hydrogen and carbon. The simple presence of oxygen and nitrogen is not a particularly good indicator of the presence of explosives, because many common items
also contain high concentrations. A more significant discriminant is the atomic densities of oxygen and nitrogen; a high nitrogen concentration, coupled with a distinctive ratio with the oxygen concentration, provides a signature for explosives. For mine detection, however, a distinctive signature for explosives is the presence of large concentrations of nitrogen alone, because such densities of nitrogen are not common in the natural environment.

**X-Ray Techniques**

These may prove interesting for mine detection. Photons (in this case, x rays) interact with matter in a way useful for imaging. The best technique would use x rays that scatter back incoherently from an underground target (at depths of a few centimeters). Such scattering provides the mechanism by which photons reach the detector. At energies of 60 to 200 keV, this type of scattering becomes important, and the number of backscattered photons reaching the detector is a maximum.

Because backscattered x rays lose energy by the nature of the scattering process, they are more easily absorbed, and those that traverse a less absorbing medium (such as nitrogen with an atomic number of 7, rather than silicon, with an atomic number of 14) are more likely to make their way back to the detector. Thus, an image of a buried mine shows increased counts when the source beam intercepts the mine. The capability to detect mines in the laboratory exists, but field-operable systems require considerably more development. Development efforts are still needed to achieve ruggedization and reliability in field-operable systems and the ability to reduce false alarms presented by other objects in the terrain, such as rocks and trash. A neural-network computer system may be useful in addressing the false-alarm problem by letting the system learn from experience what constitutes a false alarm. Other limitations are that, at present, the time to scan a large area is too long and the maintainability and operability in remote areas make the system cost too high.

**Neutron-Gamma Reactions**

Another means of detecting anomalous concentrations of nitrogen is nuclear in nature. With sufficient energy deposition, it is possible to excite the nitrogen nucleus by striking it with a neutron from, for example, a radioactive source (typically $^{252}$Cf). The almost immediate de-excitation of the nucleus produces a distinctive gamma ray. The normal isotope of nitrogen, $^{14}$N, can capture a neutron to form another isotope, $^{15}$N, in an excited nuclear state. Nitrogen-15 de-excites to the ground state and also produces a distinctive gamma ray of 10.8 MeV, which is large enough to stand out over other background radioactive sources. The resultant gamma ray is emitted with a unique energy and can be detected by gamma ray detectors, such as sodium iodide, NaI. This phenomenon may be exploited for nitrogen detection. The neutron activation gamma ray detection system may be hand-held or vehicle-mounted. However, its complication, cost, and the need to use a radioactive source may limit its use for many demining operations. Similar objections (except for the issue of the source) may apply to x-ray methods.

**Ground-Penetrating Radars**

At low frequencies, radar waves can penetrate the ground and be useful in mine detection. In general, the longer the wavelength (meaning the lower the frequency), the greater the ability to penetrate the soil. However, the resolution capability depends inversely on the wavelength, so ground-penetrating radars cannot detect small mines. Mine detection requires a frequency of 6 GHz and above, corresponding to wavelengths smaller than 5 cm.

Because conductive (e.g., metallic) matter resists penetration by electromagnetic waves but scatters back the radar wave, it is possible to see buried mines. If the detection is sufficiently sensitive, it is possible in principle to distinguish between explosives and soil because of the dielectric property difference between the two. However, water has a broad absorption band and the conductivity is
determined by the soil/water content, so for practical purposes radars are not usually useful in wet soil.

Ground-penetrating radars are not operationally feasible except in dry soil or sand, but with variable frequency capability, increased source power, and improved detector sensitivity, the absorption and penetration length challenges may not be insurmountable technical obstacles. Ground-penetrating synthetic-aperture radar (GPSAR) has been tested at the Nevada Test site by LLNL. In a synthetic-aperture radar, a single radar mounted on a vehicle is able to coherently and electronically combine the returns from the various physical locations of the source and detector and obtain an image with much better resolution than would be obtainable from a stationary radar.

Microwave impulse radars (MIRs) have been developed at LLNL. The pulse length is less than a nanosecond, so MIR operates across a much wider band of radio frequencies than conventional radars. Because the impulse radar signal contains many frequencies, returns are observed from objects that may be transparent for some particular frequency. At some frequency, the dielectric constant differs for metallic and plastic mines and soil, so a return is observed. Coupled with two- and three-dimensional imaging algorithms, MIR offers the potential for a low-cost, high-performance mine detector. The MIR appears to show a detection capability to a depth of 5 to 10 cm in moist soil and to a depth of 30 cm in dry soil. This penetration capability satisfies requirements for detection of antipersonnel mines, which are usually found either on the surface or buried less than 10 cm deep.

**Directed-Energy Breacher**

Advanced concepts that have been proposed for mine field clearance also include a directed-energy breacher. The directed-energy device is an RF antenna that projects a concentrated electromagnetic field to trigger an electronically fuzed mine from a stand-off distance. This capability does not yet exist.

**Dogs**

Dogs require extensive training, some ten weeks in the home country and an additional ten weeks while they are bonded and trained with a local handler. The useful working life of a dog is approximately six years. To maintain its value, a mine-detection dog requires high-quality veterinary attention, high-protein food, intensive care, and grooming. Periodic refresher training is required for both dogs and their handlers. Dogs have a limited attention span, so they cannot be used as mechanical instruments. Typically, the attention span of dogs for explosive detection is on the order of 15 minutes. Despite these handicaps, the dogs' track record in both Afghanistan and Mozambique has shown that they are effective means for proofing roadways and areas for normal use when armed conflict has ended. They are difficult, however, to use in combat or near combat situations. Demining operations with dogs have had to be suspended at the reinitiation of armed conflict.

South Africans collect samples of air using a truck along roadways that are thought to be cleared of mines. The air is catalogued as to location and taken back to a base where a dog sniffs the collected samples. If the dog indicates the presence of explosives, the area from which the sample was collected is subject to further intensive scrutiny. This technique has a tremendous advantage where certification is required to allow full use of a roadway. Vehicular collection of air samples is fast. The dog is decoupled from the handler and is able to examine samples from a wide area.

**Chemical-Explosives Detectors**

Chemical-explosive detectors have been developed and have had success for drug and explosives detection in relatively confined spaces such as airport baggage-handling areas and border crossings. Sensitivity of 100 parts per trillion, suitable for detection of even
low-vapor-pressure explosives in airport baggage-handling systems, has been demonstrated. The sensitivity is beginning to approach that of dogs, but the detection capability is chemical-specific and lacks the adaptability of animal senses. Such systems have not yet been engineered for mine-detection purposes, although perhaps this would be worth investigating.
Notes

1. Much of the information contained in this chapter comes from partially completed work undertaken by Anthony Fainberg while he was directing a study at the US Congressional Office of Technology Assessment (OTA). The study was not completed, because the OTA was eliminated by the 104th Congress. A final report will, nevertheless, be published in the near future, supported by the Carnegie Corporation of New York. Other members of this study team were Dean Cheng, Alex Gliksman, Xavier Maruyama, and Alan Shaw. The information in the less-than-lethal section is being developed by Fainberg for a project of the University of Illinois Arms Control and Disarmament Center for the United States Institute of Peace.

2. MOBA is the military terminology for military operation in built-up areas. Previous terminology included MOUT (military operation in urban terrain). An example of a MOBA operation is the occupation of Grozny. The Russian operation to suppress the Chechnyans was firepower intensive. It was very inefficient and costly to both the Russian military and the civilian population. Such an operation might have been started as a military operation other than war, but quickly deteriorated to combat because of the Russian over-reliance on massive firepower. Chechnyan tactics involved autonomous units of individuals against armored units.


5. Jerry Gerber, Army Research Laboratory, Adelphi, MD, private communication (Jan. 27, 1995).

6. Every object emits radiation that is characteristic of its temperature. In its ideal form, this is called blackbody radiation. Blackbody radiation does not appear at a single wavelength, but is broad band. For objects that are hot, but not hot enough to glow, blackbody radiation peaks in the IR portion of the EM spectrum. Chemical and atomic processes emit radiation, but the wavelengths are specific wavelengths or a narrow band of wavelengths that characterize the particular process.


8. Kelvin (K) is the temperature above absolute zero, which is -273°C (centigrade). A unit of kelvin is numerically equivalent to a degree of Celsius. The kelvin is the temperature unit, and the “degree” sign is not used when measuring temperature on the absolute scale.

9. Twenty years ago, mercad telluride (HgCdTe) IR detectors capable of detecting 10 microns made the night-vision goggle possible, but they were inadequate for detecting bullets in flight.

10. LWIR is IR with wavelengths around 10 microns. LWIR is used for thermal detection of objects at human body temperatures.

11. For a discussion of IR cameras, see the section concerning mine detection.

12. Flat panel display technology has application for the monitor screen.
13. "Chapter VI" refers to actions sanctioned by the United Nations Charter under the provisions of Articles 33 through 38. These articles refer to the pacific settlement of disputes. Chapter VI mandates are generally regarded as those in which military forces under the sanction of the United Nations are neutral in disputes among opposing parties. Peacekeeping is a general term for the involvement of military forces sanctioned by the United Nations within the context of Chapter VI.

"Chapter VII" refers to actions sanctioned by the United Nations Charter under the provisions of Articles 39 to 51. These articles refer to action with respect to threats to the peace, breaches of the peace, and acts of aggression. Chapter VII mandates are generally regarded as those in which military forces under the sanction of the United Nations may use aggressive force and need not necessarily be neutral in disputes among opposing parties. Peace enforcement is a general term for the involvement of military forces sanctioned by the United Nations within the context of Chapter VII.


15. The Marine Corps uses a UGS system designated as Tactical Remote Sensor System (TRSS). The Immigration and Naturalization Service uses a similar system to monitor illegal immigration on the US-Mexico border. All UGS systems consist of three parts: the detector array, a preprocessing and transmission unit, and a reception and control station. The Marine Corps system requires less manpower support than the Army system, which is in keeping with their mobility and smaller unit size. All systems have essentially similar detector units.


Arian Pregenzer, Sandia National Laboratories, private communication (April 7, 1995).

17. There is a growing appreciation within the military of the intelligence deficiency presented by the lack of mapping, charting, and geodesy. For example, during June 1995, extensive discussions of this problem were held in an e-mail list serve, whose recipients have an interest in command, control, communication, computers, and intelligence (C4I). The list serve is c4i-pro@stl.nps.navy.mil.

operations was held in June 1995. The results, including significant discussions of less-than-lethal weapons, are in Improving the Prospects for Future International Peace Operations, Office of Technology Assessment, US Congress, OTA-BP-ISS-167 (Government Printing Office, Washington, DC, 1995). Further analysis of such weapons and related topics was underway but incomplete when the OTA was closed by the Congress in October 1995. This paper makes use of work on this project, in particular drafts by X. Maruyama.


21. As pointed out a few years ago by R. Garwin.

22. "White Papers for Nonlethal Technologies," Los Alamos National Laboratory, op. cit., footnote 19. These include both a superacid proposal and the suggestion to use olefin metathesis to degrade rubber, mentioned just below in the text.


25. Again, the Los Alamos White Paper referenced in footnote 19 discusses this possibility.

26. Estimates compiled by the State Department from Embassy, Department of Defense, United Nations, and various NGO and demining contractor sources. Although all sources seem to agree within a margin of error of 25%, the numbers are still imprecise guesses, and some of the separate sources may be quoting the same original source.

27. In addition to plows and rakes, flails may be used to clear a lane. A flail is a mechanically driven rotating drum with chains that beats the ground to detonate or physically break up landmines. Flails require multiple passes to achieve a suitable level of confidence.

28. One proposal suggested within international circles concerned with the proliferation of landmines is to require landmines to contain metal. The metal content would make the mine detectable and consequently mitigate their effects after armed conflict. Source: Stephen D. Goose, Project Director, Human Rights Watch Arms, at The Henry L. Stimson Center Peacekeeping Roundtable, July 13, 1995.


31. Dave Lundberg, ibid.

33. Accounting comparisons do not include consideration of such other factors as the cost of not removing landmines. For example, a ten-year-old child with a life expectancy of 50 to 60 years who has had his leg amputated would require approximately 25 prostheses. At a cost of $125 each, the lifetime cost of the artificial limb exceeds $3000. Source: Boutros Boutros-Ghali, "The Landmine Crisis, A Humanitarian Disaster," Foreign Affairs, September/October 1994.


37. The relationship between wavelength and frequency is \( c = \lambda v \), where \( c \) is the speed of EM radiation in a medium, \( \lambda \) is the wavelength, and \( v \) is the frequency. When EM radiation traverses from one medium to another, the speed and the wavelength change, but the frequency remains the same.

38. The dielectric constant parameterizes the insulating properties of a material. Good insulators have large dielectric constants.

39. Although the radar may be inhibited in general, because propagation, absorption, and scatter are frequency dependent, variable frequency may provide a means of finding a "window" for use of the radar.


42. Impulse radars, also called broad-band radars, are used as counterstealth radars because stealth aircraft have a low probability of radar return only at specific frequencies.


Unattended Ground Sensor Technology

The Potential Application of Unattended Ground Sensors in International Peacekeeping

David A. Fuess
Sensor Applications Group Leader
LLNL

Introduction

Departing from my usual presentation, which addresses the technical aspects of unattended ground sensors (UGSs), I will, in this chapter, concentrate on applications, particularly as they relate to international peacekeeping operations. Peacekeeping operations are closely related to law enforcement. Much of what follows is based upon the sensors and methods employed by the United States Border Patrol and other law enforcement organizations we have served.

Modern-day sensor systems are technological marvels that employ the latest developments in electronics and computers. Hence, it is not possible to fully understand their applications without some knowledge of the enabling technology. I will open with a short discussion of the relevant history and an overview of the technology elements required to understand the applications. The remainder of the chapter is devoted to descriptions of various applications and discussions on the relevance of those applications to peacekeeping operations.

History and Technology

What Are UGSs?

Unattended ground sensors are not new. However, they have not seen wide application outside of military and government uses. As they have evolved, they have become increasingly autonomous self-contained instruments for measuring and reporting phenomena of interest. They most often employ simple transducers such as geophones, microphones, or passive infrared and magnetic sensors. Most of these are omnidirectional, which makes them easier to install. Less frequently, they employ nuclear radiation detectors, chemical transducers, imagers, accelerometers, and even radar. This latter group is populated with transducers that require sensitive alignment and higher operating power. They are typically used to measure phenomena of less general interest.

Early UGSs were generally built from discrete components and triggered whenever the measured parameter exceeded a threshold. They had no discrimination capability whatsoever—thus they were only
effective at indicating that something passed within range of the sensor, leaving it to human operators to determine what had triggered the sensor. For the technologist, the development and fielding of an autonomous sensor was a breakthrough. Users were generally less impressed with the accomplishment as they were worn out from chasing endless false alarms. However, the seed was planted and all that remained was to refine the product.

Modern UGS systems include the sensor, some communication link, and a display/analysis terminal. Generally the sensor includes a small collection of transducers, one or more microprocessors, a power source, and a communication transmitter. While the communication path remains RF for the most part, modern innovations in low observable waveforms and satellite communication provide alternative options. The display is most often a UNIX- or PC-based workstation with a geographical (GIS) display.

Three Classes of UGSs

Unattended ground sensors fall generally into three definable classes: simple triggers, automatic target recognizers, and distributed analyzers. Simple triggers have been described above. Examples of this class include the MIDS sensors from Qualtron and the Spartan Intrusion Detection System. They offer advantages of simple installation and long lifetime in small packages. They are useful in situations where the trigger indication is sufficient or when used as cueing sensors for larger systems.

Most modern sensors fall in the category of automatic target recognizers. There is a wide range of systems and capabilities in this category. The simplest are the military family of sensors, which discriminate among personnel, wheeled vehicles, and tracked vehicles. At the other end of the spectrum, we find the programmable sensors like OmniSense and INSENS, which discriminate among a wide and varying set of targets.

Finally, there are the distributed analyzers. In these, most (and in a few cases, all) of the processing is contained within the sensors. Distributed analyzers use powerful digital signal processor (DSP) engines to perform complex recognition and location calculations resulting in position, path, and intercept estimates. Examples of this class of systems include the Wide Area Mine and the Intelligent Sentry.

Two Technical Boundaries

Detection Range

Of all the technical details that one can know about UGSs, two characteristics are key for both the designer and the user. The first of these is the detection range. A set of nominal detection ranges for a variety of targets is presented in Table 1.

<table>
<thead>
<tr>
<th>Target</th>
<th>Nominal range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personnel (up to 3 or so)</td>
<td>5 to 10 m</td>
</tr>
<tr>
<td>Small vehicles (cars)</td>
<td>20 to 30 m</td>
</tr>
<tr>
<td>Large vehicles (trucks)</td>
<td>30 to 50 m</td>
</tr>
<tr>
<td>Trains (and tanks)</td>
<td>80 to 100 m</td>
</tr>
<tr>
<td>Jet aircraft</td>
<td>1 to 10 km</td>
</tr>
</tbody>
</table>

Personnel

Detection of personnel assumes an average person walking at a normal gait with no attempt to conceal his or her presence. The primary identification method relies heavily on seismic transducers, with corroborations by magnetic and passive IR. More than a few persons in a close crowd are difficult to distinguish seismically from a slow-moving light vehicle. Magnetic sensors may provide the required discrimination in this case.
Small Vehicles
This class includes passenger automobiles and their military equivalents on smooth roads. Off-road or unimproved road detection ranges may be larger by as much as a factor of two for seismic transducers. There is a severe range limitation for the magnetic sensors due to the $1/r^3$ reduction of signal with distance and the relatively small amount of ferrous material present.

Large Vehicles
This class is dominated by large tractor-trailer trucks (over 5 tons) and military transport vehicles. Larger ferrous mass tends to partially compensate for the reduction in magnetic anomaly signal at the ranges noted in Table 1.

Trains
This category potentially includes a wide range of targets, including passenger trains (longer and lighter), military trains (shorter and heavier), and tracked vehicles (tremendous ferrous mass and very large seismic source). This target category may also have a minimum proximity limit as well because the large seismic and magnetic signals tend to saturate the sensor electronics at short range. Magnetic sensors may also be used to estimate the number of train cars.

Jet Aircraft
Like train targets, this category covers a very wide range. The far range is dominated by rotary wing aircraft, which are detectable at distances of up to 10 km. Jet aircraft on takeoff have been detected from several kilometers off the end of the runway. Rapidly climbing military aircraft may be detected at horizontal ranges of 3 to 5 km through altitudes of 3 km or so. When deployed close-in (i.e., within about a km) along an airport approach flight path, the sensor can identify propeller aircraft as well.

The preceding is a somewhat lengthy way to say that the ranges are, in general, short and that UGSs, in general, should be regarded as point sensors. To the user this means that deployments must be planned to assure that the path of the target passes within the detection range of the sensor. Examples include deployments along trails, paths, roads, bridges, or other natural choke points. This also highlights the reason why UGSs are a poor choice for line sensing, although small arrays of UGSs can effectively monitor a reasonable-sized zone.

Operating Lifetime
The second characteristic is operating lifetime. Nominal lifetimes for the three classes of sensors defined above are presented in Table 2. The operating lifetime of a UGS is determined by the size of its battery and the power required to run the electronics. Battery sizes are limited both by operational constraints (i.e., reasonable size and weight for manpack deployment) and by the battery chemistry. Energy to run the electronics ranges from a few milliwatts for the threshold type sensor to as much as 1 watt for the DSP. Both rechargeable and

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>Rechargeable</th>
<th>Alkaline</th>
<th>Lithium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threshold</td>
<td>Days to months</td>
<td>3 to 6 months</td>
<td>3 to 5 years</td>
</tr>
<tr>
<td>Microcontroller</td>
<td>Days to weeks</td>
<td>3 to 6 months</td>
<td>1 to 3 years</td>
</tr>
<tr>
<td>DSP</td>
<td>Days</td>
<td>1 to 10 days</td>
<td>6 months</td>
</tr>
</tbody>
</table>
alkaline batteries are further limited by self-discharge, which limits the shelf life and operating life of the sensors.

Lifetime limits translate directly into logistic support requirements for the user. For short term operations, there may be a significant cost issue if the sensors are not recoverable. Long term operations will require some sensor field maintenance, which includes both battery replacement and repair.

So, Why Use Them?

With the background provided by the previous section, we are ready to examine how UGSs could be used effectively in military operation in general and in peacekeeping operations specifically. Compared to personnel, satellites, and aircraft, UGSs are inexpensive. Although inexpensive, the incorporation of intelligent processing in UGSs yields systems that are sophisticated, yet simple to produce and use.

Force Multipliers

UGS can effectively perform strategic and tactical reconnaissance from fixed positions in the theater of operations to provide indications and warnings. Prepositioned sensors can provide simultaneous monitoring of all potential infiltration routes. Specific uses include perimeter and area monitoring, high value asset security monitoring, and recognition and classification of specific targets of interest.

Tireless Staring

The ideal sentry, UGS will stare tirelessly at a specific location and alert the command center immediately upon detection of a target or activity of interest, including the passage of targets through the monitored zone. For example, if it's known that an activity of interest requires that some known precursor occur, then a sensor can be devoted to monitoring the precursor event.

The United States Border Patrol is an excellent case study for the use of UGSs in force augmentation. Faced with the task of patrolling a vast, uncontrolled border with a relatively small force, the Border Patrol chose to augment the patrol force with strategically placed sensors. The sensors are placed and configured to maximize the probability of intercepting illegal crossing attempts. All sensors in a given sector transmit messages via a network of repeaters to the central dispatcher, where the alarms are monitored and analyzed. Patrol Officers are dispatched as required to intercept detected crossing attempts.

The use of multiple transducers in target recognition reduces the probability of false identification and sometimes provides additional insight concerning the nature of the crossing. For example, a significant magnetic response coupled with the seismic identification of personnel may permit discrimination between generally benign family crossings and drug trafficking.

Unattended Ground Sensors in Peace Operations

Finally, we come to consider the role of UGSs in peace operations. To first order, peace operations are military operations where the forces, often smaller and less well-armed than in standard military operations, are tasked with preventing outbreaks of violence. The following scenarios are offered as exemplars of the application of UGSs in this arena.

Garrison Security

The peacekeeping forces that are garrisoned within hostile territory may be vulnerable to attack by local insurgent forces. UGSs can be positioned in and around the garrison to alert the sentries when a breach occurs, providing valuable preparation time to repel the assault.
Keep-out Zone Monitoring

A keep-out zone is any facility or area that has been designated by the peacekeeping force as off-limits to local occupancy. UGSs may be placed in and around such zones as sentries to provide an alert when activity is detected.

Border Area Monitoring

Similar to the US Border Patrol situation described above, border area monitoring can be applied between two warring neighbors to alert the peacekeeping force when breaches of the peacekeeping accord occur. This would be the equivalent of the formulation of a "no-man's-land" between the two parties monitored by a neutral force.

Force Multipliers/Equalizers

Sensors placed in lieu of troops at strategic locations deny opposing forces the element of surprise. As such, they allow a relatively small force to perform missions that otherwise require larger contingents.

Force Protection Monitoring

Similar to the equalizers, force protection monitors are applied at the patrol level. Sensors are used to provide cover for small forces when they stop to rest or for whatever reason find they cannot return to the garrison for the night. This kind of UGS use provides sentry augmentation.

In each of the applications described above it was implicitly assumed that the sensors were carried in and deployed by the peacekeeping force, a situation we refer to as "hand emplacement." Each installation requires the installer to: plan the most effective types and placement of transducers to achieve the monitoring mission; dig holes and trenches; and cover the installation to avoid detection by the opposition. Other placement techniques may be of interest in peacekeeping, though probably less so. For example, several sensor families are designed to be air-deployed. These can be dropped from helicopters or light aircraft. The transducers contained in these sensors tend be of a more robust variety, and do not require sensitive alignment or lines of sight. Geophones and magnetometers are often included among this class of sensors. Some emerging lines of sensors, INSENS for instance, support multiple transducers and perform multiphenomenology target recognition onboard in an air-deployable configuration.

Suppliers

There are a number of suppliers of UGS hardware in the US. They fall generally into three categories: government suppliers, commercial manufacturers, and systems houses. Two DOE national laboratories (LLNL and SNL) supply special purpose sensors to the US government. These tend to be one of a kind special purpose items or special designs which are transferred to industry. The chart below is a list of the major commercial suppliers of UGS hardware.
<table>
<thead>
<tr>
<th>Company</th>
<th>Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kaman Sciences Corporation</td>
<td>Sensor Systems Integration</td>
</tr>
<tr>
<td>1500 Garden of the Gods Rd. Colorado Springs, CO 80907 Mr. Skip Marsh (719) 599-1915</td>
<td>(Kaman does not produce sensor hardware, but is an excellent resource for UGS applications.)</td>
</tr>
<tr>
<td>GE Aerospace</td>
<td>REMBASS</td>
</tr>
<tr>
<td>Government Communication Systems Department</td>
<td></td>
</tr>
<tr>
<td>Front &amp; Cooper Sts. Building 13-5 Camden, NJ USA (609) 338-2105</td>
<td>IREMBASS</td>
</tr>
<tr>
<td>LOCKHEED MARTIN</td>
<td></td>
</tr>
<tr>
<td>Communication Systems</td>
<td>IREMBASS</td>
</tr>
<tr>
<td>1 Federal Street Camden, NJ 08102 (609) 338-3253</td>
<td></td>
</tr>
<tr>
<td>RACAL-COMSEC LIMITED</td>
<td>CLASSIC</td>
</tr>
<tr>
<td>Milford Industrial Estate</td>
<td></td>
</tr>
<tr>
<td>Tollgate Road Salisbury Wilshire SP1 2JG, England (0722) 323911 FAX (0722) 330016</td>
<td></td>
</tr>
<tr>
<td>RACAL COMMUNICATIONS, INC.</td>
<td>CLASSIC</td>
</tr>
<tr>
<td>5 Research Place Rockville, Maryland 20850 (301) 948-4420</td>
<td></td>
</tr>
<tr>
<td>Qual-Tron, Inc.</td>
<td>Mire Intrusion Detection System (MIDS)</td>
</tr>
<tr>
<td>4339 South 93rd East Ave. Tulsa, Oklahoma 74145 (918) 622-7052 FAX (918) 664-8557</td>
<td></td>
</tr>
<tr>
<td>Eagle-Telonic</td>
<td>Eagle Intrusion Detection System (EIDS)</td>
</tr>
<tr>
<td>932 E. Impala Avenue Mesa, Arizona 85204-6699 (602) 892-4444 FAX (602) 892-9139</td>
<td></td>
</tr>
<tr>
<td>Sparton Technology, Inc.</td>
<td>Intrusion Detection Systems (IDS)</td>
</tr>
<tr>
<td>4901 Rockaway Blvd. SE Rio Rancho, NM 87124 (505) 892-5300 FAX (505) 892-5515</td>
<td></td>
</tr>
<tr>
<td>Company</td>
<td>Systems</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>--------------------------------------</td>
</tr>
<tr>
<td>System Innovations, Inc.</td>
<td>OmniSense</td>
</tr>
<tr>
<td>1551 Forbes Street</td>
<td></td>
</tr>
<tr>
<td>Fredricksburg, Virginia 22045</td>
<td></td>
</tr>
<tr>
<td>(703) 371-3399 FAX (703) 371-1358</td>
<td></td>
</tr>
<tr>
<td>GEC Avionics</td>
<td>HERMES</td>
</tr>
<tr>
<td>Logistic and Customer Services Division</td>
<td></td>
</tr>
<tr>
<td>Airport Works</td>
<td></td>
</tr>
<tr>
<td>Rochester, Kent, England</td>
<td></td>
</tr>
<tr>
<td>(0634) 844400 FAX (0634) 816301</td>
<td></td>
</tr>
<tr>
<td>Alliant Techsystems</td>
<td>Remote Sentry</td>
</tr>
<tr>
<td>600 Second Street NE</td>
<td></td>
</tr>
<tr>
<td>Hopkins, Minnesota 55343</td>
<td></td>
</tr>
<tr>
<td>(612) 931-6873 FAX (612) 931-4305</td>
<td></td>
</tr>
<tr>
<td>Northrop Grumman</td>
<td>Improved Air Delivered Sensor (IADS)</td>
</tr>
<tr>
<td>Electronics &amp; Systems Integration Division</td>
<td></td>
</tr>
<tr>
<td>2301 West 120th Street, P.O. Box 5032</td>
<td></td>
</tr>
<tr>
<td>Hawthorne, California 90251-5032</td>
<td></td>
</tr>
<tr>
<td>(213) 600-5188 FAX (213) 600-5188</td>
<td></td>
</tr>
</tbody>
</table>
Note

1. Skip Marsh of Kaman Sciences has authored an excellent publication, the *Unattended Ground Sensor Manual*, which contains detailed information on the vendors and the applications.
Technology advances made recently allow effective detection of gunfire, which could be used as part of comprehensive counter-sniper systems. This chapter summarizes the problems facing technology developers and the status of sniper-detection technology today as well as providing some insights into future directions.

The Challenge

The key to effectively engaging snipers is the ability to accurately determine their location. The primary focus of counter-sniper technology efforts has been on the development of detection and location technology. Some of these systems have been aimed at civilian law-enforcement applications, and others have been focused on military applications. Military use of sniper-detection technology generally represents the most severe conditions. The environments, tactical scenarios, and levels of sniper sophistication can vary widely and must be carefully considered before a technology approach is selected.

The environment in which sniper-detection systems are to be employed plays a large role in the selection of appropriate technology. Environments can range from urban to rural, high elevations (natural or man-made) to flat terrain, areas with little potential for camouflage to ones with great potential for a sniper to hide. Urban environments, for example, make acoustic location difficult, given to multipath effects and signal masking. Environments in which there are many moving objects (i.e., busy streets) are challenging for IR systems because of rapid changes in the background scene. Prior to selecting a technology, planners must carefully consider the environment in which the system will be employed and the strengths and weaknesses of the technology in that environment.

The tactical employment of sniper-detection systems is also a driving factor in the selection of appropriate technology. Potential military use of sniper-location systems includes mounting them on individual soldiers and vehicles or locating them at fixed sites. Use by individual soldiers represents by far the greatest challenge, but also perhaps the greatest payoff. Vehicle-mounted systems provide some level of mobility and ease of implementation, but protection is restricted to zones in the immediate vicinity of the vehicles and may not be useful when the vehicles are on
the move. Fixed-site systems are the least demanding in terms of hardware, but they are useful only in areas where military control is well-established.

Another significant consideration in the selection of a sniper-detection system is the level of sophistication of the sniper. A well-trained, well-equipped sniper has a distinctly different approach to firing than an untrained civilian. Snipers prepare their deployment, shot selection, camouflage, and egress, while less trained shooters consider few if any of these issues. A trained sniper may conceal himself effectively and with stealth, select a target that represents the least possibility of detection, fire only a single shot from long range, and depart from the firing position in an effective manner. Such a scenario is likely to evade even state-of-the-art sniper-detection systems, because it provides few recognizable signatures to exploit. An untrained sniper—who conceals himself carelessly, or not at all, fires multiple shots at close range, and can be detected when leaving his firing position—can potentially be located using any one of a number of approaches.

Potential Technologies

For unaided human senses, accurate location of gunfire is a challenging problem under the best of circumstances. Using advanced sensors, a number of signatures from gunfire can be detected. Items that can be detected include the shooter, the muzzle blast from the weapon, and the bullet in flight. Acoustic, infrared, ultraviolet, and visible signatures can be exploited. Different systems exploit different signatures or combinations of signatures. Systems based on these signatures vary in terms of their accuracy, field of view, configuration, cost, information provided, and immunity to false alarms. Some of the most promising technologies are discussed below in these terms.

Some of the most promising sniper-detection technologies in the near term are:

- Acoustic muzzle blast—compact array(s).
- Acoustic muzzle blast—distributed single sensors.
- Acoustic shock wave.
- IR muzzle blast detection.
- Radar bullet tracking.
- IR bullet tracking.

It is important to note that each of these technologies provides unique capabilities. Hybrid combinations of these technologies can provide systems with capabilities beyond the individual contributions. A brief discussion of some obvious hybrid systems is also included below.

- **Acoustic Muzzle Blast—Compact Array(s)**

  One of the most obvious signatures from gunfire is the acoustic signature of the muzzle blast. Even silenced weapons produce significant acoustic signatures. An array of microphones can be used to point to the source of muzzle blasts. Such arrays can be less than a foot in diameter or larger. Multiple arrays can be networked together to develop multiple lines of bearing that intersect at the shooter's location. Acoustic muzzle-blast systems can be installed on vehicles, but they perform relatively poorly when moving because of vehicle and wind noise. Acoustic muzzle-blast-detection systems can perform well even without a line of sight to the shooter. Capabilities of acoustic muzzle blast—compact array(s) technology are shown in Table 1.
Table 1. Capabilities of acoustic muzzle blast—compact array(s).

<table>
<thead>
<tr>
<th>Event detected</th>
<th>Acoustic muzzle blast—compact array(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection</td>
<td>After one shot</td>
</tr>
<tr>
<td>Accuracy</td>
<td>1–10°</td>
</tr>
<tr>
<td>Field of view</td>
<td>360°</td>
</tr>
<tr>
<td>Configuration</td>
<td>Soldier/vehicle mounted/fixed site</td>
</tr>
<tr>
<td>Cost</td>
<td>$10K–$30K</td>
</tr>
<tr>
<td>Information provided</td>
<td>Single array: Azimuth/elevation relative to the sensor</td>
</tr>
<tr>
<td>False alarms</td>
<td>Moderate—many common sounds can be confused for a muzzle-blast signature</td>
</tr>
<tr>
<td>Availability</td>
<td>Successfully demonstrated by multiple sources</td>
</tr>
</tbody>
</table>

**Acoustic Muzzle Blast—Distributed Single Sensors**

An alternative to compact arrays locating the source of a muzzle blast is to distribute single acoustic sensors that can each detect a muzzle blast and network them together to triangulate on the source. Such systems have the advantage of covering large areas and can perform well even in urban environments. Accuracy is largely a function of the spacing between the sensors. Several of these systems have been developed for law-enforcement applications in urban environments. Capabilities of acoustic muzzle blast—distributed single sensor technology are shown in Table 2.

Table 2. Capabilities of acoustic muzzle blast—distributed single sensors.

<table>
<thead>
<tr>
<th>Event detected</th>
<th>Acoustic muzzle blast—distributed single sensors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection</td>
<td>After one shot</td>
</tr>
<tr>
<td>Accuracy</td>
<td>10–100 m (highly dependent on array deployment)</td>
</tr>
<tr>
<td>Field of view</td>
<td>360°</td>
</tr>
<tr>
<td>Configuration</td>
<td>Fixed site</td>
</tr>
<tr>
<td>Cost</td>
<td>$1K–$5K per sensor, $20K–$50K for a ground station</td>
</tr>
<tr>
<td>Information provided</td>
<td>3D location of the shooter</td>
</tr>
<tr>
<td>False alarms</td>
<td>Moderate—many common sounds can be confused for a muzzle-blast signature. Echoes can produce results that are substantially in error.</td>
</tr>
<tr>
<td>Availability</td>
<td>Successfully demonstrated by multiple sources</td>
</tr>
</tbody>
</table>
Acoustic Shock Wave

All supersonic velocity bullets produce a shock wave that can easily be detected and used to determine the trajectory of the bullet. A supersonic bullet produces a shock cone starting from the tip of the bullet and extending rearward. The angle of the shock cone is directly related to the velocity (90° at Mach 1, 30° at Mach 2, etc.). Because supersonic shock waves are not present in nature, false alarms are virtually nonexistent. The difficulty with acoustic shock wave systems is that shock waves are only detectable within a relatively short area behind the bullet (100 m or less). But these systems can perform well even on moving vehicles, because vehicle and wind noise is too low in frequency to be a problem. Arrays can be relatively small (1- to 2-m single arrays) or multiple small arrays separated by up to approximately 100 m. Capabilities of acoustic shock wave technology are shown in Table 3.

Integrated Acoustic Shock-Wave and Muzzle-Blast Detection

Effective systems can be built that incorporate both muzzle-blast and shock-wave detection technologies. Such systems have the advantages of each approach, but can potentially provide additional information. An estimate of the range to the shooter can be derived if both the shock-wave event and the muzzle blast are detected. Capabilities of integrated acoustic shock-wave and muzzle-blast detection technologies are shown in Table 4.

IR Muzzle-Flash Detection

Another obvious signature from gunfire that can be detected easily is the IR signature of the muzzle flash. Even suppressed weapons produce significant IR signatures. IR detection provides some significant advantages over acoustic approaches. The IR approach produces an image that provides the operator with contextual information crucial to pinpoint the source. However, optical systems in general are likely to have a limited field of view. Some 360° systems have been postulated, but they are unlikely to be successful at reasonable cost. IR muzzle-flash systems appear to be highly desirable in areas where pinpoint accuracy is required or where a relatively narrow field of view needs to be monitored. One significant issue with IR systems is false alarms. Many common events generate signatures similar to a weapon’s flash.

Table 3. Capabilities of acoustic shock wave systems.

<table>
<thead>
<tr>
<th>Event detected</th>
<th>Acoustic bullet shock wave</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection</td>
<td>After one shot</td>
</tr>
<tr>
<td>Accuracy</td>
<td>1–5°</td>
</tr>
<tr>
<td>Field of view</td>
<td>360°</td>
</tr>
<tr>
<td>Configuration</td>
<td>Soldier/vehicle mounted/fixed site</td>
</tr>
<tr>
<td>Cost</td>
<td>$10K–$30K</td>
</tr>
<tr>
<td>Information provided</td>
<td>Azimuth/elevation relative to the sensor</td>
</tr>
<tr>
<td>False alarms</td>
<td>Very low</td>
</tr>
<tr>
<td>Availability</td>
<td>Successfully demonstrated by multiple source</td>
</tr>
</tbody>
</table>
Table 4. Capabilities of integrated acoustic shock-wave and muzzle-blast technology.

<table>
<thead>
<tr>
<th>Event detected</th>
<th>Acoustic bullet shock wave and muzzle blast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection</td>
<td>After one shot</td>
</tr>
<tr>
<td>Accuracy</td>
<td>1–10°</td>
</tr>
<tr>
<td>Field of view</td>
<td>360°</td>
</tr>
<tr>
<td>Configuration</td>
<td>Fixed site</td>
</tr>
<tr>
<td>Cost</td>
<td>$10K–$30K</td>
</tr>
<tr>
<td>Information provided</td>
<td>Shock and muzzle blast: 3D location of the shooter (crude range estimate)</td>
</tr>
<tr>
<td></td>
<td>Shock or muzzle blast: Azimuth/elevation relative to the sensor</td>
</tr>
<tr>
<td>False alarms</td>
<td>Very low when both signatures are present; Moderate in the absence of the shock wave</td>
</tr>
<tr>
<td>Availability</td>
<td>Successfully demonstrated by multiple sources</td>
</tr>
</tbody>
</table>

Algorithms have been generated to minimize their effect, but more work is needed. Frequent false alarms may not be a significant issue with the user, because a trained operator can observe the scene and judge for himself if an event is gunfire.

Combining an IR muzzle-flash system with an acoustic muzzle-blast system appears to offer significant advantages. The range to the shooter can be determined with reasonable accuracy if both the IR and acoustic events are detected. Also, an acoustic system could cue the IR system after one shot so that it could accurately locate subsequent shots. False alarms can also be significantly reduced if both the IR and acoustic signatures are present. No IR/acoustic integration has been demonstrated to date. Capabilities of infrared muzzle-flash technology are shown in Table 5.

Table 5. Capabilities of infrared muzzle-flash technology.

<table>
<thead>
<tr>
<th>Event detected</th>
<th>Infrared muzzle flash</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection</td>
<td>After one shot</td>
</tr>
<tr>
<td>Accuracy</td>
<td>0.1–0.5°</td>
</tr>
<tr>
<td>Field of view</td>
<td>Narrow (see description above)</td>
</tr>
<tr>
<td>Configuration</td>
<td>Fixed site</td>
</tr>
<tr>
<td>Cost</td>
<td>$100K–$200K</td>
</tr>
<tr>
<td>Information provided</td>
<td>Azimuth/elevation relative to the sensor</td>
</tr>
<tr>
<td>False alarms</td>
<td>Moderate—many common events can be confused for a muzzle-blast signature</td>
</tr>
<tr>
<td>Availability</td>
<td>Successfully demonstrated</td>
</tr>
</tbody>
</table>
Radar Bullet Tracking

Studies have been conducted of radar tracking of a bullet in flight. While radar systems are feasible, they do not appear to be practical. Bullets have a small radar cross section, and the output power levels required to illuminate them and receive a detectable return are relatively high (tens of watts). The power required to operate such systems and the fact that they would be emitting high levels of RF energy make them an unattractive alternative to acoustic systems. Capabilities of radar bullet tracking technology are shown in Table 6.

IR Bullet Tracking

Some significant work has been focused on detecting the bullet in flight from its IR signature. This approach allows a sniper-detection system to operate even if the shooter is obscured. While the approach is very promising in terms of providing significant information as part of a comprehensive system, it does not provide enough information itself to locate the shooter. It generates a 2D image of the bullet in flight, which translates to a partial plane in which the shooter should be found. Additional information is needed to generate even a 3D vector from the sensor to the shooter. Another problem with IR bullet-tracking systems is the high-performance camera required to detect the track. High frame rate, high resolution, and sensitive cameras are required to detect the bullet. Such cameras constitute state of the art or beyond at this time and are likely to be very expensive. Capabilities of infrared bullet tracking technology are shown in Table 7.

It is important to note that sniper-detection technology is in its infancy and all of the systems demonstrated to date represent first-generation efforts. Future systems will demonstrate enhanced performance, given improvements in the sensor technology. They are also likely to demonstrate enhanced performance, given the integration of multiple technologies to improve overall effectiveness.

Hybrid Systems

One simple example of a system that is a hybrid of two technologies is the combination of IR muzzle-flash and acoustic muzzle-blast sensors. Such a system could have all of the attributes of the individual technologies, but would offer several significant improvements.

Such a system could significantly reduce false alarms by requiring both the IR signature and the acoustic signature (i.e.,

Table 6. Capabilities of radar bullet tracking technology.

<table>
<thead>
<tr>
<th>Event detected</th>
<th>Bullet in flight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection</td>
<td>After one shot</td>
</tr>
<tr>
<td>Accuracy</td>
<td>1–5°</td>
</tr>
<tr>
<td>Field of view</td>
<td>360°</td>
</tr>
<tr>
<td>Configuration</td>
<td>Vehicle mounted/fixed site</td>
</tr>
<tr>
<td>Cost</td>
<td>$50K–$100K</td>
</tr>
<tr>
<td>Information provided</td>
<td>Azimuth/elevation relative to the sensor</td>
</tr>
<tr>
<td>False alarms</td>
<td>Very low</td>
</tr>
<tr>
<td>Availability</td>
<td>Never successfully demonstrated</td>
</tr>
</tbody>
</table>
Table 7. Capabilities of infrared bullet tracking.

<table>
<thead>
<tr>
<th>Event detected</th>
<th>Bullet in flight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection</td>
<td>After one shot</td>
</tr>
<tr>
<td>Accuracy</td>
<td>1–5°</td>
</tr>
<tr>
<td>Field of view</td>
<td>Narrow</td>
</tr>
<tr>
<td>Configuration</td>
<td>Vehicle mounted/fixed site</td>
</tr>
<tr>
<td>Cost</td>
<td>$150K–$500K</td>
</tr>
<tr>
<td>Information provided</td>
<td>Azimuth/elevation relative to the sensor</td>
</tr>
<tr>
<td>False alarms</td>
<td>Very low</td>
</tr>
<tr>
<td>Availability</td>
<td>Successfully demonstrated</td>
</tr>
</tbody>
</table>

“flash” followed quickly by “bang”). If both signatures were not present, any single IR or acoustic signature would be rejected as a false alarm.

Another advantage of such a hybrid system would be its ability to estimate range by measuring the time difference between the “flash” and the “bang.”

State of the Art

A number of organizations are working on sniper detection. The US Army Research Laboratory (ARL) has performed a number of evaluations of sniper systems and technologies. Evaluations have been conducted under a variety of conditions, including open terrain and simulated urban conditions in the MOUT (Military Operations, Urban Terrain) Facility at Camp Pendleton, California. Acoustic muzzle-blast, acoustic shock-wave, and IR muzzle-blast systems have all been evaluated with live fire tests.

Table 8 below lists many of the organizations engaged in sniper-detection work. All of these organizations have demonstrated some significant capability or are currently active in the area of sniper detection. This is not intended as a complete listing of all sources of technology, only those that ARL is aware of.

A significant effort on the part of the US Government has been an Advanced Concept Technology Demonstration (ACTD), which was sponsored by the Office of the Secretary of Defense. The purpose of the ACTD was to rapidly evaluate promising technologies, develop training and doctrine for soldiers, and leave a number of prototype units suitable for field use in the hands of US forces. The ACTD was conducted from May to September 1996 with evaluations performed by the Army Research Laboratory and the Dismounted Battlespace Battle Laboratory (DBBL) at Ft. Benning, Georgia. It resulted in three of four systems being deemed suitable for field use; they are now in the hands of the DBBL. One of the most significant results of this activity has been the increased familiarity on the part of the US Army and Marines with potential technologies that may be employed for sniper detection; this effort has facilitated the generation of requirements for future systems.

Other ongoing efforts in the US include significant efforts on the part of the Defense Research Advanced Projects Agency (DARPA). Several of the vendors listed below are currently under contract to DARPA for a variety of sniper-detection technology approaches. The Naval Research Laboratory is continuing investigations into IR
Table 8. Organizations engaged in sniper-detection work.

<table>
<thead>
<tr>
<th>Organization</th>
<th>Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAI</td>
<td>Acoustic</td>
</tr>
<tr>
<td>Alliant Tech Systems</td>
<td>Acoustic</td>
</tr>
<tr>
<td>Army Research Laboratory</td>
<td>Acoustic</td>
</tr>
<tr>
<td>BBN</td>
<td>Acoustic</td>
</tr>
<tr>
<td>GDA (UK)</td>
<td>Acoustic</td>
</tr>
<tr>
<td>Rafael</td>
<td>Acoustic</td>
</tr>
<tr>
<td>SAIC</td>
<td>Acoustic</td>
</tr>
<tr>
<td>Sanders</td>
<td>Acoustic</td>
</tr>
<tr>
<td>Trilon Technologies</td>
<td>Acoustic</td>
</tr>
<tr>
<td>Metrovib (France)</td>
<td>Acoustic</td>
</tr>
<tr>
<td>Loral</td>
<td>Acoustic + IR</td>
</tr>
<tr>
<td>Lawrence Livermore National Laboratory</td>
<td>IR</td>
</tr>
<tr>
<td>Naval Research Laboratory (NRL)</td>
<td>IR</td>
</tr>
<tr>
<td>Hughes</td>
<td>IR</td>
</tr>
<tr>
<td>DREV (Canada)</td>
<td>IR</td>
</tr>
<tr>
<td>GTRI</td>
<td>Radar</td>
</tr>
<tr>
<td>Lincoln Laboratories</td>
<td>Radar</td>
</tr>
</tbody>
</table>

muzzle-blast technology. A number of other internal research and development efforts are continuing on the part of many companies and government laboratories. Several planned programs on the part of the US Army will include requirements for sniper-detection capabilities.

**Future Directions**

All of the ongoing sniper detection efforts represent relatively modest investments in both time and resources. Most efforts are only one to two years old, and their technologies are still relatively immature. A number of activities are needed to mature sniper-detection technology and bring it into widespread use. In addition to technology advances, additional work is needed in the areas of requirements and doctrine to effectively employ sniper-detection technology.

It is essential that potential users of sniper-detection technology develop requirements and doctrine for the employment of these systems. As early prototype systems become available, users must examine the operational strengths and weaknesses of the different technologies and conceptualize how they may be employed and which technologies are most valuable in different circumstances. Refinement of requirements will allow technologists to better focus their work and solve the most pressing problems more quickly. One key issue that users must consider is developing some statistical understanding of the sniper problem. For example, how often will urban situations be encountered versus rural ones? How often are trained snipers encountered versus untrained ones? How many situations require man-mounted, vehicle-mounted, or permanently placed systems? Such details will help to define the most promising technologies.

A number of technology issues still need to be examined further. The signature of gunshots requires further investigations. Infrared, acoustic, ultraviolet, and RF signatures have all been examined in at least some detail. Further characterization of these emissions may reveal signatures that can be exploited to detect the muzzle blast. Signatures from the moving bullet also need further examination. For acoustic sensors, techniques to reduce wind and platform noise could greatly enhance system performance. Signal-processing techniques to reduce the effects of clutter are needed for all sensors. This is particularly important because systems that frequently produce false alarms will be ignored by users. Hybrid systems that use the best features of each
technology also need to be explored further.

In the US and other countries, a number of technology efforts are under way, and several more are planned for the future. More effort is needed in the areas of fundamental understanding of phenomenology, implementation requirements, and system engineering. While current systems provide modest capabilities, the technologies are evolving rapidly and hold great promise of providing significant capabilities to protect soldiers and civilians.
Recent dramatic changes in the nature of peace operations significantly increase the challenges faced by those who must operate in this increasingly dangerous environment. No longer is it the norm for a select few blue-helmeted soldiers to stand watch in observation towers and report treaty violations to their higher headquarters. The conflicts that pull our nation's soldiers and resources into harm's way are increasingly complex political and humanitarian disasters in which nation-states fail and the very fabric of government and society is torn apart. Increasingly, they are internal conflicts that threaten the survival of many thousands of people subject to their own internecine brutality. New technologies for war have made this brutality ever more effective and have created the need for other technologies to help tomorrow's peacekeepers survive while they return these countries to a stable and peaceful condition.

Not the least of these debilitating new technologies is that of the simple, cheap, and very deadly "hidden killer" or anti-personnel (AP) mine. More than 110 million of these worldwide claim the lives and limbs of many peacekeepers in almost every operation. They also kill or maim an estimated 500 people a week (26,000 a year), mostly innocent civilians.1

Technology helped create the $3 AP mine, and technology is needed to help us overcome the horrendous impact it is having on the world today. As discussed later, the presence of even a very few mines can deny significant quantities of land from use. In fact, our estimates at the State Department are that because of the tedious, time-consuming, and manpower-intensive process of using 1950s technology to clear the land of these mines, it can cost considerable orders of magnitude more to remove a mine than it did to create it. More importantly, reclaiming the land for normal use can take literally decades.2 The Department of State is currently running a demining program in Bosnia that it estimates will cost approximately $5,000 or more to clear each acre that is either contaminated or suspected to be contaminated.3

The UN Security Council recently held a session on "Demining in the Context of UN Peacekeeping," in which the following Presidential Statement illustrated the level of concern shared by more than 35 national delegations:
The Security Council notes with great concern that the widespread use of anti-personnel mines is one of the most critical challenges facing the international community today and that, despite all international efforts, their indiscriminate use, especially in conflict areas, is still on the increase. In addition to the thousands of civilian lives that those mines take every year, and the thousands more injured, such mines also constitute a serious impediment to major elements of UN peacekeeping operations such as the establishment of freedom of movement, the holding of free elections and the distribution of humanitarian aid. They also are a continuous threat to life and health of United Nations military and civilian personnel.

Demining activities should, as much as possible, make use of modern mine clearance technologies and specialized equipment, which will considerably enhance the mine clearance capacity of affected countries. Efforts aiming at the creation of indigenous demining capabilities and training programs should attach particular attention to this aspect.

This chapter describes the nature of the impact and suggests some directions that research and testing could take to alleviate the debilitating effect of the AP landmine in peacekeeping operations.

Bosnia

Bosnia has an estimated 2 million to 3 million landmines infecting thousands of square kilometers in all ethnic areas. UNPROFOR experienced more than 200 AP casualties and 20 AP deaths from 1992 until NATO’s IFOR took over in December 1995. Since that time, IFOR has experienced more than 50 landmine casualties of its own with 10 dead, including the first US victim of this operation. Clearing mines for self-protection has been essential, and supervising the former warring factions has required movement through questionable areas. Indeed, almost all casualties have been in areas previously believed to be “cleared” by these factions. These NATO forces have the best technology available to western nations today but are still at considerable risk as they carry out day-to-day activities. Many of the mines are plastic and contain very little metal in their construction. Because metal detectors are the only standard means to search for mines, it is a very challenging task. Many of the mines have been booby-trapped in ingenious ways.

The US Department of State and other international organizations are working to establish indigenous organizations that can clear landmine-infected areas to a humanitarian standard of 99.6%. Current estimates using available technology indicate that it will take thousands of deminers several decades or longer to completely clear the aftermath of this conflict.

Cambodia

Cambodia’s landmine contamination dates from the Vietnam conflict in the early 1970s and is estimated to be in excess of 8 million mines. Cambodia has the highest percentage of amputees per capita (1:236). Many Cambodian civilians are killed or maimed by mines each month. UNTAC also experienced debilitating casualties from landmines and ultimately formed a Mine Clearance Training Unit that ultimately evolved into the Cambodian Mine Action Center (CMAC). The United States and others currently support this organization with equipment, training, and funding. With more than 1,500 trained and equipped deminers, it is estimated that using current technology it will take more than 300 years to clear the country.
Georgia

The UN Observer Mission in Georgia (UNOMIG) has almost stopped all peacekeeping activities in critical areas because of the presence of landmines. It is their mandate to monitor and patrol the cease-fire areas, but attempts to do so have met with injury and death. As in other situations, civilians and humanitarian workers are often significantly inhibited in their work and are also subject to maiming or death. Chapter VI operations of this type, in which peacekeepers are only lightly equipped, require the assistance and support of the former warring parties. When these parties lack the capability to locate or clear their own mines, then considerable resources must be spent by the UN and others to accomplish this for them.9

These UN peacekeeping operations clearly illustrate the nature of the challenges posed by landmines in today’s conflict areas and beg for technological assistance to save lives and return these countries to stable conditions. The following sections discuss some of the technological challenges to humanitarian landmine removal in the context of this environment.

Military versus Humanitarian Demining

Military demining has, as its basic tenet, the requirement to protect the force within the parameters of acceptable loss. Because mine fields by doctrine are covered by direct-fire weapons, military demining devices most often are designed to quickly breach through these fields to limit the exposure of friendly forces to fire. Machines such as flails, rollers, and earthmovers rapidly explode, destroy or push aside the mines to allow the friendly forces relatively safe movement through the gap created. Some mines may be left, but the occasional loss to armored vehicles is considered acceptable in a combat environment. This a trade-off to speed and reduction in enemy fire.

Peacekeepers and their brothers, the humanitarian deminers, cannot accept these casualties. Therefore they must have demining devices and technologies that reach the much higher standards of near-perfect detection and removal of mines. The technological approach to each of these demining situations can have complementary aspects, but often does not. These different tasks more often require very different equipment. This equipment and the related characteristics can best be described in terms of their ability to detect and finally remove the mine from the ground.

Detection

Detection not only allows deminers to find the location of the mines, so that they can subsequently be destroyed, but is also a critical component for mine awareness. Many lives can initially be saved by finding, marking, and then informing the populace or the peacekeepers to avoid the contaminated area. Accurate databases showing the locations of mine fields are a critical byproduct of effective preliminary minefield survey work. These databases then serve to keep a record of the information and assist in the planning and management of the demining effort. Reliable detection tools are critical to this survey process and database refinement.

Perhaps as important as the technical capability for a device or method to detect mines is the psychological aspect of the confidence that deminers and demining program managers have in these devices. Metal detectors have for some time been the only universally acceptable devices to ensure that all or almost all of the mines and UXO are found. Most mines have at least some metal content, and the newest metal detectors even find the small firing pin in an otherwise nonmetallic body. This of course
requires operators to react to every metal detection, however slight, and then probe with a slim rod for the solid object, which is often one or more feet underground. More often than not, the detection is of a metal object other than a mine, a “false positive,” and considerable time is wasted probing, digging, and removing a piece of shrapnel, metal waste, or other metallic object from the ground. The only way to be certain that there are no mines is to remove all metal to a depth agreed upon for the local circumstances.

The frequent false positives when using this method of detection require a slow and manpower-intensive search for a “few needles in the haystack.” Thus, there is a need for thousands of deminers over several decades, yet all the while casualties continue to mount and very large sums of money are spent on salaries and equipment. Often an area thought to be mine-contaminated because of reports or a single incident cannot be used by peacekeepers or civilians for needed duties or commerce. In addition, social disruption continues as transportation, power, water, and other infrastructure assets are denied to the economic process. The people of these countries view their own governments as impotent or inept in their attempts to solve these problems.

As others in this conference have reported, there are many new ideas for solving this problem of detection with radars, IR, sonar, microwave, etc. None so far has proven to be the magic tool to end all of our problems. Each has capabilities and limitations, and none has the confidence of the deminer practitioner in the field. The common challenge by deminers in the field to new ideas and methods is “Will you play football on the field just after you have used your device to verify that it is clear of mines?” It is understandable that deminers have a healthy sense of skepticism about new ideas, as their own lives would be at risk in using them. This leaves technology developers with a very heavy burden of proof that new devices are reliable. The reality is that, for the time being, we need to move cautiously ahead, testing and fielding these technologies in a way that wins the confidence of the people that must put their lives and limbs on the line.

It is important not just to win the confidence of deminers but ultimately that of the people who will use the land declared safe after the demining. If just one mine is found after an area is declared to be clear, that confidence is broken. Farmers will not farm, construction workers cannot repair damage, and general commerce will not resume. Thus, even the perception that mines are present will deny the land to use.

New technologies for demining need to be approached from the perspective of adding to the bag of tools that deminers can use in concert with their proven tools and techniques. Current tools and methods are used because they are cost-effective or readily available and sustainable in the local environment. New devices must also meet this requirement or demonstrate such a dramatic improvement in the result that they are worth the additional short-term costs to compensate for the long-term expense of more personnel and longer time frames for the completion of demining missions.

### Removal

Humanitarian demining efforts today require, for political, practical, and safety reasons, that mines be destroyed in place. No donor wants to pay for a mine-relocation program. Donors rightly insist that the mines be destroyed, not replanted or stored for future use. This has been a basic tenant of the US government program from the beginning. “Train-the-trainer” programs teach only this method of demining. It is also critical that peacekeepers know they will not oversee the removal of a threat one
day and then discover it the next day in their backyard. This is especially the case when belligerents are removing their own mines. It has also been shown that it is generally safer to destroy mines in place rather than risk unstable or booby-trapped mines going off during the difficult process of defusing or "render-safe" operations. Destroying in place is also a much easier process to teach and supervise, as it is not necessary to teach each deminer to be an explosives ordnance demolition (EOD) expert.

With this method, however, comes the added requirement to acquire, store, and use explosives to destroy mines. These explosives can be expensive, politically sensitive to import, and difficult to guard. This begs the need for new technologies that can do the destruction in a safer, cheaper, and quicker manner. At the same time, the removal cannot be done in a way that leaves the ground unusable for its intended purpose. For example, some demining machines being tested today literally chew the ground to a depth below the mines in order to pulverize them. If the ground is intended for agricultural use, this can degrade the topsoil's viability for years to come. Chemical means of destruction could also have the effect of contaminating the ground in ways that are inappropriate for the intended purpose or even pose an environmental hazard to the population. Adequate attention must be paid to avoid unintended consequences.

Conclusions

It is imperative that advances be made to provide deminers and peacekeepers better tools to clear landmines and protect themselves from the risk of operating in this new environment. These tools must meet the exacting standards of near-perfect performance, because the impact of a single missed mine in a "cleared area" subsequently destroys the confidence of the population and can have significant psychological and political impact, including peacekeeper casualties or limitations in how they can do their job. Most importantly, the country cannot return to a normal condition.

This conference demonstrates the growing concern and interest that the scientific community places in finding answers to these problems. It also illustrates a need for a continuing mechanism to exchange ideas and information, not only in the scientific community but also with demining practitioners. A single clearinghouse should be established to provide a medium for this interchange. The Internet is of course one obvious medium, but a sponsor and coordinating organization are needed to establish and maintain that medium. Additional conferences and meetings, such as this, are also critical to ensure that a synergy results from the coordinated efforts of a variety of experts contributing to the solution to this problem of "hidden killers" in today's peacekeeping arena.
Notes


3. This figure is calculated on the average clearance rate of a 30-man demining unit and then considers the equipment and salary costs to sustain the operation while it clears the acre. This figure is not intended to suggest that this is the norm for all demining situations, but rather to show the order of magnitude of the cost. It is important to note that measures of effectiveness for demining cannot be based on the cost to remove a mine, as densities of contamination and other variables are too great.


5. The author is currently responsible for the establishment of a demining program in Bosnia, which includes contract, indigenous deminers, and a US military training program for humanitarian demining.

6. This is the commonly accepted standard by which humanitarian demining operations are measured. It is an arbitrary number intended to enforce the notion that a meticulous process will be followed to clear all that the best technology will allow. Currently that is the ferrous metal mine detector and requires all metal detected to be removed to an agreed-upon depth at a given date and time. This is often a contract requirement from government to demining operator as a measure of effectiveness.

7. US Department of State, Hidden Killers, p. 46.

8. On a recent assessment trip to Cambodia, the author observed CMAC and NGO operations that illustrated the challenges of attempting to demine in heavy undergrowth using only basic tools such as axes and lawn shears to remove the vegetation before the mines could be removed. These areas are reclaimed one foot at a time in a tedious and time-consuming process.


10. The Sarajevo tram line from the center of town to the suburb of Illizda could not be repaired for more than six months after the implementation of the Dayton Accords, because the people believed it was mined. When competent deminers were finally able to check the area, it was found to have only one unexploded device along a several-kilometer stretch. Likewise, in Angola, the perception of heavily mined roads stopped the deployment of UNAVEM peacekeepers for several months. Mines were present in some areas, but very long stretches could not be used because the true situation was not known.
Challenges of Insertion and Application
Technology Insertion in Peace Operations

Richard E. Hayes, Ph.D.
President, Evidence-Based Research, Inc.
Program Manager
Command and Control Research
Advanced Concepts, Technologies, and Information Strategies
National Defense University

Background

As a political scientist with more than two decades of experience analyzing the performance of military systems, I have found the last two years of work with the National Defense University (NDU) both exciting and informative. During that period, ACTIS (the Directorate of Advanced Concepts, Technologies, and Information Strategies), the leading-edge component of the Institute for National Strategic Studies (INSS) and the executive agent for command and control (C2) research, has undertaken a series of six workshops that bring together researchers and operators to improve understanding of C2 in Operations-Other-Than-War (OOTW) and coalition operations, including one workshop that focused on technologies and OOTW. In addition, ACTIS was tasked in March 1996 with collecting lessons learned in C4ISR (command, control, communications, computers, intelligence, surveillance, and reconnaissance) from the Bosnia experience for the Assistant Secretary of Defense for C3I (command, control, communications, and intelligence). One of the specific issues for that assessment is the technology insertion process. As the senior scientist for all these efforts, I have been able to explore a number of key issues. In 1995, I co-authored a book entitled Command Arrangements for Peace Operations, summarizing much of what is understood of this complex and difficult topic.

Insights from Prior Research

After listening to the very rich presentations and discussion early in the conference, I want to offer a few brief insights from prior ACTIS research on peace operations. The first of these, reflected in Table 1, is drawn from the results of the first ACTIS workshop on peace operations. It stresses the existence of the great divide separating operations conducted under Chapter VI of the UN Charter (true or classic peacekeeping operations, in which the consent of the parties is clear and the primary role of the peace operators is to reassure the parties that the situation remains relatively stable) and those conducted under Chapter VII, often called peacemaking operations but really composed of two quite distinct types of missions. When the parties generally have given their consent to peace arrangements, but one belligerent is reluctant or may prefer to continue fighting, the
international coalition is engaged in peace enforcement, and must have the capacity and will to ensure compliance. Peace imposition occurs when the international community determines that a conflict must be brought under control before the warring parties have agreed on the shape of peace arrangements. When dealing with peacekeeping, the international community withdraws when the parties challenge the agreement with violence. Both types of peacemaking, however, require a military response to challenges, albeit an evenhanded one. The workshop stressed, however, that Chapter VI and Chapter VII operations proceed from profoundly different circumstances: hence, the popular term, Chapter VI and a Half Operation, used to denote a peacemaking operation undertaken with a peacekeeping mandate and force structure. Far from being a way to denote the clever ambiguity of international diplomacy, it is in fact a recipe for disaster in which the members of the international community insert themselves into a conflict situation with the wrong mindset, forces, and posture.

That same workshop also looked at command and control in peace operations and generated Table 2, which points out the very different military missions implied by the four types of peace operations recognized by the workshop as well as other factors essential to understanding C2 in this context. Of greatest importance to this conference, the workshop stressed the fact that the measure of success (effectiveness) for peace operations is to move systematically away from peace imposition, where force is essential, toward genuine peace in which no peace operations are needed. The crucial issue for any technology or other element of peace operations is its ability to contribute this goal.

Figure 1, C2 Structures for Peace Operations, which was generated at the second ACTIS workshop, provides some indication of the complexity of the environment within which new technologies must operate. The vertical axis shows the levels of decision-
making, ranging from strategic to operational to tactical. Peace operations involve all three levels, usually simultaneously. Moreover, in some peace operations (such as Somalia), one headquarters may be working at all three levels; and in many operations, one or more of the military headquarters are working at two different levels. This has profound implications both for the complexity of the functions to be supported and for the opportunities for role overlap, role gaps, and confusion.

The horizontal axis of Fig. 1 shows many of the key players whose efforts must be coordinated for successful peace operations. First, the US strategic level involves the National Command Authority (NCA), the Joint Chiefs of Staff (JCS), and a variety of agencies (often led by the Department of State), as well as the unified commander (CINC) responsible for the operation. The US also has a number of entities working at the operational level, including both Department of Defense (DoD) components and a variety of other agencies, all of which must coordinate their efforts and cooperate with the Joint Task Force (JTF) directing US forces. The second group or participants consists of foreign governments involved in the operation (coalition partners, neighboring states whose air space or territory is used by peace operators and humanitarian agencies, etc.), all of which are also active at the strategic, operational, and tactical levels. There may be a number of such foreign governments (dozens were involved in Somalia and Bosnia).

The United Nations is also not monolithic. It has several organizations involved, each reporting back to its strategic headquarters by different channels and sometimes not fully coordinated with one another. In the theater, the UN often acts through others—member states, donors, etc.

Table 2. Command and control in peace operations.

<table>
<thead>
<tr>
<th>Nature of operations</th>
<th>Military role</th>
<th>Level of stability</th>
<th>Measure of success</th>
<th>Level of stress on C² system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observer</td>
<td>Assure</td>
<td>Stable</td>
<td>Stable operation, transition to peace stable</td>
<td>Low planning level, plans last a long time</td>
</tr>
<tr>
<td>Peacekeeping</td>
<td>Assure/deter (political/economic)</td>
<td>Stable</td>
<td>Must move up to observer role</td>
<td>Moderate planning level</td>
</tr>
</tbody>
</table>

Great divide

<table>
<thead>
<tr>
<th>Peace enforcement</th>
<th>Deter/ (defensive/deny) coerce</th>
<th>Unstable</th>
<th>Must move up to peacekeeping role</th>
<th>Frequent planning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peace imposition</td>
<td>Deter/ (offensive) coerce</td>
<td>Very unstable</td>
<td>Must move up to peace enforcement role or beyond</td>
<td>Intense planning</td>
</tr>
</tbody>
</table>
Figure 1. C² structures for peace operations.
Chapter 15  Technology Insertion in Peace Operations

The host government, where one exists, is also active at all levels and must be consulted in most activities, both as a matter of international law and as a practical consideration. Here again, multiple agencies and organizations are likely to be active, with some role overlaps and role gaps almost inevitable. Finally, the NGO and private voluntary organization (PVO) groups are also active at all three levels, though many have hit-or-miss profiles, with little or no presence at the operational or strategic levels. NGOs and PVOs are complex communities, with each individual organization working under a very specific charter (to feed children, provide water or medical services to refugees, etc.), and dozens or even hundreds can be active in a given peace operation.

Figure 1 is incomplete in that it does not show the belligerent parties (who are often actively negotiating with the other actors at all levels), the media (both domestic and foreign), or the identity groups (ethnic, clan, religious, etc.), that may be factors in an operation. All in all, the enormous complexity of the environment for peace operations often makes the process of technology insertion difficult and complicated.

Emerging Technologies Relevant to Peace Operations

At least four types of new or emerging technologies are relevant to peace operations from a military perspective: force protection technologies; less lethal weapons; information systems; and technologies to improve the intelligence process. This list ignores the obvious fact that peacekeeping forces in general and UN peacekeepers in particular have often lacked the communications, logistics, mobility, and heavy weapons technologies typical of modern forces. In most cases, providing these basic technologies would improve the likelihood of mission accomplishment. At the same time, technology is not a panacea in peace operations. Success in these operations depends as much or more on the quality of political activities as on military capability.

Several different types of technologies are relevant to force protection. The quality of the equipment issued to individual soldiers (helmets, flack vests, etc.) has been improving over time. Perhaps more important, technologies that can assist in countermine warfare are improving and beginning to enter the field. Countersniper systems, particularly important in the increasingly urban setting of peace operations, are also reaching the point of serious testing, though they raise serious rules-of-engagement issues. These same urban environments also raise the value of sensors that can detect people, metal, or explosives through walls and around corners. Improved technologies for finding bombs are also valuable, given the increasing use of terrorist tactics by small dissident groups.

Less lethal technologies are also attractive in peace operations, in which casualties and collateral damage should be minimized. Forces in Somalia were often confronted by mobs, including women and children, who sometimes acted as willing human shields for weapons-carrying irregulars. In other cases, they sought to obstruct the movement of peace operators or to overwhelm their positions with sheer numbers. Similarly, angry mobs are a common barrier to freedom of movement in Bosnia. The ability to halt such groups or to buy time and space with less lethal weapons could increase the flexibility available to a commander. Similarly, the capacity to shut down or halt vehicles without using lethal force can be valuable in a variety of peace operations scenarios.

Information technologies are also an integral part of contemporary peace operations. These range from the need for secure communications systems within and among the coalition partners’ military organizations; to their ability to process, digest, and
disseminate information; to the media wars by which political attitudes and images are created and maintained. In Bosnia, for example, NATO created entirely new local-area networks (LANs) and wide-area networks (WANs) to deal with the information flow within and across military headquarters. At the same time, each participating country set up direct or indirect communications from their forces to their capitals. IFOR also set up a major information operation, including outreach to keep the press and its own radio station and newspaper informed. Ironically, in a country in which those in the political elite get most of their news from television (which is a powerful tool in the hands of extremists in all areas of the country), IFOR did not set up a television capability. Better technologies for secure communications and information processing and for the presentation of political messages would be valuable in peace operations because such operations depend very much on the quality of the psychological climate.

Intelligence technologies, beyond the urban sensors already mentioned, include the full suite of battlespace sensors, fusion processes, and presentation tools needed in classic military operations. Because these are typically operations within the boundaries of a government that the peace operators want to support, nonintrusive collection platforms and unarmed UAVs are more appealing than military aircraft; this puts a premium on new technologies. However, rapid dissemination down to the tactical level and across coalition partners is also a crucial area in which new technologies and approaches can be helpful in peace operations.

Challenges to Technologies in Peace Operations

Earlier workshops and research by Evidence Based Research (EBR) and ACTIS staffs identified several problems with or challenges to inserting new technologies into peace operations. Some of these are general problems associated with the use of any technology within coalition operations. These include interoperability, rules of engagement, and intelligence dissemination. Regardless of the degree of novelty of the technology, these three factors were problems in previous OOTW coalition activities. Interoperability issues showed up in the Grenada operation (largely among US services), Desert Shield, Desert Storm, Somalia, Cambodia, and a host of smaller coalition operations. NATO, because it encourages national communications and intelligence systems as well as logistics support, has been particularly prone to interoperability difficulties, though long-standing efforts to establish standards and exercise together have tended to mitigate their impact.

Technologies, particularly battlefield technologies, also raise rules of engagement (ROE) issues. For example, in an ACTIS workshop on technologies in OOTW, ethical and legal issues about less lethal technologies were reported to have had a profound impact on the concept of operations for their use. Specific questions—such as the impact of setting countersniper systems on automatic in urban areas, the circumstances under which less-than-lethal barriers would be used for crowd control, and the psychological and media impact of their use on groups of women and children—were actively debated. Workshop participants with experience in Somalia, where less lethal technologies were deployed by US Marine Corps units, reported hesitation to employ them because the ROE were unclear.

Intelligence dissemination has also been a serious problem for coalitions in OOTW. The exposure of sources and methods is a serious concern, particularly when coalitions include strange bedfellows, as they did in the Persian Gulf War and Somalia. Indeed, US policy has been to maintain
separate intelligence elements, under national control, and to decide which items to share on a case-by-case basis. Moreover, US systems for moving intelligence tend to be reasonably high-technology, involving technologies that are not available to all coalition partners. Hence, even a decision to share information does not make the process simple or easy.

When novel technologies are being inserted, complications often arise. These include the lack of a doctrine or concept of operations for the technology, limited training in its use, and inadequate logistics to provide spare parts and maintenance capability. These tendencies have reportedly become stronger during the era in which technology demonstrations have been used to move new items to the field without the time delay inherent in traditional test and evaluation programs for the military.

Technology Insertion in Bosnia

These generic problems provided hypotheses to be tested by the ACTIS team assigned to examine C4ISR issues in Bosnia. At the same time, the project team was also alert to new issues and lessons learned.

The first and loudest comment from those with experience in Bosnia was that they had experienced a flood of technology. This phenomenon appeared to reflect both the successful experience of the United States in deploying Joint STARS to Saudi Arabia in the Gulf War and the increasing tendency to use technology demonstrations as a means of placing new C$^2$ technologies in the field. Program managers and contractors appear to have decided that their promising tools and technologies should be placed in the field for assessment and adoption because they can be of assistance. At the same time, some personnel in theater, having been exposed to new or emerging technologies in the Advanced Concept Technology Demonstrations (ACTDs) of the past couple of years, also encouraged adoption of some systems. Some developers, notably in the national laboratories, also have reported receiving calls from senior personnel responsible for the Bosnia deployment requesting novel solutions or systems that might help with challenging problems such as countermine missions. Whatever the causes, there is general agreement that US forces in general, and the Air Force-organized Combined Air Operations Center (CAOC) in particular, were inundated with new technologies and systems.

Partly because of the technology flood, those on the ground in Bosnia also reported an often-clumsy, incomplete technology-insertion process. Many of the systems provided had not been through the full development process and arrived without associated doctrine or concepts of operations. This slowed both the process of bringing them into the day-to-day operations and fully recognizing and exploiting the potential of these systems. In addition, because they were not part of a systematic development process, these technologies were often redundant, at least in part, to the legacy systems they were intended to replace, but which remained in the inventory because they played a specific role in the existing concept of operations and met identified requirements.

Many associated problems therefore arose in Bosnia. In many cases, the only people who could operate novel systems were the contractors or specialists who came with them. No training was accomplished with the military organizations expected to use these systems; nor did appropriate training materials exist for them. Similarly, maintenance often depended on the contractors or developers, who were not military personnel. Spare parts and basic support or preventative maintenance were not part of the official logistics trail and became \textit{ad hoc} elements in the overall effort. Taken together, the lack
Meeting the Challenge of International Peace Operations

of doctrine, training, and maintenance capability added up to excessive demands on the peace operators, whose staffing plans did not make provision for the use or support of these novel technologies.

In addition, systems brought to the field without normal development and testing procedures often lacked critical functionality. For example, the Predator UAV, brought to Bosnia under a technology demonstration program, was designed without a de-icing capability, which limited its utility in that environment. Similarly, because human-factors testing had not been run on the television product from Predator, video displays scrolled at 21 linear feet per minute, which is too fast for operators to find and identify individual objects on the screen. Both of these problems can be fixed, but they are symptoms of the larger lesson learned about proper assessment and practical testing before deploying new systems.

The new technologies deployed by the United States in Bosnia also created classic problems of interoperability. First, US technologies, particularly communications and intelligence technologies, are often not fully consistent with NATO standards and may not, depending on their stage of development and level of sophistication, be sharable with NATO members of Partnership for Peace (PfP) nations. Second, virtually none of the communications systems is designed to work with the civilian organizations whose roles are crucial in Bosnia. The UN, local and regional authorities, and NGOs/PVOs all need to exchange information with the peace operators, but must do so on commercial systems that have no interoperability with military systems. Hence, data must be read out of one system and into another (classic swivel-chair interoperability) when they cross the civil-military boundary. Indeed, the CIMIC operations, set up to improve communications and coordination between civilian and military organizations on the ground, report relying on the civilian telephone system to communicate with military headquarters and being unable to communicate in any way with military vehicles.

Finally, technology insertion has also presented challenges in intelligence dissemination. Not only are US intelligence systems stovepipes that link US commands, but also the data are often sent in formats that cannot be readily transferred to NATO or PfP military organizations. Generally speaking, new US intelligence systems move information in large quantities very rapidly, using systems with much greater capacity than those built into the NATO-standard Linked Operations Capability—Europe (LOCE) system. This legacy technology cannot handle images and other high-data-rate materials. Hence, regardless of improved policies about intelligence dissemination, only limited sharing is possible within the coalition of peace operators.

Solutions: Improving Technology Insertion

Assuming, as virtually everyone who has been involved in the process indicates, that technology insertion is a good thing in peace operations and can assist in mission accomplishment, some means need to be identified to improve the technology-insertion process. Moreover, these means should not defeat the purpose of technology insertion by unnecessarily delaying availability of useful technologies.

Two specific solutions have been adopted by those responsible for peace operations in Bosnia. First, special review panels made up of technologists and operators have been formed to look at suggested technologies, their potential utility in the operational theater, their readiness to migrate, and the preparations required (adequate staffing, proper training and training materials, reasonable concepts of operation, relationship to legacy systems, site preparation, arrangements for maintenance, and so forth). These panels are
modeled on an existing US Army panel and its successful past performance.

Second, both the US Air Force and the SHAPE Technical Center have also set up technology-insertion simulation activities. These technical organizations replicate the working systems already deployed in the theater and add the proposed new technology. This allows assessment of the potential contribution of and problems associated with each new system or technology before actual deployment. Both an opportunity to ensure that the novel technology offers value added and a chance to plan for smooth migration into the operational environment are provided. Interoperability can be tested, the relationship with legacy systems examined, concepts of operations developed, and other preparatory activities organized and planned.

Clearly, the ideal technology-insertion process will take advantage of both of these approaches. At the conceptual level, review panels allow genuine expertise to examine the ideas and plan for a successful insertion. The simulation activities allow much more finite and concrete exploration of the impact of the proposed technologies and how they can best be exploited.

While these two types of solutions provide concrete steps that can be taken to bring relevant expertise to bear on the issue of inserting new technologies, they are less than optimum because they do not, in themselves, provide a list of the factors that must be considered. The mission capability package (MCP) concept, developed by ACTIS in cooperation with the JCS and elements of the Office of the Secretary of Defense (OSD), offers such an agenda. As Fig. 2 shows, MCPs occur when a requirement has been identified in the context of one or more military missions and a technological solution appears promising.

![Figure 2. Mission capability package concept.](image-url)
These conceptual solutions must always be placed in the context of a larger set of factors—the force structure, command-and-control arrangements, existing doctrine for this type of mission, and specific technology requirements that have been articulated.

The MCP process then calls for an interim concept-refinement phase in which the time and money available are used to improve the idea and ensure its practicality. Technology demonstrations are included in this phase, as well as modeling and simulation, plain old-fashioned analysis, experiments, and exercise. This phase must not be skipped if useful and productive technology insertions are to occur. Moreover, technology insertion cannot take place within operational theaters without severe consequences. Hence, the technology-insertion simulations located outside the theater would be consistent with good practice, but deploying hardware or software that had not been previously assessed would be outside sound MCP practice.

When the concept refinement has gone on long enough, the system or technology can be placed into an operational context. Its missions are known, the doctrine exists for its employment, the command structure is prepared to take advantage of it, appropriate training and education are available, and the system itself has validated reliability and maintainability. The key here is the development of appropriate measures of merit, including all three levels of crucial performance:

- Measures of effectiveness. Does the system contribute to mission accomplishment?
- Measures of performance. Does the system perform its technical functions?—e.g., does it improve the currency of information available to the commander and does it provide more precise information?
- Measures of efficiency. Does the system exhibit reliability, maintainability, and so forth?
A Japanese Perspective on Peacekeeping and Technology

Toshio Kunikata
Director
Secretariat of the International Peace Cooperation Headquarters, Prime Minister's Office
Japan

Introduction

As in other countries, Japan’s peacekeeping policies need coordination among related ministries and agencies. My office has the responsibility to do this coordination. The members of my office are from 13 different ministries and agencies; I am from the Foreign Ministry.

The fact that the planning and implementation of Japan’s peacekeeping policies are under the direct control of the Prime Minister’s Office, supported by 13 ministries and agencies, shows two things. First, it is a manifestation of the political weight that Japan attaches to peacekeeping as one of its key contributions to the maintenance of peace and security in the world. Second, the constitutional constraint over the overseas activities of the Japanese troops has such political importance that a very cautious policy mechanism is required.

Overview

Among other challenges posed by technology, the superiority of the combat technology of the conflict parties and the budget constraint of the United Nations are the two major challenges that are relevant to the introduction of technology. Peacekeepers must deal with the conflict parties’ military superiority within the framework of peacekeeping—in other words, without hampering the ongoing peace process. The huge difficulties in the financial situation of the UN not only block the establishment of new peacekeeping missions, but also place a tremendous rationalizing burden over existing missions.

In my view, surveillance technology, such as sensors, radars, and night-vision equipment, is one of the most promising areas to help address these challenges.

On the other hand, there are limits. For example, the introduction of technology takes money and time and it requires training. Also, technology should not be used to reduce manpower below the point of securing the local UN presence and maintaining the peacekeepers’ contact with the local population. And finally, the UN procurement system hinders the introduction of technology at the appropriate time.

As a nonspecialist, I have no intention of going into detailed technical aspects of technology. I would like to select surveillance technology as an example and to suggest three surrounding aspects from my
own experience, which may be helpful to deepen and elaborate our discussion.

**Implications of Logistic Operations**

Because Japan’s experiences in peacekeeping operations have been mostly concentrated in logistic operations, I would first like to examine those issues in logistic operations that arise from the introduction of high technology into a surveillance area. Hopefully, it will be helpful to those in planning and other related sectors.

If you have advanced surveillance equipment, you must also have advanced maintenance technology to fix this equipment, quite obviously. But high-tech maintenance tools are expensive, and the UN is not rich enough to buy all of them. Here, we have to remember that requests for rationalization to cut costs are applied not only to cease-fire observers and infantry peacekeepers, but also to logistic operations. Now you face a dilemma: to cut the number of personnel in the field, you need to buy new machines and equipment, but at the same time you must cut the money to buy new tools to fix the machines and equipment.

Some of the peacekeeping missions solve this dilemma by outsourcing the most advanced part of maintenance. Of course, maintenance by outside contractors costs additional money, although it is presumably cheaper than it would cost peacekeeping missions to maintain their machines and equipment themselves.

A more significant problem is that the dependence on outside maintenance lowers the degree to which a mission retains a self-contained character or self-sustainability. For instance, if the outside contractor is a company in the area governed by one of the conflict parties, will the contractor be reliable enough as one who handles the most sensitive part of the mission’s technology? If the contractor is located far from the mission area, will the efficiency of the entire operation be ensured? If maintenance is taken care of by a neighboring peacekeeping mission, will the transport arrangement be too complicated? These are some of those questions that peacekeeping planners must ponder.

**Implications for Troop-Contributing Countries**

The next thing I would like to look at is the issue of training, not from the peacekeeping planner’s side, but from the troop-contributing countries’ side. As noted above, the introduction of advanced technology must be accompanied by advanced training before deployment. However, the reality is that few countries have adopted a common training system and that the degree of technological advancement of the equipment varies from one troop contributor to another.

Therefore, if we talk about surveillance technology, we should be mindful that only the small number of countries that use advanced surveillance technology in their own military would be able to contribute peacekeepers to cease-fire monitoring units and maintenance units. Should this occur, we might wind up with three groups of countries: countries that are interested in peacekeeping units that need high-tech surveillance, countries that are not interested in such units, and countries that lose any interest in peacekeeping operations at all; further, each group might also be further divided.

Unanimous political support by the international community is absolutely necessary for any peacekeeping mission. We should avoid any divisions of the international community in the degree of political support for peacekeeping operations in any case. For that matter, I think it is advisable to prevent group formation among troop-contributing countries along technology lines.
On the other hand, we should not look at only the pessimistic side. We can reasonably hope that the necessity for high technology in peacekeeping operations will cause troop contributors to pay more attention to training. If that is the case, the introduction of technology itself might encourage them to adopt a common training system.

Nevertheless, even in that case, the necessity for troop-contributing countries to bear certain costs for training and equipment will increase. Whether or not in relation to the introduction of technology, the current difficult UN financial situation tends to increase opportunities for troop contributors to bear the costs of peacekeeping operations, and not all countries in the world are ready both to send peacekeepers and to bear additional financial burdens. To keep those countries' interest in peacekeeping operations, considerable efforts would be required on the part of peacekeeping planners.

I Influence of High Technology on Peacemaking

So much for technology and peacekeeping itself. We must remember that the peacekeeping effort is intended to support the peacemaking process, occurring in parallel, and to buy time for it. Therefore, how the peacemaking proceeds significantly affects the overall effort.

One of the prominent features of today’s conflicts is that the mass media, with its highly advanced technologies, reports every step in the progress of the conflict and peace process to virtually every quarter in the world (this is the so-called “CNN syndrome”). Consequently, two outstanding tendencies have emerged. First, public expectations about the peace process and peacekeeping tend to be greater than what can actually be accomplished. Second, short-term humanitarian interest in the peace process and peacekeeping has become markedly higher than it used to be. This can sometimes hamper efforts to achieve long-lasting peace as early as possible, because the short-term interest occasionally causes neglect of the importance of addressing the root causes of the conflict.

This is a subject that many people are studying, but it is not the main subject of this conference. So I will refrain from talking too much about it. I would just like to say that in some respects the high technology of the media gives peacekeeping mission operations additional difficulties. It does not always affect the progress of peacemaking favorably, and it sometimes increases pressure for premature establishment of new peacekeeping missions.

Conclusion

In conclusion, while we are living in a world of limited resources there are always possibilities that technology can help us. Therefore, the search for the meaningful introduction of technology into peacekeeping operations is very worthwhile. Considering that the process of conflict resolution—from preventive activities, through peacemaking and peacekeeping, to peacebuilding—is a long path, it also makes great sense to search for ways to introduce technology in other stages of conflict resolution.
My comments are those of a practitioner who has very recently been made responsible for land operations doctrine in the British Army. Like many British soldiers, my experience includes a wide variety of peace support operations (PSOs). My views on the subject were molded by my very first experience of PSOs, in Southern Rhodesia in 1980. This was a very instructive operation in many respects, including the importance of predeployment briefing and training.

I had just returned from my honeymoon when I was called in by my commanding officer to be told that I would be deploying with a small party of sergeants and corporals to a secret destination in the near future, for a task that I was not to discuss with anyone, including my new wife. Shortly after we left, she was told that I had been selected for my expendability and that she should not expect me to return!

Specialist predeployment training consisted of one day being taught mine recognition and hand demining techniques by the Royal Engineers. On Christmas Eve 1979, we flew to the British Colony of Southern Rhodesia. We had one day of orientation briefings, of which the most useful concerned the tribal basis of the complicated political and operational situation, (two rival terrorist armies, ZANLA and ZIPRA, were in places fighting each other as well as the Rhodesian Security Forces [RSF]), but the most memorable was on wildlife recognition, including the use of newly produced elephant droppings to bake fresh eggs!

The following day we deployed in RAF C-130s to our destinations. With my half-dozen soldiers, accompanied now by liaison colonels from each of the rival terrorist armies, we flew to Rutenga, on the South African border. Our aircraft had been hit by small arms fire on its previous sortie, so we were relieved to land safely under the guns of an armored train. We spent the night in an RSF base, where white Rhodesian territorials, who were restricted to their bases for a fortnight, regarded our liaison officers with amazement. They predicted that we would not last a day in the bush, restricted as we were to one rifle per man and a single medium machine gun per group.

Our concept of operations was to establish a rendezvous place, and then encourage the terrorist forces to come in from the bush by every means—ranging from the
media to simply driving around in our high-tech mine-proofed vehicles (standard British Army Land Rovers with 1/2-inch steel plates welded underneath, and a roll-over bar), using megaphones to call them in. The Rhodesians predicted we might get 10,000 in all. Twenty-seven thousand marched in from the bush.

In our camp, most were ZIPRA. This made the ZANLA colonel furious, and he decided to blame me for the imbalance. One morning he accused me at gunpoint of prejudice, and when I turned on my heel, he emptied his AK47 magazine just past my head. I rounded on him, armed only with my Blackthorn walking stick—by regimental tradition in the Irish Guards, officers carry these on operations (partly, it is said, because they are less dangerous, but chiefly because officers should concentrate on commanding and decisionmaking, not on shooting weapons). After hours of arguing in the blazing sun, he calmed down, and in a strange spontaneous reaction, I went to my bed space, between those of the two colonels, in the roofless mined mission school which was our base. There, I picked up my rifle, stripped it, and cleaned it. It was then that I discovered that I had deployed on my first operation without a firing pin . . . (I would like to believe that the ZANLA colonel had removed it). The point of this introduction is that I learned just what it was to carry less-than-lethal (my Blackthorn stick) and nonlethal (my rifle minus the firing pin) weapons on peace support operations! Quite seriously, my first big lesson is that it is not the technology that makes weapons nonlethal, but the training and attitude of the soldiers handling them.

I am delighted to have heard from the speakers that technology offers no nonlethal silver bullets, so I am going to make a few more general observations about the contribution of technology to peace support operations.

First, throughout this conference, I have found myself asking, “What’s new?” Like any other British serviceman, my 20 years in our armed forces have been devoted to a variety of PSOs, and different operations other than war, as well as warfighting. The technology, as we have heard, has application across the spectrum. So, I do not perceive that there are technological answers specific to peace support operations. That is my second big lesson; the third is related to it, and it is this: From the perspective of my service, the traditional distinctions between peace and war and operations other than war seem increasingly to be meaningless. I serve in a continuum of conflict in which the experience, needs, and activities of the soldiers on the ground are very similar, however the wider world views the operation in question.

Of course, as I say this, I am acutely aware that my views are those of a British soldier. This is perhaps my most important point. Several speakers, like Gen. Nambiar, have pointed out how diverse are the nations represented in modern PSOs. They have their own experiences, attitudes, training, resources—and their own contributions to make.

I learned in Southern Rhodesia that armies smaller and less well-equipped than the one in which I serve have, nonetheless, much to offer. The Kenyans, for instance, understood more about the crucial issue of African tribalism than any of us could hope to learn. The Fijians brought a robust and alien good humor that overcame boundaries we could not easily cross, because they carried none of our postcolonial baggage. It is vital, in my view, to recognize that every nation has something valuable to offer. The trick is to identify and make the most of it. This demands that nations are realistic and honest about themselves and about their coalition partners—not easy, but crucial: we must all work to understand our own and other nations’ motives as well as capabilities.
Intimately related to this is my fifth point: the crucial importance of a lead or at least a framework nation in coalition operations. In Southern Rhodesia, language, military culture, and history made Great Britain the inevitable lead nation. And our tactics, techniques, procedures, and technology, especially in command and control, enabled all members of the Commonwealth Monitoring Force to cooperate to excellent effect.

Concentrating on equipment, it strikes me (and other practitioners such as Gen. Nambiar have underlined this) that we must be imaginative and wide-thinking in the application of technology. Few nations have the technical base in their population to make best use of the high-tech equipment that a US soldier will find easy to use. And related to my point about making the best use of national differences, low tech does not mean bad or inadequate—just different.

Furthermore, some of the most significant contributions of technology are in low-tech areas. The first thing I learned in Southern Rhodesia is that in most of these areas of operations, soldiers are the problem, not the answer. Men dressed like me, in camouflage gear, are not necessary welcomed instantaneously as saviors. On the contrary, we must always remember that how we are perceived is critical. So, the impact of what we wear, the colors of our brets and our vehicles, is extremely important. We must take appearance into account when equipping our soldiers—sometimes the Blackthorn stick really is more productive than the rifle.

Finally, we must remember some further considerations that are implicit in using new technology, most referred to by earlier speakers. First, of course, there is cost; second, the issue of classification and implications for technology transfer. Third, we must remember the crucial importance of training commanders and staffs, and not just operators, in the use of new technology. Fourth, there are the legal constraints, which may differ from nation to nation; similarly, as we have noted, the technical abilities of soldiers vary enormously. Finally, we must never forget the maintenance and logistic burden of new technology.
Part III: Managing the Process
Managing the Process:
A View from the White House

Eric Schwartz
Special Assistant to the President
Democracy, Human Rights, and Humanitarian Affairs
National Security Council

I would like first to thank the Center for Global Security Research at Lawrence Livermore for putting together this conference. I’d like to use this opportunity to explore issues relating to the organization of the US government for the provision of assistance in complex humanitarian emergencies, and the relationship of that organization to the effective application and use of technology. I’d also like to address the implications of government organization on these issues for the support of research and development into technologies relevant to complex emergencies.

Let me begin with an anecdote that reflects the challenge we are considering and advances the proposition that technological advances do not necessarily promote efficiencies.

During a recent humanitarian crisis in which the US military was involved, some civilian officials in Washington made a very significant discovery, which, at least for a while, seemed like the ideal way to obtain real-time information. They learned that the brigadier general who was serving as operational commander for the military on the scene—a remote location—had a cellular phone in his pocket. For each of the Washington-based officials involved, this seemed like a dream come true—no need to sift through cumbersome procedures to find out what was happening on the ground or to deliver time-sensitive requests for information and advice through a bureaucracy that had little sense of urgency. The only problem was that the general soon discovered that he was spending more time on the phone than he was spending in command of the operation and—to put it euphemistically—he sent in an urgent request to be granted an unlisted phone number.

Of course, this not only reflects the problems of overloading a circuit and of cutting out—rather than cutting through—a bureaucracy, it also reflects the need to integrate advances in information technology into models of information and bureaucratic management. Before addressing these specific points, however, let me emphasize my view that the United States will continue to play a major leadership role in providing humanitarian assistance and refugee relief overseas.

In fact, if the bad news is that complex humanitarian emergencies are not only proliferating but are also characterized by their intractable and long-term nature, the good news (or at least the relatively good news)
Meeting the Challenge of International Peace Operations

is that our willingness to play a leadership role continues. To be sure, the pyramiding nature of emergencies, the reductions in agricultural surpluses worldwide, general budgetary pressures, and an unfortunate inclination in the Congress to impose unnecessary restrictions on relief programs that demand flexibility have contributed to an environment of scarcity. However, when budgets in other foreign aid accounts have taken massive hits, we have generally maintained our levels of humanitarian assistance—reflecting a congressional-executive consensus on the importance of these issues.

While the current environment is not likely to permit increases in these accounts, their insulation from large-scale cuts so far is significant. In the 1995 fiscal year (October 1 to September 30), for example, we spent about $1.6 billion worldwide, with Africa—at about 45%—and Europe—at about 28%—receiving the lion’s share of our monies.

As I’ve suggested, I’d like to explore the organization of the US Government for provision of humanitarian assistance, because the way we in government organize ourselves to deal with complex humanitarian emergencies can have a tremendous bearing on effective use of technological advances. It can also greatly influence the effectiveness of government support for research in this area.

In terms of effective exploitation of technological advances, let me take the example of information, where government organization has a great bearing on our ability to effectively share new and varied sources of data. This is true for several reasons:

• First, because in a coherent bureaucratic structure, it is more likely that all actors will define requirements similarly, and thus define information needs more clearly.

• Second, because in a coherent structure, it is more likely that critical information will be obtained by all those involved in a humanitarian response—including our partners in the private voluntary agencies and in international organizations.

• Third, because in a coherent structure, it is more likely that conflicting information will be reconciled.

For example, why don’t Rwandan refugees go home from Zaire? Is it because they fear persecution in Rwanda? Is it rather that they don’t feel they have economic prospects upon returning? Or is it because camp leaders continue to intimidate those who might want to return? Different answers yield different policy responses.

The objectives of coordination in complex humanitarian emergencies, from the Washington perspective, are straightforward:

• First, to provide to Cabinet-level—or near-Cabinet-level—decision-makers as clear an understanding of the situation on the ground as possible, and to frame options for them that reflect clear policy choices.

• Second, to fashion a coordinated implementation effort.

For the purposes of this conference, I’d define a third and fourth objective:

• To ensure that we are making the best efforts to harness technologies for effective use in humanitarian emergencies.

• And, finally, to ensure appropriate support for research and development of technologies that assist humanitarian aid efforts.

These objectives require close collaboration with our implementing partners outside government.

Let me take again the example of information-sharing to demonstrate the two-sided nature of this collaboration. To be sure, we need to provide private voluntary and international organizations with information about conditions on the ground that affect their ability to deliver assistance effectively. At the same time, it is easy to
underestimate the importance of information coming from the nongovernmental community—information that can often affect decisionmaking. In this respect, let me also help to dispel the notion that unclassified, open-source information is either less compelling or significant than what we see in classified channels. At the National Security Council (NSC), I continually receive timely information on human-rights and humanitarian issues that has important implications for policy and is not necessarily in the possession of the government. The reason is simple—PVOs and other NGOs have better coverage than we do, both physically and in terms of data analysis, in many areas of policy concern. Moreover, nongovernmental actors have informed our ideas on technological requirements, for example, in the area of demining—where they have been very much involved.

Defining the objectives of coordination is easy. More difficult is managing the substantial obstacles to achieving these rather simple objectives. First, we have a very large, complex, and multihedared arrangement for humanitarian response. At the Department of State, the Bureau of Population, Refugees and Migration administers a program of refugee assistance amounting to some $500 million/year. But that is not where the story ends at the State Department. There is an office at State dealing with the Former Soviet Union that provided some $50 million in humanitarian assistance in Fiscal Year 1995—not to be confused with a parallel office at our Agency for International Development (AID), which provided about the same amount over that period. Then there is AID’s Office of Foreign Disaster Assistance, which provides relief to some of the same groups supported by the State Department, as well as to others. There is also AID’s Office of Transition Initiatives, and still another office at AID that deals with emergency food—good for nearly $500 million in 1995. Our Department of Defense, of course, is also a player, with a humanitarian assistance program—and—in certain circumstances—with activities supported out of operation and maintenance funds.

This recitation is not an implicit call for large-scale consolidation—some consolidation may be a good idea, but there is also strength in diversity. It does, however, reveal that coordination and coherence cannot simply be assumed. Moreover, there are other factors that accentuate the challenges in this area.

First, humanitarian emergencies impose, if not unique requirements, at least unusual demands that call upon agencies to stretch their conceptions of their own roles—and responding dynamically and creatively to fast-changing situations is not an organic property of bureaucracies. During the Haitian crisis, for example, the stretching of roles meant that our military was administering a safe haven for refugees, and our Immigration and Naturalization Service was conducting interviews extraterritorially.

Second, humanitarian emergencies often appear as the manifestations of political conflict, and our bureaucratic efforts at organization often first involve agencies dealing with political—not humanitarian—response. In those circumstances, there is a risk that political decisions will be taken without an appreciation of their humanitarian implications, and that humanitarian agencies will have to play catch-up.

So, how do we organize ourselves to accomplish these goals?

Within this administration, we have used, on an ad hoc basis, interagency “executive committees” (EXCOMs)—or their equivalent—to deal with complex crises, from Haiti, to Bosnia, to Rwanda. Under this structure, representatives of all relevant agencies meet as a task force at the sub-Cabinet level to help formulate and implement policy, and to centralize and coordinate information collection and analysis. When implemented effectively, such as in Haiti, this structure has provided to
Cabinet-level—or near-Cabinet-level—decisionmakers as clear an understanding of the situation on the ground as possible, it has framed options for them that reflect clear policy choices, and it has fashioned a coordinated implementation effort.

I believe we will, and should, continue to use these kinds of ad hoc mechanisms in dealing with complex crises, but it is important to point out that they do not resolve all issues of coordination of humanitarian assistance for at least three reasons:

- First, as a practical reality, not every crisis in which we are providing humanitarian assistance results in the creation of an interagency, EXCOM-type mechanism.
- Second, even where there is an interagency group focusing on a complex crisis, there is no absolute guarantee that the humanitarian assistance issues will be presented cogently, coherently, and consistently in the group. The reason is obvious: as I’ve suggested earlier, many of these groups come about not in response to a humanitarian crisis, but instead in response to a political or security concern with humanitarian implications. Thus, the humanitarian dimension of the conflict is only one of several concerns, and it might be presented effectively within the interagency group—or it might not.
- Third, they do not provide a government-wide forum for consideration of general themes in humanitarian assistance policy, including the issues of this conference—research, development, and application of technologies relevant to complex humanitarian emergencies.

As a result, within the administration we have discussed a number of means we might pursue to enhance coordination in delivery of humanitarian assistance and meet the challenges to which I have alluded.

One option that we are exploring is the creation of what might be called a “humanitarian assistance core group” within the administration: a standing, interagency group that would meet regularly and serve as a clearinghouse for information and development of policy on humanitarian assistance issues. Moreover, in a more systematic manner than is currently the case, the core group could deploy representatives to sit on the ad hoc crisis groups that I have described, as well as on standing administration interagency groups whose work affects humanitarian activities—such as the administration’s interagency Peacekeeping Core Group. This kind of model would also facilitate broader thinking on research, development, and effective use of technologies related to humanitarian assistance.

I hope that the findings of this conference will inform the thinking of US Government officials on the issues I’ve just summarized.

In conclusion, let me emphasize the deep interest of the Clinton administration on the specific technology issues being considered at this conference. Under the leadership of Vice President Gore, the application of technology in promoting our national-security objectives has been of paramount concern—whether it is exploring the utility of advanced computer analysis in predicting state failure, implementing the creative use of satellite imagery in human rights and humanitarian crises, reviewing our practices in the areas of information management and technology procurement, or resulting from the President’s efforts to substantially augment our commitment to develop new demining technologies. The challenge for us is to enhance our efforts at coordination both within the government and between officials and our partners in the research and PVO communities.
Appendix I:
List of Participants
Appendix I:
List of Participants

Conference Organizers
Robert T. Andrews
Founding Director
Center for Global Research Security
Livermore, CA

Milton Finger
Deputy Assistant Director
Lawrence Livermore National Laboratory
Livermore, CA

Alex Gliksman
Independent Contractor
Arlington, VA

Thomas F. Rames
Lawrence Livermore National Laboratory
Livermore, CA

Publication/Production
Sylvia McDaniel
Technical Editor
Lawrence Livermore National Laboratory
Livermore, CA

Marion Capobianco
Compositor
Lawrence Livermore National Laboratory
Livermore, CA

Conference Staff
Barbara DeMarco
Lawrence Livermore National Laboratory
Livermore, CA

Karen Kimball
Lawrence Livermore National Laboratory
Livermore, CA

Conference Chair
Ambassador Robert L. Gallucci
Conference Chair
School of Foreign Service
Georgetown University
Washington, DC
Conference Participants

Dr. Mats Berdal  
International Institute for Strategic Studies  
London, UK

Dr. Frederick M. Burkle, Jr.  
University of Hawaii at Manoa  
Honolulu, HI

Dr. Glynne Evans  
International Institute for Strategic Studies and Foreign and Commonwealth Office  
London, UK

Michael Anthony Fainberg  
Federal Aviation Administration  
Washington, DC

David A. Fuess  
Lawrence Livermore National Laboratory  
University of California  
Livermore, CA

Major General Trond Furuhovde  
Permanent Mission of Norway to the United Nations  
New York, NY

William J. Garvelink  
US Agency for International Development  
Washington, DC

Rear Admiral Brian Goodson  
Independent Logistics Consultant  
Wiltshire, England

Harold Leland Halterman  
House Committee on National Security  
Washington, DC

David G. Haut  
USCINCPAC  
Camp H. M. Smith, HI

Dr. Richard F. Hayes  
Evidence Based Research  
Vienna, VA

Dr. David C. Iieberlein  
NVESD  
AMSEL-R-NV-OD  
Ft. Belvoir, VA

Admiral Jonathan T. Howe  
Arthur Vining Davis Foundation  
Jacksonville, FL

Walter L. Kirchner  
Los Alamos National Laboratory  
Los Alamos, NM

Toshio Kunikata  
Secretariat of the International Peace Cooperation Headquarter  
The Prime Minister’s Office  
Tokyo, Japan

Col. Daniel H. Layton  
Department of State  
Washington, DC

Ron F. Lehman II  
Director  
Center for Global Research Security  
NAI Directorate  
Lawrence Livermore National Laboratory  
Livermore, CA

Commander William Lonchas  
OUSD (A&T) (DARO)  
Washington, DC

Xavier K. Maruyama  
Naval Post Graduate School  
Monterey, CA

George H. Miller  
Lawrence Livermore National Laboratory  
University of California  
Livermore, CA
Appendix I: List of Participants

John M. Miller
US Army Research Laboratory
AMSRL-SE
Adelphi, MD

Lt. General Satish Nambiar
Indian Army, retired
Uttar Pradesh, India

Ambassador David Reese
Office of National Assessments
Canberra, Australia

Jason Regnier
CECOM, NVESD
AMSEL-RD-NV-CD-ES
Ft. Belvoir, VA

Col. Sebastian Roberts
Ministry of Defence
Director General of Development and Doctrine
Wiltshire, England

Eric P. Schwartz
National Security Council
The White House
Washington, DC

Nina Maria Serafino
Congressional Research Service
Library of Congress
Washington, DC

Wayne Shotts
Lawrence Livermore National Laboratory
University of California
Livermore, CA

Alan J. Spero
Lawrence Livermore National Laboratory
University of California
Livermore, CA

Bruce Tarter
Director
Lawrence Livermore National Laboratory
Livermore, CA

J. Matthew Vaccaro
OASD S&R PK/HA
Washington, DC

Dr. Edward L. Warner, III
Assistant Secretary of Defense for Strategy and Requirements
The Pentagon
Washington, DC

Christine Wing
The Ford Foundation
New York, NY

Dr. Gerald Yonas
Sandia National Laboratories
Albuquerque, NM
Appendix II:
List of Acronyms
## Appendix II: List of Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACF</td>
<td>Allied Command Europe</td>
</tr>
<tr>
<td>ACTD</td>
<td>Advanced Concept Technology Demonstration</td>
</tr>
<tr>
<td>ACTIS</td>
<td>The Directorate of Advanced Concepts, Technologies, and Information Strategies</td>
</tr>
<tr>
<td>ACTORD</td>
<td>Activation Order</td>
</tr>
<tr>
<td>AFRNET</td>
<td>African Feed Resources Network</td>
</tr>
<tr>
<td>AID</td>
<td>Agency for International Development</td>
</tr>
<tr>
<td>AKM</td>
<td>a Kalashnikov submachine gun</td>
</tr>
<tr>
<td>ANSI</td>
<td>American National Standards Institute</td>
</tr>
<tr>
<td>AP</td>
<td>anti-personnel</td>
</tr>
<tr>
<td>APEC</td>
<td>Asia Pacific Economic Cooperation</td>
</tr>
<tr>
<td>ARF</td>
<td>ASEAN Regional Forum</td>
</tr>
<tr>
<td>ARL</td>
<td>US Army Research Laboratory</td>
</tr>
<tr>
<td>ARRC</td>
<td>Allied Rapid Reaction Corps</td>
</tr>
<tr>
<td>ASEAN</td>
<td>Association of Southeast Asian Nations</td>
</tr>
<tr>
<td>BWC</td>
<td>The Biological Weapons Convention</td>
</tr>
<tr>
<td>C²</td>
<td>command and control</td>
</tr>
<tr>
<td>C³I</td>
<td>command, control, communications, and intelligence</td>
</tr>
<tr>
<td>C⁴ISR</td>
<td>command, control, communications, computers, intelligence, surveillance, and reconnaissance</td>
</tr>
<tr>
<td>CAOC</td>
<td>Combined Air Operations Center</td>
</tr>
<tr>
<td>CARE</td>
<td>Cooperative for American Relief to Everywhere</td>
</tr>
<tr>
<td>CGSR</td>
<td>The Center for Global Security Research</td>
</tr>
<tr>
<td>CIMIC</td>
<td>Civilian Military Cooperation</td>
</tr>
<tr>
<td>CINC</td>
<td>Commander in charge</td>
</tr>
<tr>
<td>CINCSOUTH</td>
<td>Commander in Chief South</td>
</tr>
<tr>
<td>Acronym</td>
<td>Full Form</td>
</tr>
<tr>
<td>---------</td>
<td>-----------</td>
</tr>
<tr>
<td>CIS</td>
<td>Commonwealth of Independent States</td>
</tr>
<tr>
<td>CMC</td>
<td>Cooperative Monitoring Center</td>
</tr>
<tr>
<td>CMOC</td>
<td>Civil-Military Operations Center</td>
</tr>
<tr>
<td>CNN</td>
<td>Cable News Network</td>
</tr>
<tr>
<td>COMAIRSOUTH</td>
<td>Commander Air Force South</td>
</tr>
<tr>
<td>COMARRC</td>
<td>Commander Allied Rapid Reaction Corps</td>
</tr>
<tr>
<td>COMIFOR</td>
<td>Commander Implementation Force</td>
</tr>
<tr>
<td>COMNAVSOOUTH</td>
<td>Commander Naval Forces South</td>
</tr>
<tr>
<td>CWC</td>
<td>Chemical Weapons Convention</td>
</tr>
<tr>
<td>DARPA</td>
<td>Defense Advanced Research Projects Agency</td>
</tr>
<tr>
<td>DART</td>
<td>Disaster Assistance Response Team</td>
</tr>
<tr>
<td>DBBL</td>
<td>Dismounted Battlespace Battle Laboratory</td>
</tr>
<tr>
<td>DHA (UNDP)</td>
<td>Department of Humanitarian Affairs, United Nations Development Program</td>
</tr>
<tr>
<td>DHA</td>
<td>Department of Humanitarian Affairs</td>
</tr>
<tr>
<td>DMZ</td>
<td>demilitarized zone</td>
</tr>
<tr>
<td>DoD</td>
<td>Department of Defense</td>
</tr>
<tr>
<td>DOE</td>
<td>Department of Energy</td>
</tr>
<tr>
<td>DPKO</td>
<td>Department of Peacekeeping Operations</td>
</tr>
<tr>
<td>EC</td>
<td>The European Community</td>
</tr>
<tr>
<td>ECOMOG</td>
<td>Economic Community of West African States Monitoring Group</td>
</tr>
<tr>
<td>ECOWAS</td>
<td>Economic Community of West African States</td>
</tr>
<tr>
<td>EM</td>
<td>electromagnetic</td>
</tr>
<tr>
<td>EOD</td>
<td>explosive ordnance demolition</td>
</tr>
<tr>
<td>EU</td>
<td>European Union</td>
</tr>
<tr>
<td>EXCOM</td>
<td>executive committee</td>
</tr>
<tr>
<td>FBI</td>
<td>Federal Bureau of Investigation</td>
</tr>
<tr>
<td>FC</td>
<td>force commander</td>
</tr>
<tr>
<td>FLIR</td>
<td>forward-looking infrared</td>
</tr>
<tr>
<td>FM</td>
<td>field manual</td>
</tr>
<tr>
<td>FORCEGEN</td>
<td>Force generation</td>
</tr>
<tr>
<td>FORCEPREP</td>
<td>Force preparation</td>
</tr>
<tr>
<td>GPS</td>
<td>Global Positioning Satellite</td>
</tr>
<tr>
<td>GPSAR</td>
<td>ground-penetrating synthetic-aperture radar</td>
</tr>
<tr>
<td>HgCdTe</td>
<td>mercad telluride</td>
</tr>
<tr>
<td>IAPF</td>
<td>Inter-American Peace Force</td>
</tr>
<tr>
<td>ICRC</td>
<td>International Committee of the Red Cross</td>
</tr>
<tr>
<td>IDF</td>
<td>Israel Defense Force</td>
</tr>
<tr>
<td>IDPs</td>
<td>Internally displaced persons</td>
</tr>
<tr>
<td>IFOR</td>
<td>Implementation Force</td>
</tr>
<tr>
<td>IISS</td>
<td>International Institute for Strategic Studies</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
<td>------------------------------------------------------------------</td>
</tr>
<tr>
<td>InSb</td>
<td>indium antimonide</td>
</tr>
<tr>
<td>INSS</td>
<td>Institute for National Strategic Studies</td>
</tr>
<tr>
<td>IR</td>
<td>infrared</td>
</tr>
<tr>
<td>IRIN</td>
<td>Integrated Regional Information Network</td>
</tr>
<tr>
<td>IRISHBATT</td>
<td>The Irish Battalion</td>
</tr>
<tr>
<td>JCM</td>
<td>Joint Combat Model</td>
</tr>
<tr>
<td>JCS</td>
<td>Joint Chiefs of Staff</td>
</tr>
<tr>
<td>JSTARS</td>
<td>Joint Surveillance Target Attack Radar System</td>
</tr>
<tr>
<td>JTF</td>
<td>Joint Task Force</td>
</tr>
<tr>
<td>KR</td>
<td>Khmer Rouge</td>
</tr>
<tr>
<td>LAN</td>
<td>local-area network</td>
</tr>
<tr>
<td>LLNL</td>
<td>Lawrence Livermore National Laboratory</td>
</tr>
<tr>
<td>LLLTV</td>
<td>low-light-level television</td>
</tr>
<tr>
<td>LOCE</td>
<td>Linked Operations Capability—Europe</td>
</tr>
<tr>
<td>LWIR</td>
<td>long-wavelength infrared</td>
</tr>
<tr>
<td>MC&amp;G</td>
<td>digital mapping, charting, and geodesy</td>
</tr>
<tr>
<td>MCP</td>
<td>mission capability package</td>
</tr>
<tr>
<td>MFO</td>
<td>Multinational Force and Observers</td>
</tr>
<tr>
<td>MIR</td>
<td>micropower/microwave impulse radar</td>
</tr>
<tr>
<td>MND (SE)</td>
<td>Multinational Division, Southeast Sector</td>
</tr>
<tr>
<td>MND (SW)</td>
<td>Multinational Division, Southwest Sector</td>
</tr>
<tr>
<td>MOA</td>
<td>memorandum of agreement</td>
</tr>
<tr>
<td>MOBA</td>
<td>military operation in built-up areas</td>
</tr>
<tr>
<td>MOUT</td>
<td>Military Operations, Urban Terrain</td>
</tr>
<tr>
<td>MWIR</td>
<td>mid-wavelength infrared</td>
</tr>
<tr>
<td>NAC</td>
<td>North Atlantic Council (NATO)</td>
</tr>
<tr>
<td>NaI</td>
<td>sodium iodide</td>
</tr>
<tr>
<td>NATO</td>
<td>North Atlantic Treaty Organization</td>
</tr>
<tr>
<td>NCA</td>
<td>National Command Authority</td>
</tr>
<tr>
<td>NDU</td>
<td>National Defense University</td>
</tr>
<tr>
<td>NGO</td>
<td>nongovernmental organizations</td>
</tr>
<tr>
<td>NORBATT</td>
<td>the Norwegian Battalion</td>
</tr>
<tr>
<td>NRL</td>
<td>Naval Research Laboratory</td>
</tr>
<tr>
<td>NSC</td>
<td>National Security Council</td>
</tr>
<tr>
<td>OAS</td>
<td>Organization of American States</td>
</tr>
<tr>
<td>OAU</td>
<td>Organization of African Unity</td>
</tr>
<tr>
<td>OFDA</td>
<td>Office of Foreign Disaster Assistance</td>
</tr>
<tr>
<td>OLS</td>
<td>Operation Lifeline Sudan</td>
</tr>
<tr>
<td>ONUMOZ</td>
<td>United Nations Operation in Mozambique</td>
</tr>
<tr>
<td>ONUSAL</td>
<td>United Nations Operation in El Salvador</td>
</tr>
<tr>
<td>ONUIVEN</td>
<td>United Nations Operation in Nicaragua</td>
</tr>
</tbody>
</table>
OOTW operations other than war
OPLAN Operation Plan
"OPM" other people’s money
OSCE Organization for Security and Cooperation in Europe
OSD Office of the Secretary of Defense
OSOCC On-Site Operations and Coordination Center
OTA US Congressional Office of Technology Assessment
PS Permanent Five (members of the UN Security Council)
PfP Partnership for Peace
PM Prime Minister
PNG Papua New Guinea
PRM Bureau of Population, Refugees, and Migration
PSO peace-support operations
PVO private voluntary organization
QDR Quadrennial Defense Review
RAF Royal Air Force
REMBASS Remote Battlefield Assessment System
rf radio frequency
RIC Rwanda Information Center
Ro-Ro roll-on, roll-off ships
ROE rules of engagement
RPF Rwandan Patriotic Front
RPG rifle-propelled grenade
RPV Remotely Pilot Vehicle(s)
RSF Rhodesian Security Forces
SACEUR Supreme Allied Commander Europe
SHAPE Supreme Headquarters Allied Powers Europe
SLA South Lebanon Army
SMIO senior military information officer
SOF  Status of Forces Agreement
SPF South Pacific Forum
SPLA Sudanese People’s Liberation Army
SRSG Special Representative of the Secretary-General
SSM Sinai Support Mission
SWAPO Southwest African People’s Organization
TOA Transfer of Authority
TRSS Tactical Remote Sensor System
UAV unmanned airborne vehicles
UGS unattended ground sensor
UK United Kingdom
UNAMIR United Nations Assistance Mission in Rwanda
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNAVEM III</td>
<td>United Nations Angola Verification Mission III</td>
</tr>
<tr>
<td>UNCRO</td>
<td>United Nations Confidence Restoration Operation in Croatia</td>
</tr>
<tr>
<td>UNDP</td>
<td>United Nations Development Program</td>
</tr>
<tr>
<td>UNDRO</td>
<td>United Nations Disaster Relief Office</td>
</tr>
<tr>
<td>UNEF</td>
<td>United Nations Emergency Forces</td>
</tr>
<tr>
<td>UNFICYP</td>
<td>United Nations Force in Cyprus</td>
</tr>
<tr>
<td>UNHCR</td>
<td>United Nations High Commission for Refugees</td>
</tr>
<tr>
<td>UNICEF</td>
<td>United Nations International Children’s Emergency Fund</td>
</tr>
<tr>
<td>UNIFIL</td>
<td>United Nations Interim Force in Lebanon</td>
</tr>
<tr>
<td>UNIPTF</td>
<td>United Nations Internal Protection Task Force</td>
</tr>
<tr>
<td>UNITA</td>
<td>National Union for the Total Independence of Angola</td>
</tr>
<tr>
<td>UNITAF</td>
<td>Unified Task Force (in Somalia)</td>
</tr>
<tr>
<td>UNMIH (Brahimi)</td>
<td>United Nations Mission in Haiti</td>
</tr>
<tr>
<td>UNOMIG</td>
<td>United Nations Observer Mission in Georgia</td>
</tr>
<tr>
<td>UNOMIL</td>
<td>United Nations Observer Mission in Liberia</td>
</tr>
<tr>
<td>UNOSOM</td>
<td>United Nations Operation in Somalia</td>
</tr>
<tr>
<td>UNPROFOR</td>
<td>United Nations Protection Force (in the Former Yugoslavia)</td>
</tr>
<tr>
<td>UNREO</td>
<td>United Nations Rwanda Emergency Office</td>
</tr>
<tr>
<td>UNSCOM</td>
<td>United Nations Special Commission on Iraq</td>
</tr>
<tr>
<td>UNSCR 1031</td>
<td>United Nations Security Council Resolution</td>
</tr>
<tr>
<td>UNTAC</td>
<td>United Nations Transitional Authority in Cambodia</td>
</tr>
<tr>
<td>UNTSO</td>
<td>United Nations Truce Supervision Mission (in the Middle East)</td>
</tr>
<tr>
<td>USAF</td>
<td>United States Air Force</td>
</tr>
<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
</tr>
<tr>
<td>USC</td>
<td>Under Secretary General</td>
</tr>
<tr>
<td>USSR</td>
<td>Union of Soviet Socialist Republics</td>
</tr>
<tr>
<td>UV</td>
<td>ultraviolet</td>
</tr>
<tr>
<td>UXO</td>
<td>unexploded ordnance</td>
</tr>
<tr>
<td>WAN</td>
<td>wide-area network</td>
</tr>
<tr>
<td>WFP</td>
<td>World Food Program</td>
</tr>
<tr>
<td>ZOS</td>
<td>Zone of Separation</td>
</tr>
</tbody>
</table>