

# **Non-Lethal Technologies: Military Options and Implications**

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Chairman: Malcolm H. Wiener

## **EXECUTIVE SUMMARY**

Today we face new challenges to our security and our humanity. To many of these, neither conventional economic sanctions on the one hand nor a Gulf War-type response on the other provide an appropriate answer. The recent examples of Bosnia, Somalia, Haiti, and Rwanda, as well as the threat of state-supported terrorism, show the need for new options and credible deterrents. Scientific and technical advances in non-lethal technologies, which cover an array of capabilities from crowd and point control to the disabling of a society's communications, mobility, and power, address this need. The following report by an Independent Task Force sponsored by the Council on Foreign Relations analyzes these new options and the steps needed to realize them while limiting the prospect of retaliation or abuse.

Non-lethal technologies include:

- jamming or destruction of communications, together with the ability to transmit television and radio programs of one's choice, potentially useful for reducing inflammatory, sometimes genocidal, messages or separating murderous rulers from army and populace;
- "slickums" and "stickums" to impede vehicle or foot traffic;
- movement-inhibiting foams and nets;
- highly obnoxious sounds and smells, capable of inducing immediate flight or temporary digestive distress.

The Task Force report considered the applicability of non-lethal weapons to recent conflicts.

- In Somalia, street and point control through the use of incapacitating foams and flight-inducing smells and sounds could have offered significant advantages over deadly fire from helicopter gunships in achieving political goals.
- In Rwanda, where radio broadcasts urging total genocide are thought to have increased the scope of horror, communications interdiction and augmentation (as was employed in Cambodia, where a radio station preaching a message of reconciliation was credited with lowering violence), plus point and movement control agents, would have been appropriate had a decision to intervene been taken.

- In Bosnia, combining technologies, including communication warfare aimed at separating leadership from people, movement interdiction efforts on roads, the use of offensive smells and sounds to disrupt or punish local efforts at ethnic cleansing, and "enhanced sanctions" directed at Serbia, together with lethal precision targeting of heavy armaments used to shell urban areas, would have offered obvious advantages had an early decision to intervene been taken.

The Task Force considered a number of risks inherent in the development and use of non-lethal weapons, and evaluated those risks.

- The "slippery slope." The use of non-lethal weapons may seem an attractive option, but might lead to further unintended and unwanted involvement, including the large-scale use of lethal weapons.
  - Widespread understanding of the capabilities and limitations of non-lethal weapons; acknowledgment of the need for careful identification of the adversary; coherent, integrated plans of action, and the practice of early congressional consultation should limit the risk of entry onto the slippery slope.
- Retaliation. Since the United States is highly dependent on technology, we may be opening the door to a form of warfare to which we are most vulnerable.
  - Coping with such vulnerability is essential whether or not we deploy non-lethal weapons. In cases where the United States is likely to be the only developer of a particular type of non-lethal technology, the decision as to whether the advantages of the technology outweigh the impetus given to the efforts of others requires careful consideration.
- Proliferation. Much military research and development is based on mimicry. If we take the lead in developing non-lethal technologies, other countries will follow and renegades will eventually acquire them. As second generation non-lethal technologies are developed, first generation technologies will filter down into less responsible hands.
  - U.S. restraint will not prevent development of all non-lethal weapons by others. Russia, the United Kingdom, France, Italy, and Israel are said to have made significant efforts to develop non-lethal capabilities. Some non-lethal weapons can be assembled from components commercially available to terrorists as well as to governments. Research and development of non-lethal technologies will contribute to knowledge of defenses and antidotes. Some research and perhaps deployment should be undertaken in secret, both to attempt to limit proliferation and to retain the benefits of surprise.
- Unrealistic expectations and onerous battlefield requirements. An expectation of bloodless battles is doomed to disappointment and a requirement that non-lethal weapons be employed before lethal means are used could expose U.S. forces to needless dangers.

- Troops equipped with non-lethal weapons should always have clearly adequate lethal weapons available, together with authorization to use them as necessary. Moreover, in certain circumstances the existence of non-lethal options may increase the safety of U.S. troops and the effectiveness of U.S. actions. Possible examples: 1) when a sniper is hidden in a crowd of women and children, inhibiting U.S. use of lethal fire; 2) when it is desirable to enlist allies who are reluctant to risk causing civilian casualties in an "enhanced sanctions" campaign against terror-supporting regimes; 3) when a hostile regime faces significant internal opposition and the goal of policy is to separate its leaders from the populace and army.
- Comparative cost effectiveness. Many of the casualty-limiting benefits of non-lethal weapons could perhaps be achieved more quickly and at less cost by increasing the precision of lethal arms.
  - In some circumstances weapons perceived to be non-lethal in intent are likely to have marked advantages in limiting opposition, obtaining support, and achieving policy goals. Many of the research costs of some technologies have already been incurred. When compared to the cost-effectiveness of other weapons systems, development, procurement, training, and operation of non-lethal technologies do not in general appear to be costly in relation to potential benefits.
- Restraints of international law. In some cases, the status of non-lethals is ambiguous under broadly drawn international conventions prohibiting the use of certain types of weapons or technologies.
  - It would be ironic if lethal weapons were employed because ambiguities in international law prevented the use of non-lethal weapons. Careful consideration should be given, however, to the definition of what is and is not prohibited under the broad definition of the Chemical Warfare Convention, so as not to appear to loosen its constraints, and to banning the deployment of lasers in a configuration designed to blind troops or non-combatants.

## CONCLUSIONS

The ability to employ non-lethal technologies may provide advantageous options to the United States as it enters the 21st century. In many respects non-lethal technologies could be particularly effective in a number of situations of low-level conflict, often involving nonstate or failed state actors, observed instantly by many publics whose support may be desirable.

Non-lethal options are, however, not a panacea, and require careful management of their potential and perils. At present, communications warfare, other non-lethal weapons options, and economic sanctions analysis are assigned to separate areas of the Department of Defense and other government agencies. Moreover, laboratory-generated technological advances largely drive policy analysis, rather than national policy

requirements shaping research. Given the long lead times historically associated with the adoption of innovations in military doctrine and training, the subject of non-lethal technology needs thorough analysis now. A national policy on non-lethal options should come from the National Security Council (NSC), in view of the varied and complex problems presented and the necessity to integrate military, economic, diplomatic, and political strategy.

In sum, non-lethal technologies have the potential for providing new strength for diplomacy, new credibility for deterrence, new flexibility for the military, and new strategic options for policymakers.

## **INTRODUCTION**

As we approach the next millennium, we face new challenges to our security and our humanity. From terrorists with murky state support and increasingly destructive lethal weapons, to the risk of ethnic, religious, or political terror resulting in mass migrations across borders including our own, to the nightly assault on our souls and consciences from televised horrors, some of which could have been prevented by our actions, the new challenges require new thinking. Many of these new challenges involve non-state actors; all call for a willingness to act and new methods of deterrence or response. It is important to close the options gap between a Gulf War-type response, on the one hand, and, on the other, typical economic sanctions of often limited effectiveness. The recent examples of Bosnia, Somalia, Haiti, and Rwanda, together with the World Trade Center bombing and the prospective proliferation of nuclear, chemical, and biological agents as well as advanced conventional weapons, show clearly the need for a wide range of options and credible deterrents, including improved deterrents to state-supported terrorism and genocide.

Simultaneously, we observe strong national and international pressures to avoid casualties. Casualties caused by the bombing of a communications structure also used as a civilian bomb shelter in Baghdad reportedly resulted in changes in targeting policy, and images of "the Highway of Death" in Iraq were said to be a factor in the early (and in the view of some untimely) termination of the Gulf War.

Against this background, the Council on Foreign Relations convened an independent Task Force to consider the subject of non-lethal technologies and optimum force options. Non-lethal technologies involve a wide range of materials and techniques that coerce or deter largely without killing (although unintended deaths may result) and that for the most part will also appear to be intended to limit casualties and destructiveness. (There is no sharp division, but rather a continuum, between non-lethal weapons and precision-directed lethal weapons that can be used in non- or limited-lethal actions, such as the nighttime or holiday destruction of power, communications, or weapons facilities.)

This report poses a number of questions whose political and technical complexity preclude immediate resolution. The objective here is to highlight aspects of policy regarding non-lethal technologies that deserve closer and more sustained scrutiny than they have yet received in or out of government.

Potential non-lethal technologies include communications elimination and substitution and other forms of information warfare, various "slickums" and "stickums" to impede

vehicle or foot traffic, movement-inhibiting foams and nets to ensnare combatants and vehicles, precision kinetic disabling of heavy weapons, computer-assisted precision anti-mortar/anti-sniper devices, obnoxious sounds or smells that cause flight, counter-sensor lasers, and electronic or electromagnetic means of disabling power grids, communications, computers, and credit networks.

Some of the weapons and the technologies exist now; others are ready or close to ready for development and deployment, while still others would require considerable research and development. What may have seemed remote to the general policy community when this study was initiated a year ago has become immediate as a result of the request by the commander of the U.S. operation covering the U.N. withdrawal from Somalia for various types of non-lethal weapons.

In the absence of any national policy on non-lethal weapons, development of non-lethal technologies has been largely driven by various scientific laboratories offering proposals as their nuclear warfare budgets were reduced. In February 1994 the Department of Defense established a Senior Officials Group, now called the Non-Lethal Weapons Steering Committee (NLWSC). In July the Department of Defense circulated for comment a draft directive of policies and procedures governing non-lethal weapons, but explicitly excluding for organizational and budgetary reasons the subjects of precision-targeted weapons and information warfare.

To date there has been no serious effort at the national level to incorporate the strategic and policy implications of non-lethal weapons in foreign policy analysis or planning. The paucity of general analyses may be due in part to the wide range of potential activities covered, which cut across departmental boundaries and include: 1) "enhancing sanctions" (such as interruption of power grids, transportation, credit, and computer systems); 2) conducting information warfare; 3) restraining masses of people or riots; 4) intervening in intrastate ethnic, tribal, or political conflict; 5) engaging in counter-terror and counter-proliferation activities; 6) diminishing the level of violence required in certain conventional military operations; and 7) countering the use of non-lethal technologies (such as computer viruses and carbon fiber attacks on power grids) against both U.S. forces abroad and terrorist targets in the United States.

## **SCENARIOS AND POSSIBILITIES**

The Council Task Force considered a number of scenarios to which non-lethal weapons systems could be applied, both for their individual characteristics and to determine whether such scenarios have significant characteristics in common.

The prospect of economic sanctions enhanced by technology was considered first. Potential benefits noted include the possibility of achieving greater effect than conventional sanctions, with more impact on adversaries as distinguished from the general populace; the greater ease of applying, relaxing, and reapplying, if needed, such technological sanctions; the prospect of effectiveness through U.S. unilateral action; the consequent prospect of greater immediacy of action and result, potentially useful in itself and as a deterrent to further acts by an adversary; the possibility of securing international agreement for a long-term approach (for example, against nations sponsoring terrorism) involving closing international travel, computer, credit, and communication links, and

limiting television transmission and power where necessary. Research and development in those areas was deemed promising, subject to the general caveats described below regarding slippery slopes, risks of retaliation, and encouragement of proliferation through mimicry.

Various scenarios involving crowd control, peacekeeping, and lower levels of peace enforcement were considered, and the Task Force noted the potential advantage of non-lethal weapons (for example, to attack snipers moving among crowds or guns placed in sites of high cultural value), particularly where winning the support of the populace is critical. For example, the reported death of an estimated 6,000 to 10,000 Somalis from actions by U.N. forces, many as a result of fire from helicopter gunships, seems inimical to the stated purpose of the intervention even apart from the moral repugnance of needless death. The effect on U.S. forces of firing into crowds including women and children in which snipers are concealed is also relevant. Incapacitating sticky foams, obnoxious and disorienting smells and sounds to dispel crowds, and disabling bullets were among the systems considered in this context.

In respect to the foregoing scenario and all others involving the use of force, it should of course be clear that U.S. military forces should always have adequate lethal means available, along with authorization to use them as needed.

The potential applicability of non-lethal weapons to the war in Bosnia was next considered. The time frame chosen was that of the first reports of ethnic cleansing and detention camps and of the Serb naval shelling of Dubrovnik, when 100,000 people were reported marching in the streets of Belgrade in opposition to the policies of Serbian leader Slobodan Milosevic. In this scenario (which implies an early decision to intervene), emphasis was placed on employing non-lethal techniques that had the potential to detach the populace and army from Milosevic and his cohorts, or at least to avoid to the extent possible driving them together. Among the possibilities considered were shorting out power, communications, air control facilities, and television transmission and impeding transportation north at the river Drina choke points through non-lethal "slickums" and "stickums." Ending the shelling of cities by ships, planes, tanks, or heavy artillery through precision counterfire was considered a possibly important limited-lethal supplement to non-lethal means. It was noted that the outcome of one war game suggested that at the present state of development it is easier to use non-lethal weapons against infrastructure than in direct combat. Intensive further war gaming and modeling of non-lethal weapons systems (including those now available, those whose development is near at hand, and those thought likely to be developed) is strongly recommended by the Task Force.

The question arises as to why power, air control facilities, bridges, roads, and tanks should be rendered inoperable by non-lethal weapons when the task could be performed more readily and reliably by precision-targeted explosives. It is necessary to define in this regard the type of force deemed optimal in light of the stated objectives. The difference in local reaction and in images televised worldwide between tanks, bridges, and people destroyed through precision targeting with explosives and tanks stuck temporarily or repeatedly in "slickum" seems significant. When a primary purpose is to separate leadership from populace and army, while holding a coalition of nations together in an age of instant communication, contrasting reactions to televised images may weigh

heavily in policy calculations. In traditional military terms this may be regarded as a problem in avoidance of loss of potential allies or enemy defectors through friendly fire. Moreover, the post-war costs of reconstruction will be lower to the extent non-lethal rather than explosive weapons have been employed.

Information warfare appears to be a critical component of campaigns in many cases (and in military campaigns in general). For example, the ability to deliver a message on Serbian television in the above scenario seems highly desirable. Graphic descriptions of atrocities being committed could have been accompanied by messages stating, "Our actions are not anti-Serb. We remember and honor our joint fight against fascism. Rather we are attempting to prevent the shelling of citizens and towns by any forces. We regret the harm caused by our actions, which are intended to be non-lethal and which will cease as soon as the support for those dishonoring the Serb name in Bosnia ceases."

Similar actions directed against Pale and other Bosnian Serb strongholds could have been accompanied by the additional information that where ethnic cleansing of a town has occurred and the homes of its inhabitants seized, that town and the hometown of those responsible, if known, would be rendered uninhabitable (for example, by some combination of obnoxious smells, disorienting sounds, and sticky foams).

The foregoing Bosnia scenario is intended solely as a graphic illustration of various non-lethal possibilities, some not yet available, and not as a recommendation for current action. A senior U.S. official once remarked, "Every time we look at Bosnia, we think of things we haven't developed."

The examples given involve the use of information warfare. The consensus of the Task Force was that the potential advantages of such capability across a wide variety of situations justifies substantial developmental efforts, particularly since even partial success may be significant. Recent events in Rwanda, where a single radio station urging total genocide is believed to have had a major impact, underscore this point. Conversely, a radio station in Cambodia that preached a message of reconciliation is credited by U.N. observers with a significant positive impact. In the Rwanda case, substitution of a different message, such as that the Tutsi and Hutu are one people wrongly separated by former colonial overlords and those who kill will be punished, would have had obvious advantages over interdiction alone.

Of course information techniques of this nature are not a comprehensive strategy. Any genocidal message heard on television or radio can also be transmitted more slowly by word of mouth, but slowing the spread of such incitements can be critical to stabilizing a particular situation. Communications interdiction or substitution may generally require additional action on the ground to be effective. (For example, in the Rwandan case it may be that the early deployment of forces capable of countering gangs armed largely with machetes would have been necessary.) In general, there may be very few cases where information warfare alone will be useful. At the same time the critical factor may be the will to employ such methods-evidently absent in Rwanda when they were available and might have proven valuable. What this episode reveals regarding the lack of knowledge and preparedness regarding non-lethal technologies is a question deserving further study.

The point justifies emphasis in view of the risk that a leader skilled in communications might be tempted to engage in communications warfare, if only to give the appearance of

action. Interference with broadcasts and/or the airing of opposing messages, however, in most cases will not persuade a terror-sponsoring dictator to desist.

The significant role of information warfare in many situations, some involving economic warfare and non-lethal technology as well as lethal weapons, illustrates the importance of involving agencies and individuals encompassing a broad range of knowledge-military, diplomatic, economic, and societal (with a deep understanding of the cultures, mores, and languages of the area in question), as well as specialists from the intelligence community-in planning campaigns spanning the spectrum from counter-terrorism to regional conflict.

## **SOME IMPORTANT CAUTIONS**

The Task Force considered a number of potentially significant obstacles and objections to the development and use of non-lethal weapons systems.

First was the problem of the slippery slope. Non-lethal weapons may create options that appear so attractive, politically and otherwise, that decision-makers will be tempted to use them in inappropriate circumstances and be led into a quagmire. For example, decision-makers responding to televised images of horror and wishing to appear to act might resort solely to information warfare under circumstances where it would be useless, counterproductive, or arouse resentment about interference in other societies. Recognition of this danger, however, should serve to abate it. Congressional oversight is of course also relevant, and congressional leaders normally consulted regarding interventions and the dispatch of U.S. troops should be familiar with both the potential advantages and risks of non-lethal technologies in warfare.

Second is the risk of retaliation. The United States in many ways is the most open, technology-dependent, and vulnerable society. Power grids and computer systems in particular are potential targets. The Task Force concluded that such vulnerability requires independent attention and the development of counter-measures whether or not we field non-lethal systems or weapons. Of course retaliation might well be lethal, with our comparative advantage in technology balanced by the comparative advantage of others in their readiness to resort to terror. Here again a "slippery slope" analysis encompassing suggested subsequent steps in the event of escalation is critical.

A third potential objection, closely related to the second, is the risk of proliferation. U.S. development of non-lethal weapons has already aroused and will continue to excite the interest of others, particularly since much military research and development is based on mimicry. Moreover there is the risk that as second generation non-lethal weapons are developed, first generation weapons will gravitate into increasingly less responsible hands. No U.S. restraint, however, will guarantee against the development of weapons by others. Reports indicate that Russia, the United Kingdom, France, Italy, and Israel have developed or are developing significant non-lethal capabilities. In general, research and development will also contribute knowledge about defenses and antidotes. Where U.S. vulnerabilities are disproportionately high, as in the area of computer virus warfare, restraint in use as distinguished from development may be particularly appropriate. To the extent that the threat of employing non-lethal technologies, economic warfare, and information warfare may be relevant in deterring state support for terrorism, intelligence

estimates that at least 20 nations have or are developing chemical or biological warfare capabilities are worth noting.

A fourth potential objection to a vigorous program to develop non-lethal technologies lies in the fear of creating unrealistic expectations of bloodless battles and the concomitant prospect that U.S. forces would be exposed to danger by a frequent or general requirement that non-lethal force be used before resorting to lethal means. A policy of ensuring that U.S. forces equipped with non-lethal weapons always have lethal weapons available, with authorization to use them as needed, should allay these fears. Moreover, there are situations where availability of non-lethal weapons may increase the safety of U.S. troops, such as a sniper hidden in a crowd of women and children, where a commander would hesitate to order lethal weapons fire. The detailed analysis and war gaming recommended elsewhere concerning situations where employment of non-lethal technologies may be particularly appropriate (such as point and crowd control; "enhanced sanctions" campaigns where the participation of allies is essential; action against fragile regimes or failed states with internal opposition we wish to encourage) may also be relevant with respect to countering unrealistic expectations.

A final related objection is expressed in the proposition that "anything worth doing is worth doing lethally," and that anything less means fighting with one hand tied. But lethal and non-lethal weapons are not mutually exclusive alternatives. As the prior examples indicate, there are times when non-lethal weapons or technologies and limited force options may be preferable for achieving objectives while limiting negative responses or counterproductive consequences.

The costs of non-lethal technologies, including opportunity costs in the employment of top scientific and technological personnel, need to be examined. For example, a comparison of the estimated benefit from using funds that would be earmarked for non-lethal systems for additional development of precision-targeted lethal weapons instead is clearly relevant. However, circumstances exist, as described above, where the advantages of rendering a target inoperable via non-lethal means might well be significant even where precision-directed lethal means exist to destroy the target. Moreover, precision delivery systems may be used for non-lethal as well as lethal payloads, and hence share common costs. Many of the costs of non-lethal weapons have already been paid in the course of developing the relevant technologies. By and large, the costs, based on Department of Defense estimates, of developing non-lethal weapons systems appear proportionate to their benefits even in comparison with other weapons systems, provided there is continual dialogue between policy planners drawn from all relevant backgrounds and the suppliers of weapons, so that sums are not spent developing weapons for which there is no clear requirement or benefit, or which we would not be prepared to use for moral or legal reasons.

The moral and legal implications of international law for various proposed non-lethal systems must be carefully weighed. The Biological Weapons Convention of 1972, ratified by the United States in 1975, might be interpreted to prohibit the development of certain agents designed to embrittle artillery and tanks or degrade lubricants (either through a literal reading or because of the unintended possible effect of human exposure). Quite apart from questions of non-lethal weapons, the rapid rate of development of

biotechnology and the increasing civilian use of bioengineered organisms (for example, in the treatment of oil spills) is likely to require periodic updating of the convention.

The recent Convention on Conventional Weapons does not address non-lethal technologies, but they are likely to be considered in a forthcoming review conference on the agreement. There may be proposals to ban lasers that can be used to blind, or alternatively to ban the intentional use of lasers to blind troops or noncombatants permanently. The International Committee of the Red Cross is considering a similar resolution. Nevertheless, since lasers with the capacity to blind have already been deployed in foreign forces, proliferation must be anticipated and we must be prepared for the possible use of blinding lasers against us, for example in terrorist attacks against political leaders. (Lasers of limited power were used by U.S. forces in the Gulf War for range finding and precision target designation.)

With respect to chemical agents developed to provide crowd and point control or retaliatory options to deter atrocities, there exists a gray area of substances banned under the Chemical Weapons Convention (now awaiting ratification by the U.S. Senate), which prohibits the use of chemical riot control agents against combatants in wartime. It would, of course, be a tragic irony if nations used lethal means against noncombatants because non-lethal means were banned by an international convention. Evidence that potential adversaries, including terrorist-supporting states, are developing fearsome chemical weapons supports the interest in such a convention. Further analysis and research should be devoted to the legal aspects of this problem, and to the moral, practical, psychological, and precedential aspects as well.

The Nairobi Convention, to which the United States is a signatory, prohibits the broadcast of electronic signals into a sovereign state without its consent in peace-time. Of course the contemporary world provides many situations between full peace and all-out war. The concept of a "declaration of hostilities" or of a "failed state" may be appropriate in such circumstances, not only with regard to the use of electronic signals but to the use of enhanced sanctions and non-lethal weapons as well.

## **CONCLUDING OBSERVATIONS**

Longer-range questions requiring national consideration include:

1. A declared intent to acquire and, if necessary, to use non-lethal force as an instrument of U.S. national security is worth consideration. By extending the capacity to intervene in situations where lethal force is either infeasible or incredible, such a declared national policy may also help to deter genocide (which we are committed by international convention to oppose). In the longer run a policy of this nature could affect decisions by rogue states regarding costly and/or treaty-violating acquisition of some types of weapons of mass destruction or advanced conventional capability because of their knowledge that advanced non-lethal capabilities may provide the means of effective retaliation without causing large civilian casualties, thus making such U.S. action credible as a deterrent. Conversely, a long twilight war against terrorist groups and terrorist-supporting regimes may require a level of secrecy to preserve the effectiveness of non-lethal technologies and create uncertainty as to the agent, foreign or domestic, of

disruptive events, and the degree of ultimate potential for destabilization or for support of domestic opposition.

2. Throughout history, the capacity for destruction has proliferated; it is now gravitating into increasingly less responsible hands, so that today individuals with little training or support can explode a World Trade Center-type bomb and much worse. Moreover, deadly microbes and substances can be easily manufactured and used. As a consequence, our comparative advantage in technology may in some circumstances be opposed by a comparative advantage in terror. Does this consideration suggest an increasingly cautious approach to foreign intervention of any type, including the use of "enhanced sanctions," communications warfare, or non-lethal weapons? The threat of terrorism has evidently been a factor in causing certain West European countries to reject intervention or cooperation with peace-enforcement measures in the Middle East, the Balkans, and elsewhere. It is worth recalling in this regard that while lethal acts have sometimes brought no immediate response, as in the case of the Israeli attack on an Iraqi nuclear reactor in 1981, conversely, terrorist attacks in the United States may occur no matter how low the U.S. profile, and any inability to respond may invite attack.

3. To what extent and in what manner should non-lethal warfare capabilities be shared with our traditional allies? If the United States is to share peacekeeping, peace-enforcement, anti-genocide, counter-proliferation, and counter-terrorism responsibilities with other nations, the development of common doctrine and training is indicated and the sharing of research and development costs obviously attractive. The NATO Defense Research Group has recently begun a study of non-lethal technologies.

4. What constitutes an act of war in the coming era? An attempt to destroy a funds transfer (banking) system, U.S. or foreign, through the introduction of computer viruses or by other electronic means, assuming state support can be identified? The crippling of power grids? The broadcasting of false reports causing panic and deaths? Support of terrorist actions? Further, what degree of state support for such actions constitutes a *casus belli*? A closely related issue concerns the role of the Congress in approving U.S. non-lethal actions abroad.

5. The problem of national policy coordination, and of getting there from here, requires consideration. A joint project of the Departments of Defense and Justice, instituted at the initiative of the Justice Department, addresses the research and development of technologies with dual potential for domestic law enforcement and national defense. The creation of a Department of Defense NLWSC, following years of organizational uncertainty at the Department of Defense level, is most welcome. The current exclusion from this initiative of precision weapons and of information warfare, a field in which the Army, Navy, and Air Force maintain separate centers (at a time when there is still no non-lethal weapons center), shows the need for further efforts at the secretary, deputy secretary, and Joint Chiefs levels. It is important that research in non-lethal weapons and information warfare not be limited to the traditional weapons laboratories, but rather take advantage of the full potential of our rich and diverse technological

base. An integrated approach to the full spectrum of non-lethal technologies, including information warfare, should guide development and deployment.

The development of military doctrine must of course go hand in hand with the development of weapon systems to produce satisfactory results. Military history teaches that the time elapsing between the introduction of a weapon and its satisfactory incorporation in doctrine is typically 20 years. (For example, the tank was first used by the United Kingdom in World War I but had no profound effect on warfare until it was incorporated into the doctrine of blitzkrieg by Germany in World War II.) The pace of technological change today brooks no such delay. It is accordingly essential that the Department of Defense establish policy, doctrine, and structure covering all aspects of non-lethal conflict. The Department of Defense Draft Directive Policy for Non-Lethal Weapons is a significant step in this direction. The directive, however, has yet to be executed.

At the national policy level, the absence of any overall consideration of the interrelationships between and potential impact of enhanced sanctions, communications warfare, and non-lethal weapons (combined when appropriate with precision-directed lethal weapons) is troublesome. Senior officials in the State Department and NSC display little knowledge of non-lethal options.

The subject of non-lethal technologies appears of sufficient importance for the NSC to play a major coordinating role, in order to ensure that all the relevant departments, agencies, and areas of expertise needed to inform public policy in this challenging area are heard. An NSC directive may be desirable or necessary. The president, vice president, secretary of state, director of Central Intelligence and members of the relevant congressional committees should receive appropriate briefings, updated as required, concerning the expanded range of options for national policy that non-lethal technologies present, together with the caveats concerning their development and employment discussed in this report.

In summary, vigorous exploration of non-lethal technologies is politically, militarily, and morally appropriate, and affordable as well. "Once in a while a door opens, and lets the future in," wrote Graham Greene. With respect to non-lethal conflict, such a door may now be opening.

## **NOTES**

1 Throughout this report, "strategic nonlethal weapons" implies weapons that achieve a strategic objective; they may be tactical weapons used on a large scale, or nonlethal weapons delivered from a distance of thousands of Kilometers, or (perhaps only) weapons that might act primarily on national leaders.

2 Neither the chair nor the director of the Independent Task Force was granted significant access to these programs, despite an explicit request to the deputy secretary of defense and a secret-level briefing by DoD that resulted from this request. In this context, a "large program" might have an annual budget of \$100 million. While such restrictions on access may be intended to support security goals, narrowly defined, they impede useful support and informed criticism that respects security limitations.

## **MEMBERS OF THE TASK FORCE**

**KENNETH L. ADELMAN:** Mr. Adelman is Vice President of the Institute for Contemporary Studies and a nationally syndicated columnist. He was Director of the U.S. Arms Control and Disarmament Agency and Deputy Representative to the United Nations.

**JOHN ALEXANDER:** Dr. Alexander was Project Manager, Non-Lethal Defense, at Los Alamos National Laboratory. Before retiring from the Army, he was Director, Advanced Systems Concepts, U.S. Army Laboratory Command.

**JOHN L. BARRY:** Colonel Barry is Commander of the 39th Air Wing, Incirlik, Turkey and has recently completed a Fellowship at the Kennedy School. Previously he served as Military Assistant to Secretary Dick Cheney.

**TYRUS W. COBB:** Dr. Cobb is President of Business Executives for National Security and a Senior Fellow at the Center for Strategic and International Studies. He served on the National Security Council staff from 1983 until 1987.

**MICHAEL J. DUGAN:** General Dugan is currently President and CEO of the National Multiple Sclerosis Society. He formerly served as Chief of Staff of the U.S. Air Force.

**DOUGLAS J. FEITH:** Mr. Feith is founding partner of Feith & Zell. He has served in several positions at the Department of Defense and at the National Security Council.

**ALISON B. FORTIER:** Ms. Fortier is an Executive at Rockwell International, responsible for coordinating national security issues. Prior to joining Rockwell International she served on the National Security Council staff.

**RICHARD L. GARWIN:** Dr. Garwin is IBM Research Fellow Emeritus. Currently he also serves as Vice-Chairman of the Federation of American Scientists.

**LESLIE H. GELB:** Mr. Gelb is President of the Council on Foreign Relations. He was foreign affairs columnist and Editor of the Op-Ed Page for The New York Times. He also served as Director of the State Department's Bureau of Politico-Military Affairs.

**KENNETH H. KELLER:** Dr. Keller is Senior Vice President and Senior Fellow for Science and Technology studies at the Council on Foreign Relations. Previously he served as President of the University of Minnesota.

**GEORGE KENNEY:** Mr. Kenney is an author and consultant. He was a career foreign service officer and a consultant at the Carnegie Endowment for International Peace.

**ROBERT H. KUPPERMAN:** Dr. Kupperman is Senior Adviser at the Center for Strategic and International Studies. Before joining CSIS he was chief scientist at the U.S. Arms Control and Disarmament Agency.

**JESSICA T. MATHEWS:** Dr. Mathews is Senior Fellow at the Council on Foreign Relations. She served as Deputy to the Undersecretary of State for Global Affairs and was Vice President of the World Resources Institute.

**EDWARD C. MEYER:** General Meyer is the former Chief of Staff of the U.S. Army. He is currently Chairman of GRC International.

JOEL W. MOTLEY: Mr. Motley is Managing Director of Carmona, Motley and Co, specializing in underwriting and financial advice for municipalities around the country.

RICHARD N. PERLE: Mr. Perle is a Resident Fellow at the American Enterprise Institute. From 1981 to 1987 he served as Assistant Secretary of Defense for International Security Policy.

HARVEY M. SAPOLSKY: Dr. Sapolsky is Professor of Political Science at the Massachusetts Institute of Technology and Director of the MIT Defense and Arms Control Studies Program.

DANIEL A. SHARP: Mr. Sharp is President of the American Assembly. He was with the Xerox Corporation for 20 years and has been an adjunct professor at Columbia University.

JEREMY J. STONE: Dr. Stone is President of the Federation of American Scientists. Originally trained as a mathematician, Dr. Stone has been the CEO of FAS for 25 years.

MALCOLM H. WIENER: Mr. Wiener is Chairman of the Millburn Corporation, an investment firm. His publications include works on ancient history, international law, and contemporary political economy.

MYRON WOLBARSH: Dr. Wolbarsht is Professor of Ophthalmology and Biomedical Engineering at Duke University. He is engaged in research on laser safety.