**U.S. Ballistic Missile Defenses, Other High Tech Weapons Programs, and Prospects for Disarmament after September 11**

By Andrew M. Lichterman*

It will be some time before the impact on high technology military programs of the September 11 attacks in the United States can be fully assessed. One immediate effect, however, has been the muting of dissent in mainstream U.S. political debate on all matters concerning the military, including the funding of programs not directly related to what the government calls the "war on terrorism." The increased likelihood of U.S. military action in the coming period also is likely to give increased impetus to what used to be referred to as theater missile defense programs,[1] (the Defense Department no longer is making a distinction between "national" and theater" missile defense) which are seen by the military as needed both to protect concentrations of U.S. forces and to reassure allies who might fear missile attack by U.S. adversaries in their regions.

Also likely to be accelerated or expanded are offensive weapons systems now under development that are anticipated to work together with missile defenses against weapons of mass destruction, by destroying production and storage facilities, delivery systems, and command and control facilities before weapons of mass destruction can be used. These range from earth penetrator versions of existing conventional cruise missiles to new, high-speed missiles which still are at an early stage of development.[2] Although the utility of nuclear weapons for any purpose other than deterring nuclear attack remains controversial even within the military, research on modifying existing nuclear warheads and delivery systems to make them more effective against underground facilities and chemical and biological weapons and associated facilities also is likely to be continued or expanded.[3]

Other programs which may be accelerated are those aimed at increasing U.S. capabilities to apply conventional force from a great distance without reliance on forward bases, which the current crisis has shown can be difficult both to obtain and to secure. These include, for example, development of conventional payloads for intercontinental ballistic missiles of various kinds, including such concepts currently under study as the Common Aero Vehicle, a maneuvering re-entry vehicle which would deploy a variety of sub-munitions.[4]

These programs are justified primarily as needed to counter the WMD threat from so-

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called “rogue states.” But highly accurate, powerful, long-range conventional weapons of this kind could have broad destabilizing effects, since they may also be able to destroy a variety of targets that previously could only be attacked with long-range nuclear weapons.[5]

If there are reductions in high-tech weapons programs, it is most likely that the mid-course national missile defense interceptors now under development and longer-range, more speculative technologies for missile defense and other applications (such as the space-based laser) would be slowed down. Defenses against ICBMs appear to be a lower priority for the military, who view defense of forward deployed forces and bases against shorter range missiles both as more feasible and as more likely to be needed in the short to medium term.[6] In addition, there has been little opposition from either party in Congress to the technologies being explored for defense against short and medium range missiles, while the mid-course interceptors intended to defend against ICBM’s still have influential opponents in Congress.

It is possible that the cost of large new military interventions, combined with a relative shortage of forces needed to sustain operations against irregular forces, will result in some debate within the military and their political supporters on the wisdom of spending many billions of dollars on high risk technologies such as missile defenses and even more speculative space-based weapons systems. But the proportion of national output now devoted to the military is relatively low compared, for example, to Cold War spending levels, and the United States for the past half century has used military spending as a primary form of economic stimulus when as now, the economy is weak. In the changed political climate, increases in military spending that are quite large in absolute terms are likely to be approved without a great deal of dissent from either of the major political parties. Proposed FY 2002 military spending, at well over $300 billion, would be at approximately 3% to 3.5% of GDP. Consequently, there could be substantial increases in military spending with the resulting spending levels still below average Cold War levels. Annual military spending for most of that period remained above 5% of GDP, and often was considerably higher.[7] Hence it seems likely that both extensive military interventions and additional high technology weapons research and procurement programs could be sustained.

Despite some rhetoric about international cooperation, the Bush administration’s foreign policy in the aftermath of September 11 still seems to favor unilateral action wherever possible, with collective action put together on an ad hoc basis to serve the needs of U.S. initiatives. Combined with the lack of substantial opposition in mainstream U.S. political circles to either military interventions aimed at finding and punishing alleged terrorists or significant expansion of military spending, this entrenched preference for unilateralism makes arms control progress involving the United States unlikely for the foreseeable future. There may be some reductions in nuclear force numbers which will look large to the general public, but cuts that will significantly change the capabilities of U.S. nuclear forces also are unlikely. The numbers publicly discussed by the Bush Administration in connection to recent U.S.-Russia talks– to 1700 to 2200 deployed strategic nuclear warheads– still would leave an arsenal large enough for the U.S. to carry out its

current nuclear war plans, which contemplate all-out "counterforce" attacks against Russia.[8] The Bush proposal was silent on the number of warheads that would be retained on inactive status rather than destroyed, and also said nothing about non-strategic nuclear forces or ongoing efforts to increase the capabilities of existing nuclear warheads and delivery systems.[9]

The trends towards new kinds of armaments with global reach provide reasons we desperately need control of weapons of mass destruction, long-range missiles, and other types of weapons that could operate through or from space. They also are reasons why meaningful arms control is so difficult to achieve in the current context. The economic, political, and bureaucratic obstacles that the military-industrial complex pose for arms control are well known. Also all too familiar are the difficulties of making progress towards disarmament amidst an ongoing arms race, even a one-sided one, due to constantly changing technologies, and the difficulty of anticipating their future progress.

Less discussed are the problems presented by overlaps among the technologies used to develop, operate, and maintain different types of high-tech weapons. If we ignore these relationships, it may be difficult to understand why certain programs continue, and why certain types of arms control steps or initiatives will or will not work. It has long been well known that the U.S. Department of Energy research laboratories that design and maintain the U.S. nuclear arsenal have worked for decades on a variety of other weapons programs, from ballistic missile defense to directed energy weapons. Nonetheless, little attention has been given to the implications for arms control of the multiple roles of such research programs and technologies. High energy laser and pulsed power facilities, and associated high performance computer simulation efforts, for example, play a significant role both in nuclear weapons research and development and directed energy research relevant to other advanced weapons concepts:

> ...[C]ooperative or collaborative work exists with DOE laboratories on pulse power, compact HPM [high power microwave] source development, RF [radio frequency] effects tests, power beaming technology investigations, specialized security sensor development, RF coupling code development, and mid-IR [infrared] semiconductor laser diode development.[10]

The Department of Defense 2000 *Laser Master Plan* called for greater coordination of high energy laser research with the Department of Energy nuclear weapons laboratories:

> DOE is funding related HEL [high energy laser] technologies such as Solid State Lasers and new beam diagnostics. The development of such technologies has potentially large payoffs if leveraged properly to DoD weapons applications. Conversely, DoD developments in HEL technologies may have significant potential for DOE missions, and DOE should take advantage of those developments. Also, advances in SSL [solid state laser], simultaneously being pursued by both DoD and DOE, could be coordinated more

> effectively. The DOE National Laboratories have opened the door to new lethality mechanisms that offer options for defeating targets with lower power lasers than previously thought. This should provide a rich set of opportunities for DoD-DOE collaboration.[11]

The FY 2001 Defense Authorization Act contained language implementing the *Laser Master Plan,* and also strengthened cooperation between the DOE laboratories and the Ballistic Missile Defense Organization on BMD research.[12]

These overlaps among weapons programs and facilities may have significant consequences for arms control. Facilities and programs which, for example, would present obstacles for nuclear disarmament, may have additional, powerful military and contractor constituencies in non-nuclear weapons programs. This makes it makes it more difficult to stop new programs and facilities or to close down existing ones, even where doing so likely would be a significant gain from the nuclear disarmament perspective. Even transparency for arms control purposes may be harder to achieve, because facilities may be used for a wide range of classified programs, some falling under one arms control regime or another and some under none at all.

Ballistic missile defense poses similar problems. BMD research and eventual deployment could provide the technology and infrastructure for a variety of space based weapons systems. The space based sensing systems BMD requires can be used to target a wide variety of weapons systems, and some of the more speculative BMD technologies (such as the Space Based Laser) could be used to attack terrestrial targets.[13] Consequently, even if BMD research fails to result in workable missile defenses in the near term, many of the relevant programs may be sustained because they have other applications, and hence a base of political and economic support that reaches beyond missile defense advocates.

Some U.S. missile defense opponents, seeking tenable middle ground in a U.S. political context where cost and technical critique is acceptable but criticism of the purposes of U.S. military programs remains taboo, have been willing to accede to billions of dollars in funding for a broad range of BMD research programs, while opposing early deployment. This approach, however, ignores the political power of the institutions that will be sustained and expanded by putting tens of billions of dollars into such research over decades. These institutions will provide campaign contributions, public relations budgets, lobbyists, and rosters of experts to promote their wares to Congress and the public, making the deployment of one set of missile defense or space weapons technologies or another almost inevitable. And given the long lead times of high-tech weapons programs, the militaries of other nations will argue that they must invest in programs to counter or evade the technologies that the U.S. might some day deploy. The Cold War in general, and its cycle of ever more sophisticated missiles developed in part to defeat never-deployed missile defenses, should have taught us that military technologies don't have to work to be dangerously destabilizing.

But when considering all of these details, it is important not to lose sight of the larger reality: as long as large, technologically and economically powerful countries remain in a state of high military mobilization, little will change. This is the most important feature of the current crisis: the growing ability of the most powerful state to place large forces and inflict great violence anywhere on earth.[14] Huge high-tech military forces and the institutions needed to sustain them create a constant tendency to use violence to resolve international conflict. The longer these forces persist without demobilization, the greater their political power, and the more acceptable the infliction of death and destruction as an instrument of policy.

Concrete arms control proposals focused on the most threatening weapons systems– like the Model Nuclear Weapons Convention and the various proposals for a truly comprehensive missile control regime-- are important, because they provide an alternative in public discussions to just building more high-tech armaments. But it also is essential to stress the importance of general disarmament, of moving away from the enormous, highly mobilized militaries of the last half century. This does not mean that we have to be able to envision a practical path to a world without weapons in the foreseeable future. But it does mean that the halting of all technology development that makes it easier for the most powerful states to apply great force quickly over great distances, must be a first priority. This must be accompanied by the elimination of weapons of mass destruction, and then reductions in long range forces of all kinds. We can not afford to accept the permanent state of readiness for total war that has existed for the past half century as normal.

This will require far more from all of us than criticism of particular weapons systems either as too expensive or impractical, or even as too "destabilizing." We need scientists and other people with visible and respected roles to provide more than technical information and expert judgments. If we hope to prevent a 21st century arms race, we will need them to provide a critical perspective on the uses of science and technology, and on the ethics of turning the skills of our most talented and educated people to the development of ever more devastating weapons, that informed the disarmament movements of the mid-20th century.

A half century ago, Lewis Mumford, an astute observer of the relationship between science and the military, told us what was necessary:

> Now, to the honor of the scientists who produced the atomic bomb, the consciences of their leaders suddenly took fire as soon as man-controlled nuclear fission proved possible.... They did their best, in this brief time, to repair the damage caused by their century-old indifference to social consequences. But their best was not good enough. To have aroused mankind fully to the extent of political invention and moral rehabilitation needed to provide even a minimal security, the actions of the scientists would have had to speak even louder than their words. They would have had to close their laboratories, give up their researches, renounce their careers, defy their governments, possibly endure

> martyrdom, if they were to convey to the public the full urgency of their convictions. Here the new social responsibility failed to overcome the neutralist habits of a lifetime. Even those who were most deeply disturbed by the possible misapplications of science continued to apply themselves to science. And while 'science as usual' prevailed, it was fanciful to hope that 'business as usual' and 'politics as usual' could be shaken out of their rut.[15]

In the end, the arms control efforts of the 20th century were not enough. This time around, scientists and arms policy experts in the United States will need to play a part in a genuine peace movement, one willing to question the purposes of these massive military forces, the interests they serve, and the role they play in the U.S. economy and in its politics.

1. "DoD has refocused and revitalized the missile defense program, shifting from a single-site "national" missile defense approach to a broad-based research, development, and testing effort aimed at deployment of layered missile defenses. These changes in the missile defense program will permit the exploration of many previously untested technologies and approaches that will produce defenses able to intercept missiles of various ranges and in various phases of flight. These defenses will help protect U.S. forward-deployed forces. Moreover, they will provide limited defense against missile threats not only for the American people, but also for U.S. friends and allies." U.S. Department of Defense, *Quadrennial Defense Review Report,* September 30, 2001, p.42

2. A Defense Threat Reduction Agency research funding request for "Counterproliferation Support," for example, note that

> Standoff weapons to be enhanced include the Tactical Tomahawk in a penetrator variant and the Conventional Air Launched Cruise Missile (CALCM). An enhanced payloads project explores alternate warhead options to conventional blast/ fragmentation with the objective of mitigating collateral effects associated with dispersal of NBC. Hard Target Defeat (HTD will demonstrate non- conventional (non-nuclear) weapons to functionally defeat tunnels. RDT& E Budget Item Justification Sheet (R- 2 Exhibit), RDT& E, Defense- Wide/ Advanced Technology Development Counterproliferation Support; 0603160BR, Project BK–Counterforce, June 2001.

A recent report to the U.S. Congress on "Defeat of Hard and Deeply Buried Targets" listed a number of other weapons programs intended to increase U.S. capabilities. See *Report to Congress on the Defeat of Hard and Deeply Buried Targets*, Submitted by the Secretary of Defense in Conjunction with the Secretary of Energy in response to Section 1044 of the Floyd D. Spence National Defense Authorization Act for the Year 2001, PL 106-398, July 2001, p.18 (Hereafter *HDBT Report).* The unclassified content of the report can be found at http://www.nukewatch.org/nwd/HiRes_Report_to_Congress_on_the_Defeat.pdf

U.S. programs researching hypersonic missiles and flight are summarized in United States Air Force Scientific Advisory Board, *Report on Why and Whither Hypersonics Research in the US Air Force,* SAB-TR-00-03 December 2000, p.29 et seq. (Hereafter Air Force SAB Hypersonics Report).

3. The *HDBT Report* stated that "unique and emerging strategic threats that are critical and well protected, both physically and through focused camouflage, concealment, and deception programs" will require "additional investment in intelligence, special weapons, and counter-WMD capabilities, including nuclear weapons." at p. 6. For

an overview of U.S. research aimed at developing more useable nuclear weapons for hard-target defeat roles, see Andrew Lichterman, *Looking for New Ways to Use Nuclear Weapons: U.S. Counterproliferation Programs, Weapons Effects Research, and "Mini-Nuke" Development*, Western States Legal Foundation Information Bulletin, Winter 2001 http://www.wslfweb.org/docs/mininuke.pdf

4. The *Air Force SAB Hypersonics Report* described the Common Aero Vehicle program as follows:

> Boeing and Lockheed Martin have been participating in Air Force–sponsored studies of advanced maneuvering reentry vehicles, often referred to as CAVs (see Figure 21). These vehicles with high lift-to-drag ratios have no primary propulsion, but have movable surfaces to provide high cross-range capability. They are designed to carry conventional weapons (small bombs, submunitions, or penetrators) and can be deployed from conventional ICBMs or a hypersonic cruise vehicle operating at high altitude. At p.35

A recent article in an Air Force Space and Missile Systems Center (SMC) newsletter indicates that such concepts already were gaining momentum:

> Over the last year, the force applications team has secured SMC's role in the future missile system commonly referred to as Minuteman IV that hopes to be a $20-30 billion procurement between 2004 and 2040. New missions for the system include holding both hardened and deeply buried targets and strategic relocatable targets at risk. Concepts being evaluated for these missions may include an earth penetrator reentry vehicle or a "smart" maneuvering reentry vehicle. With respect to force applications, the Minuteman IV activity is simply the first initiative, among many, for possible future space weapon systems. In parallel with the Minuteman IV is another effort addressing conventional prompt global strike needs which is referred to as the Common Aero Vehicle (CAV). " "Schriever Legacy Carries on in XR," *The XR Report, A Quarterly Newsletter of the Developmental Planning Directorate, SMC*, Vol. 3 no.2, Jan-Mar 2001.

5. The combination of precision, long-range conventional weapons and advances in electronic and information warfare is seen by some analysts as capable of fulfilling a variety of missions currently assigned to nuclear weapons. see, for example, A.F. Krepinevich, Jr. and R.C. Martinage, *The Transformation of Strategic-Strike Operations*, (Washington: Center for Strategic and Budgetary Assessments, 2001).

6. As the recently retired Commander of U.S. Joint Forces Command stated in the fall of 2000,

> This issue's been studied by panel after panel after panel and we got it-- Our current policy is one that I support and understand. The priority is lower tier theater ballistic missile defense systems first, upper tier systems second, national missile defense third. That's the way the threat is arrayed. Admiral (Retired) Hal Gehman, former Commander-in-Chief, US Joint Forces Command, speaking at a Washington, D.C. conference, "National Strategies and Capabilities for a Changing World," November 16, 2000, transcript at http://www.ifpafletcherconference.com/army2000/new.htm

7. The *National Defense Budget Estimates for FY 2002* places proposed total FY 2002 "National Defense" spending at 3.0% of GDP. This compares to levels of 5.1-6.2% during the 1981-1988 Reagan years, 7.4-9.4% during the 1960's, and at reaching levels over 10% during the 50's Cold War buildup. The estimated FY2002 Department of Defense Budget of $329,151,000,000 is estimated at 2.9% of GDP, meaning that an increase of $100 billion still would amount to slightly less that an additional 1% of GDP. Office of the under Secretary of Defense (Comptroller), *National Defense Budget Estimates for FY 2002* (August 2001), pp.68-73, Table 6- 2, Department of Defense TOA by Category, and pp. 202-203, Table 7- 7, Defense Shares of Economic and Budgetary Aggregates. At the time of this writing, the amount appropriated for the military by Congress still is not final, but it is liekly to be above these original estimates.

[8] Concerning the cuts discussed in November 2001 Bush-Putin talks, see Fact Sheet, "New Strategic Framework with Russia," White House Office of the Press Secretary, November 14, 2001. The Department of Defense noted in its year 2000 report to Congress evaluated the U.S. arsenal permitted by the proposed START III agreement, which called for 2000-2500 deployed strategic warheads:

> Once the Treaty on Further Reduction and Limitation of Strategic Offensive Arms (START II) has entered into force, the Department is confident that it can maintain the required deterrent at the force levels envisioned in a future treaty (START III), as agreed to in the March 1997 Helsinki Summit and reinforced at Cologne, Germany, in June 1999. William S. Cohen, U.S. Secretary of Defense, *Annual Report to the President and Congress 2000*, Chapter 6, Nuclear Forces and Missile Defenses

[9] Regarding the large n umbers of warheads and warhead components not counted in "deployed" weapons numbers, see Hans M. Kristensen, "The Unruly Hedge: Cold War Thinking at the Crawford Summit," *Arms Control Today*, December 2001, http://www.armscontrol.org/act/2001_12/kristensennov01.asp

[10] U.S. Air Force Materiel Command, Air Force Research Lab, Wright Patterson Air Force Base, FY98 Directed Energy Technology Area Plan, p.4.

[11] U.S. Department of Defense, Report of the High Energy Laser Executive Review Panel: Department of Defense Laser Master Plan, March 24, 2000 p.10.

[12] National Defense Authorization Act, Fiscal Year 200, Public Law 106–398 Oct. 30, 2000, sec. 241 et seq. (Lasers and directed energy); Sec. 3132. ("Enhanced Cooperation Between National Nuclear Security Administration and Ballistic Missile Defense Organization"). For a summary of Department of Energy nuclear weapons laboratories research areas considered by the Defense Department to be fruitful for military space systems, see U.S. Department of Defense, *Space Technology Guide FY 2000-2001,* Appendix H, pp. H-8 et seq., available at https://www.space.gov/technology/stg.shtml

[13] "Many of the technologies, systems and CONOPS [concepts of operations] developed for a robust Missile Defense provide a significant springboard for Force Application capabilities. In the event that the NCA [National Command Authority] chooses to accomplish Force Application, the ongoing Missile Defense efforts and the research and development initiatives outlined in the plan would meet all mission requirements by 2020;...." U.S. Space Command, *Long Range Plan: Implementing USSPACECOM Vision for 2020* (1998), p.69.

[14] The 2001 Quadrennial Defense Review emphasized that U.S. forces must "have the ability to project power worldwide, " and that

> Capabilities and forces located in the continental United States and in space are a critical element of this new global posture. Long-range strike aircraft and special operations forces provide an immediately employable supplement to forward forces to achieve a deterrent effect in peacetime. New forms of deterrence, emphasizing the strategic and operational effects that U.S. capabilities can impose upon an adversary, can incorporate globally distributed capabilities and forces to rapidly strike with precision mobile and fixed targets at various distances. *Quadrennial Defense Review Report*, pp. 43, 26.

Although the Bush Administration is likely to give more emphasis to military space programs and long range precision strike than its immediate predecessor, these programs already had considerable momentum:

> The precision strike ITT [integrated technology thrust] is addressing technology to enable an affordable capability to swiftly and flexibly deliver highly effective weapons against targets at any required global location. This ability to affordably destroy or neutralize any target on the earth will enable the execution of

more missions from CONUS or forward base. Department of the Air Force, *The Air Force Science and Technology Plan, FY2000*, p.22 Obtained through the Freedom of Information Act by the Western States Legal Foundation.

15. "Social Consequences of Atomic Energy," (1953) in Mumford, Interpretations and Forecasts: 1922-1972 (New York: 1973), p.307, at 310.