STRATEGIC MISSION—A MISSION DIRECTED AGAINST ONE OR MORE OF A SELECTED SERIES OF ENEMY TARGETS WITH THE PURPOSES OF PROGRESSIVE DESTRUCTION AND DISINTEGRATION OF THE ENEMY'S WAR-MAKING CAPACITY AND HIS WILL TO MAKE WAR. TARGETS INCLUDE KEY MANUFACTURING SYSTEMS, SOURCES OF RAW MATERIAL, CRITICAL MATERIAL, STOCKPILES, POWER SYSTEMS, TRANSPORTATION SYSTEMS, COMMUNICATIONS FACILITIES AND OTHER SUCH TARGET SYSTEMS. AS OPPOSED TO TACTICAL OPERATIONS, STRATEGIC OPERATIONS ARE DESIGNED TO HAVE A LONG-RANGE, RATHER THAN IMMEDIATE, EFFECT ON THE ENEMY AND ITS MILITARY FORCES.

JCS PUB 1-02

The impetus for maintaining the government and industrial teams has been provided by the continual development of systems. Trained workforces and specialized facilities cannot be maintained without a development program. Production of existing systems traditionally underwrites the development of the next by maintaining an industrial and governmental base. While no one can know what the future holds, viable strategic systems (and, especially, submarine-based systems) will be needed well into the next century. When a new strategic weapon system is needed in the future, development may be forced to proceed without an existing industrial base. In the absence of such a development, the life of existing strategic systems must be extended via the application of new technology. A key consideration in the planning for strategic systems, therefore, is the preservation of the key industrial and governmental base. Of particular interest in this regard are reentry system technology, rocket motors, and high-performance inertial guidance systems.

The definition of the strategic mission given in Joint Chiefs of Staff (JCS) Publication 1-02 (see shaded text) is more expansive and is concerned primarily with the intended targets and the level of control required. Other studies have begun to consider the strategic problem without limiting the solution to nuclear weapons. Another way to describe *strategic* is in the larger context of strike warfare. Strike warfare is the destruction or neutralization of enemy targets ashore using conventional or nuclear weapons. In other words, it is more accurate to think of strike warfare as a continuum, with the strategic mission as one extreme. This is shown in Figure 1. This view of strike encompasses the use of ballistic missiles of all ranges with conventional payloads against strategic targets, as well as short-range missiles for power projection or in a fire-support role in a littoral environment. Since it is not weapons-systems based, it also includes aircraft and cruise missiles.

This new definition of the strategic mission still assumes that deterrence is primary. It assumes, however, that the weapons required to deter may vary with circumstances. For example, a very capable nuclear triad is appropriate when dealing with a similarly capable adversary. On the other hand, SLBMs with conventional warheads may be used to augment the nuclear force or to supplant it when faced with a different adversary or situation. Taken further, smaller short-range missiles (on either submarine or surface platforms) may be appropriate in a theater-level conflict or in a littoral situation. They may deter or can be used to support landbased operations in the theater.

Studies that attempt to define strategic systems requirements assume a range of possible futures. They vary from a resurgent Russia with a large nuclear capability, to a much smaller treaty-limited nuclear force and multiple countries who possess nuclear weapons, to a world with no nuclear power comparable to the U.S. The variety of weapons previously described are characteristic of those needed in each of these situations. Perhaps the biggest challenge will be to sustain an appropriate strategic capability in the future within a constrained DoD budget. Maintaining a capable government-industry team will be critical to meeting this challenge.

In short, four thrusts associated with future strategic systems have been identified: maintenance of the industrial base, improved planning systems, modernization and life extension of existing systems, and the expansion of the strategic mission. There are ongoing efforts associated with each thrust. The Reentry Systems Application Program (RSAP), for example, addresses maintenance of an industrial and governmental base in reentry systems through the development of technology to extend the life of current reentry systems and components. One area receiving attention is the replacement of heatshield materials. The SLBM Retargeting System (SRS) program is addressing the improvement of the strategic retargeting processes from landbased planning and processing to shipboard implementation. This program, which began in 1989, has included both hardware and software upgrades and was one of the driving forces behind the SLBM Fire Control (FC) Life-Cycle Cost Control (LCCC) program. The FC LCCC program, besides adding capability needed to improve onboard retargeting processes, will yield a shipboard FC system that is supportable (and upgradable) well into the future. It will replace a computer-centered architecture (with a 1970s era computer and other specialized elements) with a distributed computer architecture utilizing nondevelopmental items (NDI) and commercial off-the-shelf (COTS) components (hardware and software) to the greatest extent possible. There have also been studies (leveraging the Advanced Technology Demonstration/Advanced Concept Technology Demonstration (ATD/ACTD) and Independent Research and Development (IR&D) programs) that address technology issues associated with the development and fielding of conventional SLBMs and the incorporation of existing small missiles, such as the Army Tactical Missile System (ATACMS).

NSWCDD has a long history in the SLBM program. It has been the primary developer of FC and targeting software for all SLBM systems from POLARIS (A1) to TRIDENT (D5).[1] It has

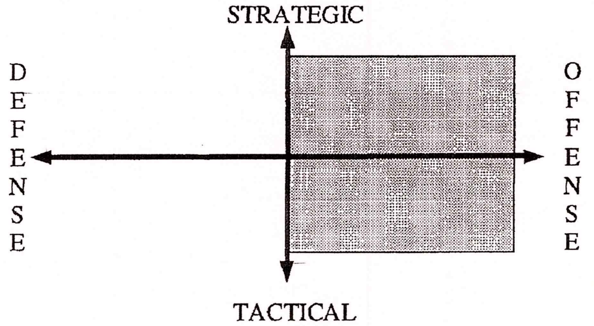

Figure 1—The Strike Continuum

an equally long history in developing and testing reentry systems. It has roles in the TOMAHAWK cruise missile, in surface ship-based missiles, and in Naval Surface Fire Support (NSFS) programs. These are described in previous issues of the *NSWCDD Technical Digest.*

The articles in this issue describe some of the NSWCDD efforts supporting the four thrusts outlined above. Morrison and Vamos describe the RSAP as well as the conditions that gave rise to it. Hill, Lafferty, and Marren address the wind tunnel facilities at NSWCDD, from its origins after World War II to its upgrades and use in testing many reentry and space systems. Gillum and O'Hare continue the discussion with a description of the analysis and testing of reentry body nosetip and heatshield materials. Regan considers a specific technical issue associated with a maneuverable reentry body. In particular, he develops a moving mass control system for such a vehicle and analyzes vehicle design and autopilot issues.

There are several articles that describe new technical solutions to standard targeting problems. Davis and Owen present a computer algorithm that can be used to solve the multiple constraint targeting problem characteristic of shipboard mission planning for SLBM. Godin describes a new approach to solving the traditional sequencing and grouping problems associated with the targeting of multiple, independently targeted reentry vehicle (MIRV) systems, such as TRIDENT. He proposes the application of a fuzzy-logic-based expert system to this problem. Nuclear warhead detonations can be used to produce a high-altitude electromagnetic pulse (HEMP). Brown and Bressler describe the military utility of this phenomenon and the fundamental physics that support a first-principles computer code developed by NSWCDD.

FC modernization can take several forms. Cooper and Philpott address some of the implications of developing software for an NDI/COTS-based distributed, synchronous, real-time FC system. They describe the current system and its associated constraints, and the implementation of NDI/COTS elements in a way that satisfies these constraints. FC modernization may also address the upgrading of computations to either incorporate new mathematical techniques or better utilize the capability provided by a new shipboard computer architecture. Two specific examples are included. Rufty presents the development of an accurate and computationally efficient gravity model based on point masses, point dipoles, and point quadrupoles. He develops the model and describes its applicability to both SLBM and other applications. Wright describes the current modeling of reentry weather data in SLBM FC computations and possible improvements to it.

As noted previously, NSWCDD has supported a variety of efforts related to the development and testing of small short-range missiles that have applicability to possible future strategic missions. One such system is a Navy version of the ATACMS (sometimes called NATACMS). NSWCDD supported N8 in an ATD program to demonstrate the effectiveness of the ATACMS in a shipboard environment. Frazer and Bibel describe the modifications required to the Army missile and launcher, the flight test program (including a launch from USS *Mount Vernon*), and postflight results.

REFERENCES

1. Gates, Robert V., "Strategic Systems Fire Control," *Naval Surface Warfare Center, Dahlgren Division Technical Digest,* 1995 Issue.