Medaris award recognizes GMD Team, Missile Defense Program

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The Huntsville, Ala., chapter of the National Defense Industrial Association honored the U.S. Army Space and Missile Defense Command in October 2004 as part of the Ground-based Midcourse Defense (GMD) Team, which was recognized with the John B. Medaris Award[1]. The award honors the memory of MG John B. Medaris, who provided the leadership and direction that resulted in significant contributions in the field of missile systems technology. He was the first officer in Army history given complete responsibility for research, development, production and deployment of a major weapons system, the Jupiter Intermediate Range Ballistic Missile (IRBM).

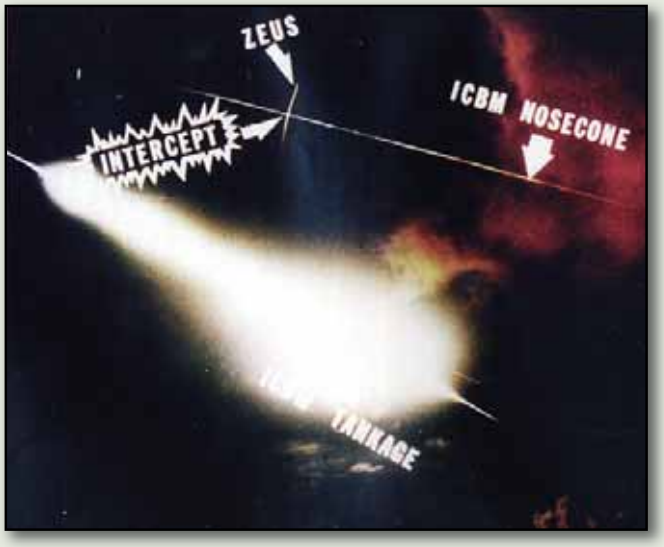
The GMD team was led by the GMD Joint Program Office, Missile Defense Agency, and included the prime contractor, the Boeing Corporation with its subcontractors; the Army Corps of Engineers; and the U.S. Army Space and Missile Defense Command — all recognized for their significant contribution to the technical progress of this national defense program.

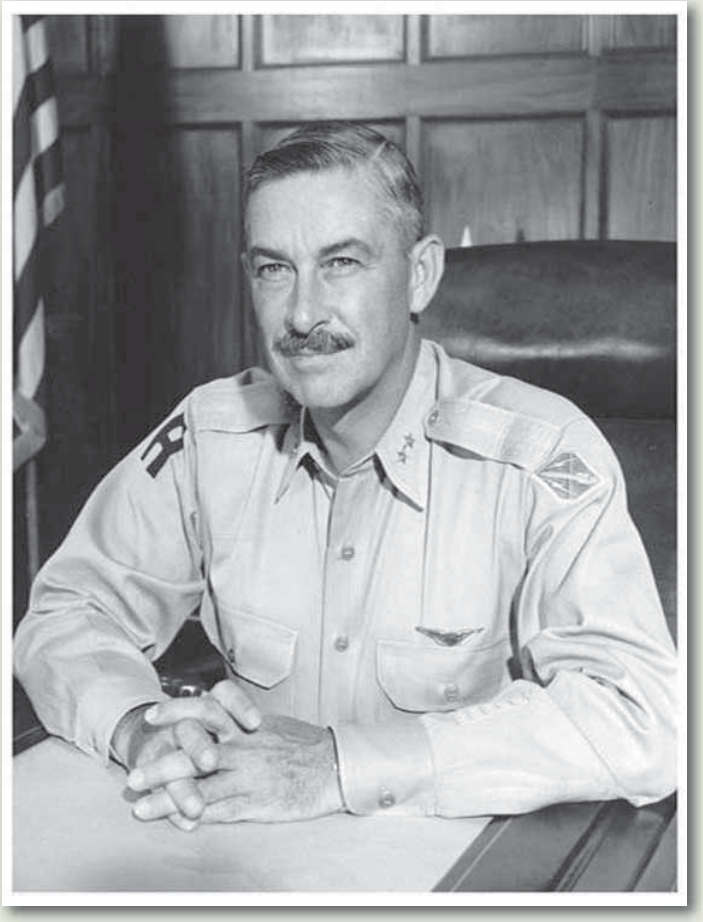
While the Medaris Award recognized the team, it also acknowledged all the people and organizations involved in developing missile defense from its beginnings. The Army's roles and missions in Space and missile defense stem from its oldest assignment, protecting American territory from foreign invasion. While the means of performing the task have changed from coastal defense forts in the 19th and 20th centuries, to antiaircraft and air defenses in the 20th and 21st centuries, the intent has remained unchanged.

At the end of World War II, two new weapons, the atomic bomb and the guided missile, complicated this mission, presenting the Army with unprecedented technological challenges. These new factors in the national defense equation led the Army to expand its investigations and experiments with missiles, Space-based communications and sensor technologies to field new weapons systems. General Medaris was one of the leaders of these Army efforts.

By the mid-1950s, under the threat of Soviet nuclear attack, the Army and Bell Laboratories, a major defense contractor, concluded that ballistic missile defense was both technologically feasible and affordable. The Army's efforts in developing guided missile technology resulted in the first successful American missile flights, earth orbiting satellites, lunar and solar probes, safe live primate launch and recovery, as well as the first communications, meteorological and reconnaissance satellites. Many of these early Army efforts were the work of Dr. Wernher von Braun and his rocket team, who worked under General Medaris' direction, at the Army Ballistic Missile Agency (ABMA) at Redstone Arsenal.

Through 1959, the Army's efforts in rocketry, missile defense and sensor technology were complementary. That year the Eisenhower Administration broke this synergy when it reallocated military Space missions among the armed services and formed the National Aeronautics and Space Administration (NASA) to civilianize Space exploration. While retaining proponency for ballistic missile defense, the Army was stripped of its Space assets. The new agency inherited some of the missile programs and the Redstone Arsenal missile development facilities, renamed the Marshall Space Flight Center. It also received the Explorer satellite program, all the rocket and missile contracts the Army had with the California Institute of Technology's Jet Propulsion Laboratory, as well as responsibility for developing the 1.5 million-pound thrust Saturn rocket. The Army also transferred technical expertise (approximately 6,500 people) from the ABMA Development Operations Division to NASA. The Air Force gained control of the Jupiter-C IRBM program and responsibility for developing an intercontinental ballistic missile (ICBM).





Above, on Dec. 12, 1962, the NIKE-ZEUS Project Office achieved the first fully successful intercept of an ICBM. This photograph illustrates beyond a doubt the Army's achievement.
Right, MG John B. Medaris.

Forced out of Space, the Army continued to make technological progress in pursuit of ballistic missile defense, culminating in the deployment of the only Ballistic Missile Defense (BMD) system in the western world. In the 1950s and 1960s, as it created various missile defense systems, Nike-Zeus, Nike-X, Sentinel and Safeguard, the Army missile defense organizations evolved into entities that combined research, development, testing, evaluation and acquisition functions.

Despite the successes of the Nike-Zeus in intercepting an ICBM in 1962 and its successful satellite intercept the following year, Secretary of Defense Robert S. McNamara generated controversy when he determined that the missile defense system was neither technologically feasible nor cost effective. He assumed the Soviets would overwhelm it by launching more missiles than could be intercepted. His own preferred solution was mutual assured destruction[2]. In 1965, after China developed and tested nuclear weapons and missiles, strategists referred to an "Nth" country threat to stability. McNamara eventually agreed with the premise and announced a decision to deploy the Sentinel system to protect urban and industrial areas[3] against a possible Chinese attack. Development work proceeded.

In the 1960s, missile defense research developed the Sprint and Spartan missiles as part of the Sentinel system — a BMD system designed for light area defense against low level ballistic missile attack. Sentinel later became the SAFEGUARD System — midcourse and terminal phase defense for ICBMs[4]. As arms control negotiations began with the Soviet Union, diplomats on both sides used their anti-missile systems as bargaining chips to obtain concessions. In November 1966, Secretary McNamara announced that the Soviet Union had deployed an ABM system around Moscow. Sixty-four launchers surrounded Moscow, equipped with the Galosh, a nuclear-tipped interceptor with an estimated range of 200 miles. In the 1970s, the Army activated the only missile defense system in the West, the Stanley R. Mickelsen Safeguard Complex in North Dakota. The SALT I talks eventually produced the Anti-ballistic Missile (ABM) Treaty, which limited each signatory to deploying ballistic missile defense systems at two sites each: one near the National Command authority, and the other near an ICBM complex. The Senate ratified the treaty in 1972. Further restrictions were placed on the ABM program after a protocol to the treaty, limiting each country to one ABM site either the National Command Authority or an ICBM complex was signed in 1974. This agreement went into force in May 1976.

In October 1975, the Stanley R. Mickelsen SAFEGUARD Complex (SRMSC) became the first and only ABM system in the western world. On that same day, the House Appropriations Committee recommended the SAFEGUARD site be deactivated by the end of the fiscal year, reasoning that its operating costs, combined with the limitations imposed by the ABM Treaty and the development of Soviet MIRVed missiles, would make its benefits negligible

In December 1975, the Joint Chiefs of Staff ordered the SAFEGUARD Command to terminate the ballistic missile defense mission and ordered the deactivation of SAFEGUARD in February 1976. The missiles and warheads were removed by September 1976 and in September 197, the SRMSC entered caretaker status.

Despite this setback, the Army's scientists and engineers continued to develop and test a missile defense concept through the Ballistic Missile Defense Organization (BMDO), the organization that consolidated all ballistic missile defense efforts under a single manager[5]. The period between 1974 and 1983 began with congressional limitations in ballistic missile defense initiatives, expanded interest in Directed Energy weapons (Neural Particle Beams and lasers) and was followed by a rush to accelerate development of a defense for American ICBMs.

BMDO's engineers explored using airborne and/or Space-borne sensors to discriminate between targets. These experiments demon-

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The Stanley R. Mickelsen Safeguard Complex in North Dakota.

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strated that a long-wave infrared sensor could discriminate between, designate and track reentry vehicles. Encouraged, the experimenters investigated the technical feasibility of using airborne optical sensors to detect, track and discriminate between ballistic missile reentry vehicles together with the ability to pass trajectory data to ground-based radars.

The advances made in infrared sensor and computer technology encouraged scientists to experiment with hit-to-kill technology, leading to the first kinetic interception of a missile in Space with the Homing Overlay Experiment. In June 1984, a kill vehicle and a mock warhead collided at speeds greater than 15,000 feet per second more than 100 miles above the Pacific Ocean. The Homing Overlay Experiment was the first true revolution in ballistic missile defense since research began in the 1950s, literally proving that a bullet could hit a bullet.

In the early 1980s, the Joint Chiefs of Staff began a reassessment of the vulnerability of America's ICBM arsenal. They concluded that a missile defense effort was required. In a February 1983 meeting with President Ronald Reagan, they recommended that the United States follow a national security strategy which placed increased emphasis on strategic defense. In the words of the Chairman of the Joint Chiefs of Staff, General John Vesey, "Wouldn't it be better to defend the American people rather than avenge them." In a March 1983 national television address, President Reagan announced his concept for the Strategic Defense Initiative (SDI) and called on "the scientific community in our country … to give us the means of rendering these nuclear weapons impotent and obsolete."

The Strategic Defense Initiative Organization (SDIO) was a multi-service group that created a concept for tiered, or layered, defense against enemy missile systems during any of its three flight phases: boost, midcourse and terminal. Each service was assigned elements designed to track or intercept a missile during specific phases of its flight. However, the Army's anti-ballistic missile experience was its foundation and the Army repeatedly took the lead in project development.

By September 1987, Secretary of Defense Casper Weinberger had approved the Strategic Defense System Phase I baseline architecture and authorized six components of SDI to enter demonstration and validation process, including a Space-Based Interceptor, a Ground-Based Interceptor, a ground-based laser, a ground-based sensor, Space-based sensors and a battle management system. The cumulative effect was to place the Army back in Space with missile development.

The 1980s also saw interest in the anti-satellite program. The Army had conducted anti-satellite experiments between 1962 and 1963 in Project Mudflap. In May 1963 a Nike-Zeus missile launched from Kwajalein successfully intercepted an Agena D earth satellite. In September 1964, President Lyndon B. Johnson announced the United States possessed an anti-satellite capability. The Army and the Air Force each deployed a system. The Army's Nike-Zeus anti-satellite system was terminated in 1966 because it duplicated an Air Force system, which remained operational until 1975.

The new anti-satellite program continued research begun in the 1970s, and would counteract an already deployed Soviet anti-satellite system. Defense Acquisition Board requirements included both kinetic energy and directed energy approaches. As funded, the anti-satellite program was distinct from strategic defense, but drew on the Army Strategic Defense Command's kinetic and directed energy research. Thus, SDI funding directly affected anti-satellite development. This work culminated in a hover

test that demonstrated the kill vehicle's ability to fly a predetermined simulated flight path by firing its divert/attitude control system thrusters.

Through the 1980s and 1990s, the services worked toward developing lasers that could be used against satellites and missiles. In 1989, the facility at White Sands Missile Range, N.M., the High Energy Laser Systems Test Facility, was transferred from the Army Materiel Command to the Army Strategic Defense Command's control to centralize high-energy laser research. The Data Collection Experiment of 1997, using the Mid-Infrared Advanced Chemical Laser and the Low Powered Chemical Laser demonstrated that even a low-powered laser could affect a satellite's performance after brief exposure.

The end of the Cold War and the collapse of the Soviet Union and its Eastern European empire changed the way the Army looked at missile defense. The proliferation of missile technology and weapons of mass destruction signaled a change in strategic defense, shifting the emphasis to protecting against limited attacks from hostile nations. In the 1990s, missile defense focused on integration. Ambassador Henry Cooper, later the SDIO Director, submitted the results of his independent study of the SDIO program that examined the strategic requirements for this new situation. Ambassador Cooper delineated the concept that became the Global Protection Against Limited Strikes, which was a change in missile defense specifically designed to protect against limited strategic and tactical missile attacks.

During the Gulf War of 1991, a Patriot air defense missile destroyed an Iraqi Scud missile attacking a U.S. air base in Saudi Arabia; the age of "Star Wars" actually arrived. These developments encouraged the Army to reevaluate its goals for missile defense and Space, and led to creating a new organization, the U.S. Army Space and Strategic Defense Command, to meet them. The new organization would centralize the Army's research and development of Space and strategic assets for the Soldier in the field.

In 1997, the Space and Strategic Defense Command became the Army's newest major command, the Space and Missile Defense Command. The new command would be responsible for ensuring that Army warfighters have access to Space assets and the products they provide to win decisively with minimum casualties and effective missile defense to protect the nation as well as deployed U.S. and allied forces and lead the way for Army Space and missile defense. It would integrate Space support in full spectrum land operations, create a global multi-element missile defense, cultivate Space partnerships and extend advanced Space and missile defense technology for combat forces. It was, in fact, the culmination of a process that began in the 1980s as the Army reentered Space and continued as it centralized its Space and missile defense efforts in 1992.

SMDC would be tailored to suit the Army's 21st century needs for an organization combining combat and materiel developments, acquisitions and operations. Integrating these functions in a single entity continued an effort begun by centralizing BMD functions to save time, effort and money by reducing the competition for Space and missile defense resources within the Army, enabling it to better explore the global reach of the Army's assets.

After the end of the Cold War, the fires that fed the missile defense debate appeared to have been banked by the disappearance of the Soviet threat. As new threats emerged, the proliferation of both guided missiles and weapons of mass destruction, missile defense became a more urgent matter. When it returned to the national stage, the debate was still bounded by the same parameters it had when Secretary of Defense McNamara thought it both technologically and economically unfeasible. Partisans on both sides shed more heat than light, overshadowing the work of the Army's engineers and contractors who performed amazing technological feats. Nevertheless, missile and nuclear proliferation have compelled the United States to begin constructing a missile defense system.

Our future embraces the past and the present — from rockets to Space to missiles and missile defense — brought together by the visions of people like General Medaris. In July 2004, research took another small step toward national missile defense reality when MG John Holly, Program Manager for GMD, officials from MDA and visiting dignitaries dedicated the first GMD missile field at Fort Greely, Alaska. The monument unveiled at the dedication reads, "Forging America's Shield." The missile defense program remains a work in progress, but our research and testing will continue to improve that reality.

[1] Based on the Oct. 20, 2004, SMDC presentation at the Tennessee Valley Chapter of the National Defense Industrial Association, Medaris Award ceremony.

[2] Mutual assured destruction (MAD) was based on the notion that neither the United States nor the Soviet Union would ever start a nuclear war because the other side will retaliate massively and unacceptably. It was a product of massive retaliation, and despite redefining it as "flexible response" or "nuclear deterrence," it was the central theme of American defense planning for more than 30 years. The strategy assumed each side had enough weaponry to destroy the other and that either side, if attacked for any reason by the other, would retaliate with equal or greater force. The expected result would be an immediate escalation resulting in both combatants' total and assured destruction. MAD further assumed neither side would launch a first strike because the other would launch on warning resulting in the destruction of both. This doctrine was used during the Cold War and was seen as preventing direct full-scale conflicts between the two nations as they engaged in smaller proxy wars around the world.

[3] In 1967-1968, the Department of Defense announced the locations of fifteen Sentinel sites: Boston, Chicago, Grand Forks Air Force Base in North Dakota, Salt Lake City, Detroit, Seattle, Hawaii, New York, Albany, Georgia, San Francisco, Los Angeles, Sedalia, Missouri, Warren Air Force Base in Wyoming and Malmstrom Air Force Base in Montana. Two other site locations, Washington, D.C. and Fairbanks, Alaska, were never publicly announced. This deployment ensured that the combined footprint of the various batteries covered the entire nation.

[4] Sentinel and SAFEGUARD used the same equipment. The former defended cities and industry while the latter defended ICBMs. The first Sentinel component was the Spartan, a three-stage interceptor armed with a high-yield nuclear warhead launched from an underground cell and designed to destroy ICBMs in the exoatmosphere. The second was the two-stage short range Sprint, armed with a low-yield nuclear warhead, designed to maneuver within the atmosphere to intercept warheads that survived the area defense provided by Spartan. This maneuverability maximized the time available for discriminating between warheads and decoys.

[5] Not to be confused with the predecessor organization to the present day Missile Defense Agency.