TMD REPORT TO CONGRESS

30 MARCH 1991

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I. Introduction

This Plan is submitted in response to the FY 91 Appropriations Conference Committee Report, H. Rep. 101-938, Title IV, pages 117-118, dated October 24, 1990. In that report, the conferees:

- Stated that research and development on tactical and theater ballistic missile defense programs should be accelerated and that the system should be fielded as soon as technologically and fiscally feasible;

- Acknowledged that it was premature to designate a particular Tactical Ballistic Missile Defense (TMD) system as the baseline and stated that such a baseline should be developed on fair and impartial evaluation of the cost and military effectiveness; and

- Asked the Secretary of Defense to submit to the Congress, no later than March 1, 1991, his plan for determining requirements for the tactical baseline system and selecting and fielding it. Furthermore, the conferees asked that

> "this plan be funded fully in the fiscal years 1992-1997 Six Year Defense Program. The conferees also believe that this plan should include a full examination and inclusion, as appropriate, of the Navy and Air Force requirements for tactical ballistic missile defense systems and programs. The plan should outline how the Defense Department will integrate these services into the centrally-managed programs to address their requirements."

The Conference Report called for the establishment of a centrally managed tactical ballistic missile defense research and development program under the auspices of the Office of the Secretary of Defense. The Strategic Defense Initiative Organization (SDIO) will be this management office and, therefore, responsible for central management and oversight of the DoD TMD Program. This decision reflects several considerations including: the leverage of using an established organization that was already involved in theater missile defense research (ERINT, THAAD, and Arrow for example) with ready access to SDIO-developed technologies; the efficiencies of closely coordinating theater and strategic defense technology development programs; and the need to integrate DoD programs and international requirements to ensure the effectiveness of future fielded systems. In response to this decision, the SDIO will establish a managerial position as Deputy for TMD, equal in status to the Deputies for technology and strategic programs.

II. Overview

As ballistic missile technology proliferates, the tactical ballistic missile threat is becoming more complex and sophisticated. In the foreseeable future, longer range, more capable missiles can be expected to threaten possible theaters of operation for deployed US forces as well as our friends and allies throughout the world. The TMD Program will be designed to provide regional wide area defenses to counter these future missile threats, which may be armed with conventional, chemical, biological, or nuclear weapons.

A number of recent decisions serve to underscore the importance the Administration attaches to achieving an effective TMD capability at the earliest opportunity. Most significantly, as a result of more than 12 months of analysis of the changing international security environment and its implications, the President directed that the SDI program be reoriented to focus on accomplishing a revised set of mission objectives—protecting the United States, US forward-deployed and power-projection forces, and our allies and friends from limited ballistic missile strikes, irrespective of their source. As a result, Theater Missile Defense activities have taken a much greater priority

within the overall SDI program. Because a system capable of performing this mission must be truly global in scope, it is called "GPALS," which stands for Global Protection Against Limited Strikes. Accordingly, Secretary of Defense Dick Cheney has directed that the Department's TMD plans and programs be accelerated and that SDIO develop options for deploying improved theater missile defenses by 1995.

The DoD, through SDIO, will provide centralized TMD program direction and integration of requirements and technology initiatives with decentralized execution of the program. The TMD Program will require and involve the full participation of the Services and warfighting Commanders in Chief (CINCs) in the system selection and development process, focused by SDIO as the DoD central manager, to meet Department goals. SDIO will ensure that a fully coordinated, yet accelerated, development and deployment program will provide balanced defense systems to protect deployed US Forces and interests and our allies from ballistic missile attack. The SDIO TMD Program will develop a baseline Theater/Tactical Ballistic Missile Defense System for deployment in the near-term and identify its synergy with strategic defense components including overall Battle Management/Command, Control, Communications (BM/C^3) architectures. Further, this centralized management will ensure effective use of resources to upgrade existing systems, develop new concepts, and integrate defenses with our allies. SDIO will be the principal architect for what could be a stand-alone TMD system, including US systems and potential allied elements, by the mid 1990s. It would also be readily integrated into a Global Protection Against Limited Strikes (GPALS) system, which will not be fully deployed before the end of the decade. This future combined capability will result in improved efficiency and increased effectiveness of US TMD systems. Finally, SDIO, as the DoD agent, will identify and allocate the resources necessary to support research, development, and acquisition of TMD elements throughout the Future Year Defense Program, consistent with the Department's Planning, Programming and Budgeting System.

This TMD Plan was prepared in coordination with the Services and meets the objectives established by the Appropriations Conferees in the first session of the 101st Congress. The Plan: presents an overview of the ballistic missile threat and current system capabilities (Chapters III & IV); identifies the baseline requirements definition process and the role of SDIO as the central manager for the TMD Program in that process (Chapter V); and presents Department (Agency and Service) roles in developing technologies and fielding weapons improvements to include a baseline TMD system (Chapter VI). It also describes the allocation of funds that will be the basis for full funding to support the TMDI Program, to include technology demonstration and procurement, throughout the FY 92- FY 97 period (Chapter VII).

III. Threat

The TMD threat is characterized by missile technology proliferation (improved accuracy and increased range); the rapid expansion of missile-capable nations (purchase from others and/or indigenous manufacture); and increased technical sophistication (warhead design to include weapons of mass destruction). These developments are even more worrisome when combined with what we know to be a major effort by some nations to develop or acquire weapons of mass destruction, such as chemical, biological or nuclear weapons.

As Secretary Cheney noted in his February 21, 1991, testimony before the Senate Armed Services Committee:

> [The war in the Persian Gulf] presages much of the type of conflict we are most likely to confront again . . . major regional contingencies against foes well-armed with advanced conventional and unconventional weaponry.

> Iraq also illustrates the growing problem of the proliferation of weapons of mass destruction . . . . By the year 2000, it is estimated that at least 15 developing nations will have the ability to build ballistic missiles--eight of which either have or are near to acquiring nuclear capabilities. Thirty countries will have chemical weapons, and ten will be able to deploy biological weapons as well.

In addition, an extensive network exists for trade in advanced technology related to ballistic missiles and their components, which means that additional countries, beyond those that can indigenously produce their own, may acquire ballistic missile capability.

The impact of this proliferation is significant: most of our allies and friends, as well as the Soviet Union, are vulnerable to missile attack from many developing nations. The quantity of missiles and their possible use is also a consideration. Missile-capable nations may not need to use large numbers of missiles to cause dramatic political change in the region, for the mere threat or subsequent use of a weapon of mass destruction may be sufficient to achieve a regional goal. Lt. Gen. Charles A. Horner, Air Component Commander of Central Command, supported this need in a recent statement:

> I underestimated the political impact of the Scud intermediate-range ballistic missile. It is a lousy weapon, a terror weapon. It was a miscalculation that was defused only by the success of . . . PATRIOT anti-aircraft missiles in destroying most of the Scuds before they hit the ground. But the PATRIOT's success also has exposed a hole in the allied arsenal. The PATRIOT is a point defense weapon and the areas to be defended in Saudi Arabia are concentrated in a few small clusters. If the allied military targets had been spread out, there wouldn't be enough PATRIOTs in the world to defend them all. In 15 to 20 years, when very accurate missiles with mass destruction warheads are available to Third World [Developing] nations, the US will need a regional, wide-area air defense force to duplicate on a grand scale the PATRIOT's pivotal role in defanging the Scud.

The threat to be countered, then, includes intentional missile attack as part of a regional campaign to seize and control territory; terrorist threat or limited attack of population centers or critical assets to achieve political benefits; and/or accidental launch of missiles.

As we look to the future, the threat posed by ballistic missiles will increase. Not only will more countries acquire ballistic missile capabilities, but the technology of those missile systems will improve. While we will redouble our efforts to control the spread of missile technologies, we have seen that these efforts alone cannot solve the problem. We can already identify the trend toward longer range missiles with increased accuracy, and more lethal warheads. As a result, these systems will not only pose a more serious military threat, but they will be more challenging targets to defend against.

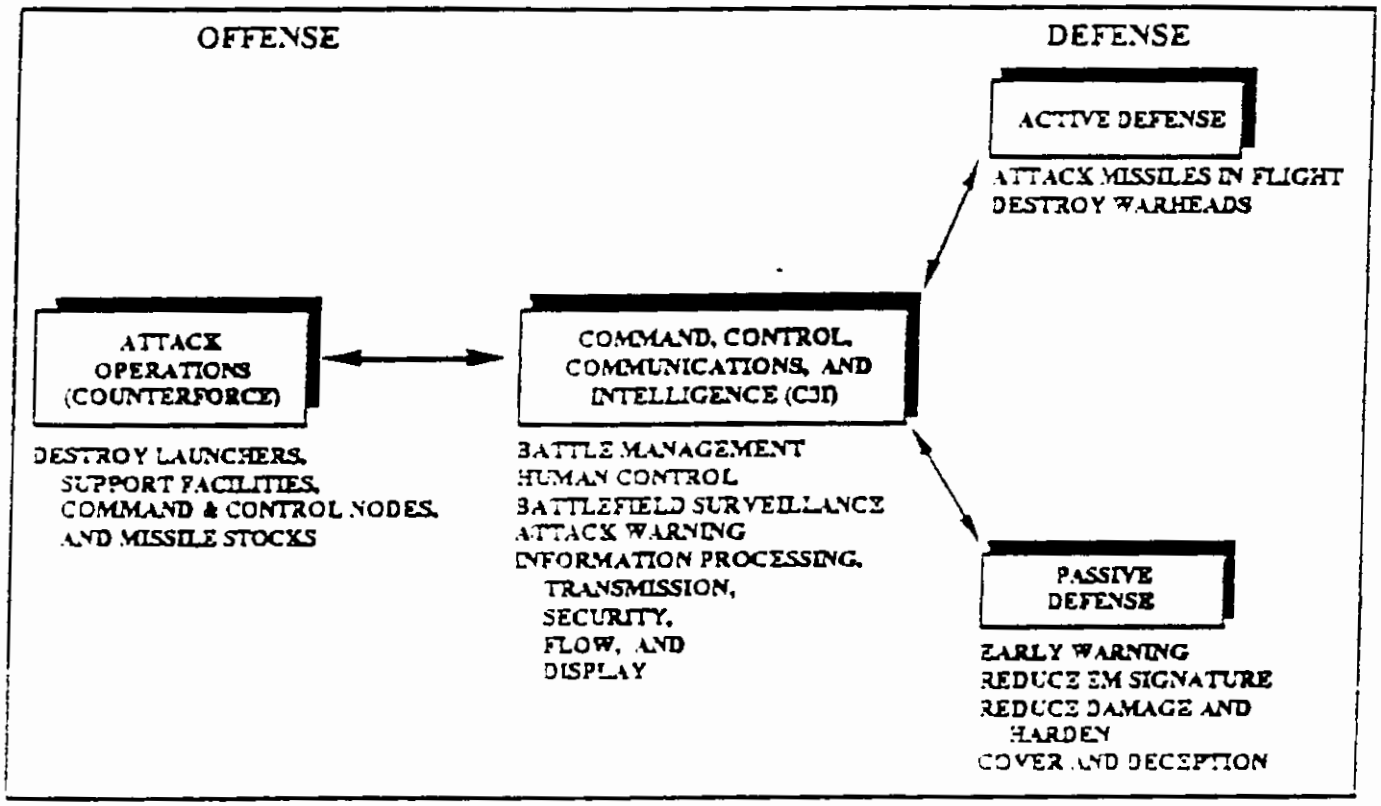
The United States cannot afford to allow these ballistic missile threats to constrain a future President's flexibility in pursuing vital national interests. Our credibility as a distant security partner and our role as the leader of a global coalition for freedom depend on our ability to project power. In the future, our power projection forces will be increasingly threatened by advanced missile threats. Hence, the development and deployment of advanced theater missile defenses under the TMDI program is an essential component of our national security posture in the 1990s and beyond.

IV. Current Capabilities

The need for TMD has been recognized by the Department for several years with the requirement process concentrated on the defense of critical military assets threatened by ballistic

missiles of the Soviet Union and its Warsaw Pact allies. The current Joint Chiefs of Staff-approved Operational Concept for tactical missile defense is under review to identify emerging CINC concerns to provide a basis for this new, more robust TMD Program. Whatever the outcome of this review, certain attributes of the current program will be retained.

Figure 1. Elements of Theater Missile Defense System



As illustrated in Figure 1, the general attributes of a comprehensive defense against theater ballistic missiles consists of four major elements: Active Defense or the in-flight intercept and destruction of ballistic missiles; Attack Operations or Counterforce Missions to destroy the enemy capability to launch missiles once hostilities have started; Passive Countermeasures or the ability to evade target detection and/or survive nearby missile impact; and Command, Control, Communications, and Intelligence (C^3I) capability to effectively control TMD operations.

The TMD Program will build on the technologies developed and systems deployed by the Services and the programs described in the Joint Tactical Missile Defense Master Plan (U), dated 20 July 1989, to meet the increased threat as described earlier. Allied contributions to the TMD Program will also be considered. Current capabilities include:

Active Defense: PATRIOT is the only system available to US forces today that is able to provide limited area defense against conventional ballistic missiles. System improvements are planned to improve substantially its limited capability. The Army HAWK and Navy AEGIS with its Standard Missile provide anti-cruise missile and manned aircraft defense capability that is being evaluated for possible anti-TBM roles.

Attack Operations (Counterforce): Each Service provides its element of a combined arms team to support counterforce operations. The Air Force uses its surveillance systems to target suspected launch sites and support facilities, then provides that information to the

Service Counterforce Planners. The Army uses its intelligence and early warning and deep attack capability to attack ballistic launcher sites with missiles or artillery. The Navy provides its support with long-range cruise missiles, strike aircraft, or ship-based artillery. The Air Force uses manned aircraft to attack ballistic missile launch sites with air-to-surface munitions. Special Operational Forces of all services will also be employed. Marine Air Ground Task Forces are capable of conducting attack operations against ballistic missile launcher sites with air, artillery, and a variety of other means.

Passive Countermeasures: Such measures are designed to increase the survivability of critical unit-level assets and forces. Specifically, such measures can: reduce the probability of target detection; increase the time required to obtain sufficient target accuracy; and reduce the vulnerability of the target itself. Such measures include camouflage, cover and deception; mobility; emission control; hardening; and redundant systems.

Command, Control, Communications, and Intelligence: Current space-based, airborne, and ground-based sensors collect intelligence information on missile launch sites and command and control centers, principally once a missile has been launched. This information is disseminated to all Service users through existing communication channels once it has been processed. National and military assets can provide early warning of missile attack and targeting and cuing information to battlefield systems; airborne systems provide surveillance and fire control for manned aircraft counterforce operations.

V. Determining the Baseline Requirements

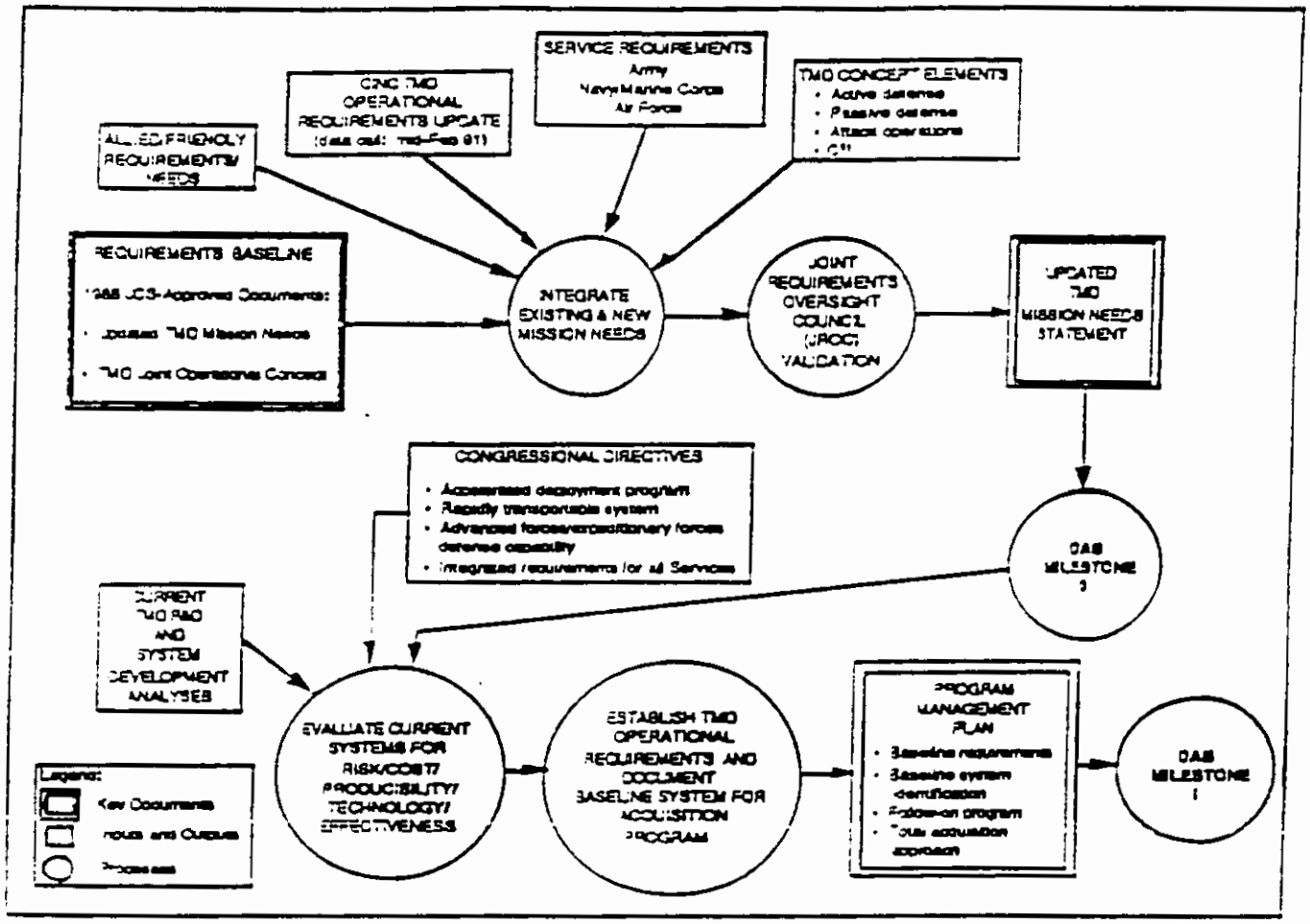
The requirements process includes consideration of the status of deployed assets and planned product improvements, expected changes in the threat, and possible defenses to be employed by our allies. The process will include the intelligence community development of the threat by region in terms of quantity and quality; CINC- and Service-developed mission needs; the Joint Requirements Oversight Council (JROC) validation of mission needs; and SDIO-developed technical alternatives to meet these needs. The process will include allies as they participate in cooperative programs. Figure 2 illustrates this requirements process. It is consistent with the Defense Management Report, implementing DoD acquisition policies and procedures (as defined in DoD Directive 5000.1 and Instruction 5000.2), and the accelerated program required to meet this growing threat.

The requirements process will balance the need for technical improvement of each of the elements of the TMD concept to achieve an overall goal of improved anti-ballistic missile defense for deployed US Forces and interests, our allies, and friends. Relevant SDIO technology will be applied to and leveraged by Service Counterforce, Passive Countermeasures, and C^3, and Intelligence mission areas to contribute to a balanced TMD Program.

TMD system designs will evolve in concert with other SDIO activities to assure that TMD system elements can be fully integrated into the overall architecture for the GPALS system. This fully integrated capability will enhance the stand-alone TMD system's effectiveness by providing earlier attack warning that could permit intercepts prior to stand-alone TMD engagement ranges.

In sum, the ultimate system will provide: pre-launch intelligence and warning; nearly instantaneous launch detection and accurate launch point determination and impact point prediction; threat trajectory for interceptor cuing; improved antimissile lethality and keepout range; and real-time tactical data links between all sensors and defensive elements. These capabilities are needed to increase defensive coverage, reduce counterforce reaction times, and improve overall TMD system effectiveness.

Figure 2. TMD Baseline Requirements System Selection Process



VI. Program Definition/Responsibilities (Selecting Baseline/System Fielding and Support)

The TMD Program will build on existing systems, developing and deploying system improvements and new system components as soon as technically and fiscally feasible. It is proactive and prescriptive to identify technical approaches to provide required operational improvements at the lowest cost. The DoD Program will expand allied cooperation, as appropriate, in the development of regional TMD concepts through international cooperative programs. International programs could include existing alliances such as NATO and bilateral agreements with other nations such as Israel.

The TMD Program will be integrated, will build on Service/DoD initiatives and will receive the support it needs through the Department's Planning, Programming and Budgeting System. TMD-specific programs will be closely monitored and unified to: ensure Service technology requirements are clearly stated to affect funding and development in a timely manner; maintain program focus on validated threat sets and operational requirements and priorities; synchronize priorities and schedules; and develop budget requests and acquisition plans supporting an orderly transfer of programs, program authority, and funding from SDIO to the appropriate Service at an agreed upon milestone event such as the decision to proceed with Full Scale Development (FSD). These transfer agreements will be identified by Service/SDIO Memoranda Of Agreement (MOAs). The point at which transfer to Service Management occurs, including associated resource considerations, will be approved by the Defense Acquisition Executive (DAE). The receiving

Service will fund the operation and support of each system. The Services will participate throughout the Program and contribute to program management decisions, technology selection, test and demonstration programs, and maintaining program viability through hand-off. Individual project management responsibility will be transferred to a user as systems mature and the user has both a validated requirement and a mandated mission.

The Service roles and mission in the TMD program are to: participate in the establishment of operational requirements for the protection of assets; manage programs under SDIO direction; participate in the conduct of Developmental Test and Evaluation; conduct Operational Test and Evaluation; support production, deployment, and operation of assigned TMD material as required and agreed upon; and identify, plan for, and fund programs, after transition to the Services, including operation and support (O&S) and force structure for agreed TMD systems.

Each Service or Agency will be tasked to perform the functions described below.

- The Secretary of Defense and Deputy Secretary of Defense provide overall policy, program, and fiscal guidance to the Director, SDIO, who is the Strategic Defense Initiative Acquisition Executive (SDIAE). The Director, SDIO, within the Department budget, in coordination with the Defense Acquisition Executive and Service Acquisition Executives (SAEs), identifies funding needed to support the development and deployment of TMD systems. The acquisition management process flows from the SDIAE through SAEs to executing agents under MOAs, which define tasks, delineate responsibilities, and allocate resources to specific Service programs. Day-to-day program administration and management is conducted by the Deputy Director of the SDIO for Theater Missile Defense and the executing Service agents. These acquisition responsibilities will be executed consistent with applicable laws relating to the roles of the Under Secretary of Defense for Acquisition and the Secretaries of the Military Departments.

- OSD will: develop and ensure implementation of TMD policy guidance including DoD activities related to allied involvement in TMD. In its oversight capacity, conduct program reviews in accordance with DoD Directive 5000.1 and Instruction 5000.2 and as appropriate to assure evaluation of competing technologies and programs in active and passive defense, attack operations, and C^3I related to TMD; conduct treaty compliance reviews of TMD programs; and review TMD test and evaluation activities. Assure that the acquisition process will support accelerated program milestones in accordance with DoD Directive 5000.1 and Instruction 5000.2.

- The Chairman, Joint Chiefs of Staff, in conjunction with the CINCs will: formulate the operational concept; coordinate and validate mission needs and operational requirements; provide liaison with associated Allied Commands; establish command and operational control doctrines for resources assigned; establish command relationships, force structures and assets, protocols, and rules of engagement.

- Theater/Specified Commanders-in-Chief will: identify TMD requirements in their theater of responsibility; provide liaison with associated Allied Commands; establish command and operational control doctrines for resources assigned; and establish command relationships, force structures and assets, operational plans and requirements, protocols, and rules of engagement.

- The Army will: be the combat and materiel developer for ground-based and Army space-based and airborne TMD systems, coordinating efforts with other Services; continue TMD-related PATRIOT improvements and HAWK replacement through definition analyses of the Corps' area surface-to-air missile; provide program analysis and support; integrate

TMD within the Army Program and Air Defense Modernization Plan; provide requisite Force Structure to support TMD operations; contribute to and participate in TMD engineering and concept development; participate in proposed Strategic Defense Systems/Global Protection Against Limited Strike (SDS/GPALS) component analyses; manage designated TMD asset (hardware, software, and human) development; and evaluate the interaction of TMD with ground-based air defense assets.

- The Navy will: be the combat and materiel developer for any sea-based TMD components, coordinating efforts with other Services; continue to investigate AEGIS enhancements; participate in and contribute to TMD engineering and concept development; develop operational and technology requirements for improving force projection for over-the-horizon/-shore and coastal defense of naval assets in contingency theaters; and evaluate the impact of TMD and its interaction with air defense of naval assets.

- The Marines Corps will: identify and define requirements for TMD self-defense for forward deployed and expeditionary forces, coordinating those efforts with other Services; establish and evaluate operational requirements for rapid deployment for a contingency operation; assist in the development of components to satisfy near-term expeditionary antiballistic missile needs; assist in the analysis of TMD in over-the-horizon/-shore and coastal force projection and defense of naval assets in contingency theaters; and assist the Navy in evaluating the impact of TMD and its interaction with air defense of naval assets.

- The Air Force will: be the combat and materiel developer for space-based, airborne, and some ground-based TMD system support components, coordinating these efforts with other services; establish operational requirements for protection of its resources against the threat; evaluate the interaction of TMD and conventional air defense operations; help structure threat and threat excursions in cruise and conventional Air Force weapons; participate in the proposed SDS/GPALS component analyses and provide space-based, airborne, and ground-based components analyses to support a layered system; evaluate sensors/weapons to enhance counterforce capability; and provide space-based and air-based sensor support to deployed forces.

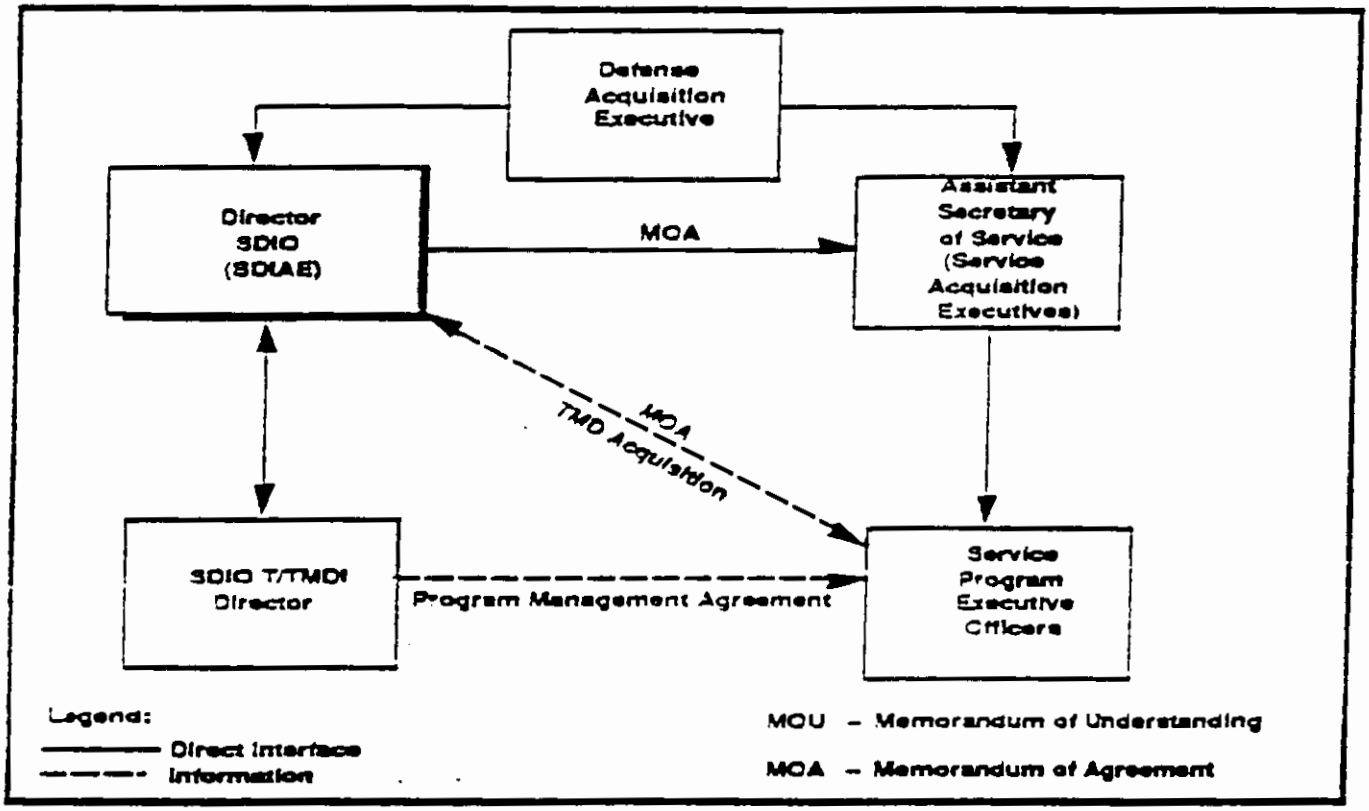
- DIA will validate the threat for TMD. The threat should include threat sets for system development and evolution, providing projections of threat parameters, characteristics, probable use, and provocation for use.

- Defense Communications Agency will: define and update Theater Command and Control Master Plans; provide projections of TMD telecommunication requirements and tactical interface issues; coordinate and consolidate TMD technical requirements for capacity, interconnectivity and information (including intelligence) processing, transmission, security, flow, and display.

- SDIO will provide TMD Program management and direction for the Department by integrating the needs of the warfighting CINCs and Services and the technical approaches that will resolve those needs. SDIO responsibilities include: leading and guiding architectural studies; defining overall system technical operations and functions; managing overall system engineering evolution to achieve validated architectures and requirements; assuring the integration and transfer of appropriate SDIO technology into the TMD baseline; identifying R&D activities and providing funding and guidance to the Executing Agents; coordinating, developing, and funding C^3I integration interfaces; evaluating planned TMD for fulfillment of operational requirements, system operations, and functions; assessing the Program's incorporation of the four elements of TMD; setting minimum performance standards for systems; providing access to SDIO facilities for simulation and

emulation testing; quantifying and managing TMD developmental test and evaluation; executing technical programs and activities with allied and friendly nations; and requesting adequate funding to develop and test demonstration systems in a timely manner. Figure 3 presents the relationships between SDIO and the many organizations that must coordinate for a successful TMD Program.

Figure 3. TMD Program Management and Acquisition Oversight Structure



VII. Resource Allocation

The FY 91 Appropriations Conference Committee Report endorsed the FY 91 Defense Authorization Act that directed SDI to fund the Theater Missile Defense Program Element and appropriated $180 million with 10 percent realignment authority. Consequently, under its baseline, SDI allocated $180 million under PE-63216C for Theater and ATBM Defense.

The FY 91 Appropriations Conference Committee Report also provided $218.249 M for the new, centrally managed, Tactical Ballistic Missile Defense Program and recommended funding as follows: $103 M for ERINT; $45.4 M for PATRIOT; and, $42.0 M for Arrow. In response, DoD established PE-637431D Tactical Ballistic Missile Defense Initiative, a new PE separate from SDI.

SDIO, as the DoD Office responsible for central management of the Department's TMD Program, distributed the FY 91 funds allocated in these two PEs as shown in Table 1 and plans to distribute FY 92 funds as shown in Table 2. This allocation will support the rapid development of coherent and cost-effective TMD systems and components. These systems and components build on current development and demonstration efforts; can be unified under candidate architectures; support the four TMD elements; and meet risk, cost, and performance parameters/trade-offs. These TMD systems will be assessed and evaluated against the theater/regional missile threat and in

the context of a balanced US Defense program, force structure constraints, Service missions, and warfighting CINC requirements.

OSD separated SDIO and TMD work by establishing these two program elements (PEs) with the TMDI PE under the auspices of OSD's tactical warfare program. The SDI effort is funded under five program elements as part of the Strategic and Theater Nuclear Forces programs. This is in response to language in House Appropriation Committee report 101-822: "SDI should continue to fund programs aimed at providing strategic layered defenses, including ground launched missile interceptors, as the Secretary of Defense deems appropriate . . . . All other tactical missile defense work in the Defense Department should be funded in a single integrated program separate from SDI to include a possible HAWK replacement missile and PATRIOT upgrades if necessary." Management of both the tactical and strategic missile defense programs was assigned to SDIO. SDIO, in turn, developed a balanced TMD Program based on these PEs, valued at approximately $9 B (in FY 88 dollars), over the next 6 years, that will provide significantly improved TMD capabilities for the United States and our allies. The SDIO has identified early system upgrades and procurement dollars beginning in FY 92 to meet this accelerated program. Additional details on resource allocations can be found in the Congressional Description Summary dated 4 February 1991.

The Program will build on technology being considered for active defense and include technology evaluation and down-selection. Current interceptor programs/experiments (PATRIOT Pre-planned Product Improvement [P³I], Navy Standard Missile, US-Israeli Arrow, Extended Range Intercept Technology [ERINT], and Theater High Altitude Area Defense [THAAD]) will be assessed and evaluated by flight tests and integrated system demonstrations prior to down-selection for system production. Systems that satisfy equivalent valid operational requirements will be viewed as potential competitors for down-selection with evaluation based on a variety of factors including weapons lethality, fire power improvement, mobility, force structure impact, technology maturity, allied concerns, and cost. Simulation and emulation, hosted on computer facilities called test beds, will be used extensively to objectively examine and assess engineering, integration, and operational alternatives in all phases of technology development. The cost and operational effectiveness analyses process used by the Services will be the basis for future down-select procurement. SDIO will manage and guide the Program to maximize results with judicious, quality-guided resource expenditures in accordance with congressional and DoD policies and directives.

FY 91 Resource Allocations and Plans

FY 91 Program resources are presented in Table 1.

Table 1. FY 91 Appropriation/Allocation for DoD TMD Programs

PROGRAM	TMDI PE PE-63743D*	SDIO PE PE-63216C
PATRIOT ATM	45.4	
TMD Integration	27.8	
ERINT	103.0	
Arrow/ACES	42.0	9.2
THAAD		18.0
Survivability/Lethality		6.2
E2I Technology		20.0
Air Force/Navy TMD Analysis		8.1
System Engineering/Analysis		33.0
Extended Air Defense Test Bed		37.9
Systems Architecture Analysis		9.5
Experiments		38.1
TOTALS	218.2	180.0

* This PE was established for FY 91. It will evolve to three PEs in the out-years to support R&D, FSD, and procurement.

PE-63743D. FY 91 TMDI funds are allocated to interceptors and other relatively mature components that can form the framework for the active defense element of a TMD baseline system with an Initial Operational Capability in the mid-1990s. Arrow Continuation Experiments (ACES), a joint US-Israeli program to conduct a series of flight experiments for an area defense interceptor missile, will begin once negotiations on an MOA between the United States and Israel are complete. The ERINT flight test program, demonstrating a small, agile, low-endoatmospheric, asset defense interceptor with hit-to-kill capability, is also funded. SDIO will provide support to improve the PATRIOT PAC-II system's antimissile capability against the evolving missile threat. Integration of these systems into existing defense architectures uses the remainder of the funding.

PE-63216C. FY 91 funds are being used to perform research on developmental active defense components, passive defense techniques, C^3I, and attack operations concepts. Funding is also used to support mission, threat, and requirements analyses and to conduct system validation efforts. For example, concept definition of the THAAD System, a planned overlay to limited area defense systems (such as PATRIOT and ERINT), is funded as is the final year of the first Arrow project. SDIO technology that may meet TMD needs, such as Endo/Exo-Interceptor (E^2I), will be supported. Feasibility studies on improvement and development of Navy- and Air Force-specific assets to be integrated into the TMD architecture have been initiated. Sensor concept programs, hypervelocity gun technology programs, and lethality and survivability research projects are also funded. Architecture and other studies as well as computer-driven simulations (i.e., test beds such as the Extended Air Defense Test Bed) used for operations and engineering analysis are funded within this PE.

FY 92 Resource Allocations and Plans

The FY 92 Program resource requirements are presented in Table 2. FY 92 is the first year that SDIO provides funds as the DoD TMD manager for procurement of long lead components of improved PATRIOT missiles.

Table 2. FY 92 Appropriation/Allocation for DoD TMD Programs

PROGRAM	TMDI PE PE-63743D*	SDIO PE PE-63126C
PATRIOT ATM	170.5	
TMD integration	51.5	
ERINT	171.0	
Arrow/ACES	60.0	
THAAD	150.0	
Survivability/Lethality		15.50
EEI Technology		15.00
Air Force/Navy TMD Analysis		20.00
System Engineering/Analysis		49.40
Extended Air Defense Test Bed		39.50
Experiments		140.30
TOTALS	603.0	279.50

* See footnote Table 1.

PE-63743D. In FY 92, SDIO will continue to improve the capability of the PATRIOT interceptor to address low radar cross sections, high terminal velocities, and high angles of attack by modifying PATRIOT radar and missile components. The addition of a multi-mode seeker (a cooperative development with Germany), an improved autopilot, and integrated fuzing incorporates an active seeker into the PATRIOT missile, improves accuracy against reduced radar cross-section and higher velocity threats, and increases system capabilities against both missile and aircraft targets. The ERINT flight test program continues with demonstrations of the integration of an active seeker, composite rocket motor casing, and a combination of aerodynamic and impulse control to achieve the desired hit-to-kill probability. The ERINT pre-prototype missile and launch control system will be developed and demonstrated. ACES and THAAD will provide options for area defense, providing 10 to 100 times the volume coverage of PATRIOT. The Arrow Continuation Experiments builds on successes in the Arrow Program by exploiting smaller and lighter weight designs, extending the missile range, and enhancing lethality. Initial flight tests of ACES will be conducted in accordance with an MOA between the US and Israeli governments. Down-selection to one contractor team for the THAAD Dem/Val Program will be accomplished based on concept definition completed in 1991. The interface and integration of TMD programs and critical technologies will continue across all theater-related programs, with FY 92 efforts emphasizing the development and evaluation of overhead and passive sensor technologies. Additionally, development of concepts of operations, via experimentation on computer-driven simulations including space-based assets, will determine how to maximize their contribution in attack operations and passive defense. Additional advanced technology projects will be conducted to develop and test warheads for hit-to-kill effectiveness.

PE-63126C. The cooperative experimental program will continue to evaluate various US- and allied-proposed TMD technologies to determine their utility. The interrelations effectiveness trade-offs among sensor capabilities, countermeasures, discrimination rules, information integration, data fusion, and kill assessment will be examined. Research will be performed on balancing technologies (sensor, interceptor, information transfer, and operational control) to determine the best combination of features and costs with the goal of supporting a near-term deployment decision. Survivability concepts will be developed. Lethality measures of effectiveness will be determined. A more capable modular, transportable radar will be developed. Hypersonic hit-to-kill interceptor technology will be demonstrated. Risk analyses and experiments will be performed to improve the understanding of the antimissile technology constraints. The 35-year-old, manpower-intensive HAWK Air Defense system has been upgraded 5 times. The concept definition of a system to replace HAWK will be initiated by SDIO as proposed by the Army in concert with the Marine Corps, and approved by OSD in 1990. This new Corps area surface-to-air missile program will be the first US Air Defense program to fully consider, at its onset, the integration of Air Defense and missile defense in a single system that is highly mobile, has low force structure impact, and provides significant defense capability. The feasibility of developing laser systems for TMD application will be tested.

VIII. Summary

The TMD Program will provide a centrally managed effort to develop a tactically capable, rapidly deployable, mobile system to counter the ballistic missile threat to US contingency and expeditionary forces and to the national security of allies and friends. The TMD Program, under the direction of the SDIO, will integrate and unify the activities of all DoD elements and appropriate allied efforts to provide a focused, economically realizable set of options for deployment of TMD system improvements and the development and deployment of new systems as soon as possible.

The following represent the key elements of this Plan:

- DoD is organized to accomplish an effective, efficient, centrally managed TMD Research and Development Program through the SDIO.

- The SDIO, with its extensive background in complex missile defense program management, in-depth R&D program experience, and participation in a wide range of international programs, will:

  - provide guidance in accordance with validated threats and requirements;
  - accelerate research and development to identify technical solutions in support of validated operational requirements for an effective TMD to counter the evolving threat from developing nations and to pre-plan technology exploration for follow-on systems;
  - explore component options, objectively assess them, using agreed upon down-select criteria, and integrate the most effective ones for final tactical baseline system selection;
  - integrate user requirements and ensure ongoing involvement of all Services and international partners in all phases of system development to ensure maximum military effectiveness;
  - provide the program plan for an integrated and unified missile defense development;
  - deliver the most cost-effective and best balanced systems meeting the demands of the four elements of TMD for final system selection;

- accomplish the theater/tactical mission while providing an underlay to the proposed US-based and space-based global protection system; and
- develop TMD systems capable of autonomous operation but that can be readily integrated with other elements of a US GPALS system and/or allied and friendly missile defense forces.

- The result will be an integrated, accelerated TMD Program that will be proactive with regard to the threat and provide significantly enhanced capability over current systems, that meets the guidance of the 101st Congress.