(2)

AD-A200 164

Report of the Defense Science Board Task Force Subgroup on Strategic Air Defense

(SDI MILESTONE PANEL)

May 1988

Office of the Under Secretary of Defense for Acquisition
Washington, D. C. 20301-3140

UNCLASSIFIED
SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188
Exp. Date: Jun 30, 1986

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED	1b. RESTRICTIVE MARKINGS NONE
2a. SECURITY CLASSIFICATION AUTHORITY N/A	3. DISTRIBUTION/AVAILABILITY OF REPORT Distribution Statement A. Approved for Public Release: Distribution is unlimited.
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE N/A	
4. PERFORMING ORGANIZATION REPORT NUMBER(S) N/A	5. MONITORING ORGANIZATION REPORT NUMBER(S) N/A
6a. NAME OF PERFORMING ORGANIZATION Defense Science Board, Ofc of the Under Secy of Def (A).	6b. OFFICE SYMBOL (If applicable) DSB/OUSD(A)
6c. ADDRESS (City, State, and ZIP Code) The Pentagon, Room 3D1020 Washington, D.C. 20301-3140	7a. NAME OF MONITORING ORGANIZATION N/A
	7b. ADDRESS (City, State, and ZIP Code) N/A
8a. NAME OF FUNDING/SPONSORING ORGANIZATION Defense Science Board/OUSD(A)	8b. OFFICE SYMBOL (If applicable) DSB/OUSD(A)
	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER N/A
8c. ADDRESS (City, State, and ZIP Code) The Pentagon, Room 3D1020 Washington, D.C. 20301-3140	10. SOURCE OF FUNDING NUMBERS

PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO.	WORK UNIT ACCESSION NO.
N/A	N/A	N/A	N/A

11. TITLE (Include Security Classification)
Report of the Defense Science Board Task Force Subgroup on Strategic Air Defense (SDI Milestone Panel), UNCLASSIFIED

12. PERSONAL AUTHOR(S)
N/A

13a. TYPE OF REPORT	13b. TIME COVERED	14. DATE OF REPORT (Year, Month, Day)	15. PAGE COUNT
FINAL	FROM N/A TO N/A	88/05/00	12

16. SUPPLEMENTARY NOTATION
N/A

17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT ☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☐ DTIC USERS	21. ABSTRACT SECURITY CLASSIFICATION
22a. NAME OF RESPONSIBLE INDIVIDUAL Diane L.H. Evans	22b. TELEPHONE (Include Area Code) (202) 695-4158/6463
	22c. OFFICE SYMBOL DSB/OUSD(A)

DD FORM 1473, 84 MAR 83 APR edition may be used until exhausted.
All other editions are obsolete.

SECURITY CLASSIFICATION OF THIS PAGE

UNCLASSIFIED

TF

DEFENSE SCIENCE BOARD

OFFICE OF THE SECRETARY OF DEFENSE
WASHINGTON, D.C. 20301-3140

April 13, 1988

MEMORANDUM FOR SECRETARY OF DEFENSE
UNDER SECRETARY OF DEFENSE (ACQUISITION)

SUBJECT: Report of the Defense Science Board Task Force Subgroup on Strategic Air Defense (SDI Milestone Panel)--INFORMATION MEMORANDUM

Attached is the report of the SDI Milestone Panel. We have reviewed the SDI Program and recommend that the Program be replanned as a number of steps leading to a Phase One system capable of meeting the JCS requirement rather than as a single major action.

We will be pleased to meet with you to discuss the report, if you so desire. We believe we have completed the task you gave us but stand ready to continue our work if you so desire.

Robert R. Everett
Chairman

Attachment

13 April 1988

Conclusions of the Defense Science Board's
Report of the Strategic Defense Milestone Panel include: 1)

Summary

1. In view of the technical, budgetary, political, and arms control uncertainties surrounding the ballistic missile defense program, the Panel recommends planning a number of steps in the technical development and deployment of a system to meet the JCS requirements rather than a single major action.

2) From a development point of view, priority should be given to the sensors, processing and communications necessary to provide an adequate assessment of what is actually going on, the nature and extent of the attack, and the detection and tracking of boosters and reentry vehicles. This framework is needed whatever weapons are actually used, and the research, development, and experimentation required to provide it involves most of the critical technologies. This surveillance system should evolve as the supporting technology becomes available, allowing the inclusion of whatever weapons are available and wanted. This restructuring would help assure priority attention to critical technical problems despite budget uncertainties. and

3) Deployment should be in steps, each of which should provide some capability and have some value in itself. One possible set of steps is as follows: (code)

First - A limited, treaty compliant, deployment of 100 fixed ground-based long range interceptors cued from existing warning sensors. Such a system falls within our present demonstrated technical capabilities. It would be a limited deployment and as such would have limited capabilities, but it would provide some preferential defense as well as some protection against accidental or third country attacks or blackmail attempts.

Second - A treaty compliant deployment of the next generation of space surveillance systems to improve our early warning detection and assessment of a ballistic missile attack and to lay the foundation for subsequent steps that can deal with larger and more sophisticated attacks.

Third - A deployment to protect the NCA against decapitation by ballistic missiles, including those from submarines. This would require the emplacement of shorter range interceptors.

Fourth - Further expansion, including additional bases and ground-based interceptors and improved sensors to cope with countermeasures.

A

88-196

Fifth - The addition of space-based interceptors for boost and post-boost attack to fully meet the JCS requirement. This step might begin before step 4 was completed.

Sixth - The addition of space-based or ground-based directed energy weapons.

For each step the deployment decision would entail a separate and discrete act.

4. The first two deployment steps as well as the continued development of improved weapons up to the point of prototype demonstration could all reasonably be judged to be allowable under the narrow definition of the ABM Treaty. The third step may be achievable within the Treaty depending on the characteristics of the systems deployed. Subsequent deployment steps would require renegotiation of or withdrawal from the Treaty. The continued evolution of the surveillance system as described above does not appear to be constrained by the Treaty.

5. This approach would allow for more confident decisions and more flexibility in the face of uncertainties and would probably not require any more time in the long run.

6. The JCS have not addressed the utility of deployments short of the full Phase I deployment. Their views on the utility of possible phased deployments and the desirability of proceeding with them should be explored.

7. The Panel understands that the SDIO is evaluating this concept and is developing alternative plans for a stepped deployment.

8. We believe very strongly that capable long term engineering support for the SDIO is essential to carry out this large complex program. The existing limitations on such support should be removed as a part of any agreement on the future of ballistic missile defenses.

Introduction

The Strategic Defense Milestone panel was reconvened at the request of the Secretary of Defense to review the current plans for the Strategic Defense Initiative. The Panel met three times during February and March 1988, was briefed by the SDIO and held discussions with the Secretary and his staff, with General Abrahamson, and with General Herres. A list of the members participating is attached.

In general, we believe that the concerns we expressed last year are being addressed in a forceful manner but many concerns are yet to be satisfactorily resolved. This is not surprising since many of the problems facing the SDI are of substantial difficulty and require a great deal of work to solve. Although the plans for attacking these problems appear reasonable in themselves, we are concerned about the larger problems that result from the financial and political uncertainties that surround the program. These uncertainties lead to unrealistic schedules and to a wasteful process of replanning as funding changes. Varying interpretations of the constraints imposed by the ABM Treaty lead to confusion in the testing process.

About a year ago, a decision was made to develop the SDI system in phases. The SDIO is currently engaged in a demonstration and validation program looking toward a Milestone II decision on a proposed concept for a first phase deployment. Preparatory to this decision, SDIO will have to develop a detailed plan and schedule for FSED and deployment of the Phase One concept. Because of the complexity and cost of the Phase One concept, the time required to deploy it and the political sensitivity of issues related to the ABM Treaty, we believe that SDIO should plan the Phase One deployment as a sequence of steps, each accomplishing a useful mission. Such a sequential program, which pays for itself with incremental benefits as it goes, will be more likely to achieve support than one which contributes little or nothing until the completion of Phase One.

Typically, large complex systems whether military or commercial, have not been created all at once. Rather they have all evolved over a period of time with each new step built on the foundations of technology, management, and public acceptance previously established. Air defense systems were evolved in this fashion, as were air traffic control systems, commercial telephone systems, and carrier task forces. Further, these systems continue to evolve.

Development

The Strategic Defense System has been thought of by many as a collection of major components, BSTS, SSTS, SBI, ERIS, PROBE, etc. tied together by a Battle Management/C^3 system of some sort. The concerns we expressed last year in our SDM Panel report focused on the surveillance, background and signature measurement, discrimination, system engineering and BM/C^3. We believe it would be better to think about ballistic missile defenses as first of all a surveillance system together with its associate processing and communications, whose purpose is to determine the actual characteristics of an attack, to find the boosters against the background and to find the RVs amid the decoys, chaff, nuclear effects, and other countermeasures and to determine where they are and where they are going. Given such information, decisions can be made, and actions taken within existing limitations. Actions can range from alerting to

dispersal, to active defense, to striking back. Without adequate information none of these actions can be confidently taken.

The need for information is not limited to RVs of course. The characteristics of attacks of all sorts, from aircraft, cruise missiles, and other weapon systems armed with either nuclear or non-nuclear warheads, must be correctly and promptly determined if the country is to be defended.

Once a surveillance system exists it can be used to provide information to whatever weapon systems are available, ground or space based, KKV or DEW. A limited surveillance system now exists, consisting of the warning satellites and radars. This system should evolve as better sensors, better information on objects and backgrounds, and better processing and communications are developed and deployed.

This way of looking at ballistic missile defenses should help to enforce an orderly set of priorities on the development program. It will continually emphasize the need for system design, for a measurement program, and for a close tie between ballistic missile defenses and the other deterrent forces.

Emphasis on a surveillance system will not, of course, remove or even weaken the need for weapons and their associated fire control. However, it will make possible an evolutionary approach to weapons development and procurement. The several types now under development could then be deployed when and if they make sense in themselves. Each element will not be hostage to the successful development and deployment of the others. A ballistic missile defense system will, in fact, exist at all times. the process is one of improving that system in ways and at rates which are both possible and acceptable.

Deployment

There are a number of possible ways in which a ballistic missile defense system might be deployed in steps. It is neither necessary nor possible to lay out a fixed plan for all steps at this time because the actual steps to be taken depend on technical advances, international relations, and public acceptance. The first step or two must be defined, however, and subsequent steps outlined as possibilities. The purpose is to provide a set of options for future decision makers.

While the Panel is in no position to specify a plan in detail, we suggest the following possible directions for a stepped deployment plan.

First - A limited deployment of long range ground based interceptors. These interceptors would be IR-terminally-guided, their launch and initial direction being cued from the existing warning sensors. They would be something like ERIS but would

probably be somewhat larger, both to provide greater performance margins and to permit deployment before the final high quantity production version of the interceptor is complete. The earlier version should have adequate performance margins to provide, from a single deployment site, a very thin area defense for much of CONUS. If such an interceptor deployment were sited at Grand Forks or in the national capital region it would be Treaty-compliant so long as the number of interceptors remained below 100.

We were favorably impressed by the Phase One Engineering Team (POET) group's proposal for such a deployment. Capability would be limited, especially against countermeasures, but a thin defense over much of the country would provide some preferential defense against small attacks, and some protection against accidental unauthorized launches and against third country attacks and threats of blackmail.

The choice of an initial site involves political judgments and is beyond the scope of our Panel. We note that the Grand Forks site currently exists and would provide coverage over most of CONUS while a deployment in the national capital region would provide a beginning for an NCA defense. We note also that a decision to switch our permitted deployment from Grand Forks to the national capital region would have to be announced by October 1988, the end of the current 5-year ABM Treaty review period.

Either choice would establish a base from which the BMD system could evolve, put BMD into the military operational structure and teach valuable lessons about the management and operations of such a system. Last, but not least, it would make a start toward achieving symmetry with Soviet BMD deployment activities and, in this way, contribute to inhibiting breakout.

Second - Begin to update and improve our surveillance, in particular by deploying an improved satellite Early Warning System (EWS). Better space surveillance is needed to provide better warning and better attack assessment through better counting and tracking, whatever happens in active defense. Whether this improved space surveillance involves the currently specified BSTS or something more like an improved satellite EWS is a matter for further thought. We should not think of an improved satellite EWS as the end of the line. Later and still better versions should be expected.

Improvements to other surveillance systems should be investigated as well. The process of measuring background and gathering information on friendly and unfriendly objects in space is a continuing one and should be pursued as an intrinsic part of the evolution of the surveillance system, an evolution which would proceed in parallel with the other steps.

Third - Install shorter range interceptors in the Washington area to protect the NCA against decapitation by ballistic missiles, including those from submarines. We prefer a dual-mode surface-to-air missile system with capabilities similar to those of the Soviet dual-mode SA-12, such as an improved version of Patriot, which would have capabilities against aircraft and cruise missiles as well as short range ballistic missiles. The use of equipment already in production would greatly reduce costs. HEDI is also a possibility.

Fourth - Further expansion, including additional bases and interceptors, to cover other parts of the country and cope with larger attacks and improved sensors to cope with countermeasures.

Fifth - The addition of space-based interceptors for boost and post boost attack. The deployment of this step would presumably meet the JCS requirement.

Sixth - The addition of space- or ground-based directed energy weapons.

The development of these or equivalent steps would be carried to the point of decision but would not be deployed unless actually wanted at the time. Each step would build upon the previous steps, most of which would continue to coexist.

The ABM Treaty

There is not a force acting on the SDI program that is more damaging or more insidious than the present debate on the "narrow vs broad" interpretation of the ABM Treaty.

The notion of the "broad" interpretation of the ABM treaty has been promulgated presumably to give the SDIO program greater flexibility to plan and carry out its testing program. In fact, it has had the opposite effect; the present testing program is in a straitjacket. This has come about in large part because in the course of debate on "narrow" vs "broad" interpretations of the treaty, the "narrow" interpretation of the treaty itself was so squeezed by both the opponents and proponents of SDI that it lost all reasonableness. Whatever else is done, a way must be found to terminate this debate.

The Treaty is ambiguous in many of its details; two areas of ambiguity appear to be especially important for the kind of sequential program we believe is desirable. The first arises from the lack of a clear definition of "systems based on other physical principles" (OPP). The second ambiguity arises from the conflict between the Treaty's allowance of early warning radars on one hand and, on the other, its prohibitions on development of mobile, including space-borne, radars and its restrictions on deployment of stationary radars for acquisition, tracking and battle management. As an illustration of the

deleterious effect of this ambiguity, we currently operate satellites for early warning, but find that BSTS, which would perform similar functions, is considered questionable. Because the Soviets exploit ambiguities to the limit (and beyond as in the case of Krasnoyarsk), a U.S. policy that restricts us to activities that are unambiguously permitted by the Treaty could seriously impair our security.

We believe, therefore, that DoD should define a technically optimum testing and deployment program and should then adhere to that program except when Treaty constraints unambiguously require it to otherwise. The DoD should place the burden of proof on those who would restrain the program.

In our opinion, there is a way of reading the treaty which separates the important from the less important. The Treaty limits the number of effective ABM interceptors each country can have by placing a limit of 100 on launchers, requiring that they be fixed, restricting them to limited areas, and prohibiting rapid reload and MIRVing. The Treaty says nothing about the size, range, velocity, or guidance of the interceptors. The Treaty limits the radars to the vicinity of the launchers but permits warning radars around the periphery of the country. It says nothing about and therefore places no limits on warning satellites.

We believe that the first two deployment steps, plus the follow-on development of weapons up to the point of prototype demonstration, could be judged to be allowable under the Treaty. The third step may be achievable within the Treaty depending on the characteristics of the systems deployed. Subsequent deployment steps would require renegotiation of or withdrawal from the Treaty. The continued evolution of the surveillance system as previously described does not appear to be constrained by the Treaty.

We also believe step one to be treaty compliant by comparison with the existing Soviet ABM deployment. The step one system is very similar in general terms, contains only elements already in the existing Soviet system, and has capabilities which are similar to and may be less than the Soviet system. The differences are largely technical details which are not even mentioned let alone limited by the Treaty.

We do not see that the Treaty limits tactical warning and attack assessment (both sides had IR satellites at the time the Treaty was written) so step two should not violate the treaty.

Step three may or may not violate the Treaty depending on what is actually done. Numbers of SA-10's are deployed around Moscow and the Soviets are beginning to deploy SA-12s. Arguing by analogy as before, dual-mode surface-to-air missiles with

capabilities comparable to the SA-12 can be deployed around Washington without violating the Treaty.

Schedule

A stepped process such as we have described would appear to lengthen the schedule by increasing the number of deployments and requiring money for earlier deployment. The current schedules are very uncertain, however, not only because of technical uncertainties but because of funding uncertainties. If the present program enjoyed stable funding and support, it might go faster without intermediate steps. We believe, however, that the difficulty of supporting such a large decision all at once and of bringing all system elements to a satisfactory stage at the same time make the all-at-once plan very risky. The stepped plan allows much more confident decisions and much more flexibility in the face of uncertainties. Furthermore it allows decoupling the schedules of many of the system elements. We think a stepped plan will eventually lead to shorter schedules and lower costs than the current Phase I plan.

Requirements

The JCS requirement for Phase I was very important in placing a foundation under the SDI program. A stepped program such as described above would not meet the current requirement until something like the fifth step. The JCS have not addressed the utility of deployments short of the full Phase I. Their views on this matter need to be explored and the military utility of various steps agreed upon.

System Engineering Support

The Panel was pleased to learn that the ad hoc system engineering team under discussion last year has been established and is in operation under the title of Phase One Engineering Team or POET. We believe this is an important advance but are still concerned about the need for long term support. We think that a stepped deployment increases this need if the steps are to be properly planned and integrated.

The SDIO's need for responsive, long term systems engineering and technical assistance is very evident to the Panel; we think this need must be satisfied if we are to achieve an effective ballistic missile defenses. The Systems Engineering and Integration contractor, although needed to meet other demands, is not a substitute. We recommend strongly that the Secretary of Defense make such support available to the Director, SDIO, from the resources of existing DoD FCRC's and ensure this support is fully responsive to the long-term needs of the SDIO. Should these actions be ineffective or inadequate in providing the type or quality of engineering and technical assistance required by the SDIO, an agreement should be reached

with Congress to support the establishment of a new and separate FFRDC to satisfy SDIO requirements.

SDIO

The concept of a stepped deployment and of an evolutionary surveillance, processing, and communications system has been discussed with Lieutenant General Abrahamson and his staff. We understand that they are evaluating the idea and are developing alternative plans for a stepped development.

Attachment

Mr. Robert R. Everett
Task Force Chairman

Strategic Defense Milestone (SDM) Panel of the DSB

Mr. Robert R. Everett
President Emeritus
The MITRE Corporation
(Panel Chairman)

Dr. Solomon J. Buchsbaum,*
Executive Vice President-Customer Systems
AT&E Bell Laboratory

General Russell E. Dougherty
USAF, Retired
Private Consultant

Mr. Harry J. Gray
Chairman Emeritus of the Board
United Technologies Corporation

Mr. Harold J. Haynes**
Chairman Emeritus
CHEVRON

Mr. Fred S. Hoffman*
Director,R&D Associates-Pan Heuristics

Mr. Ralph E. Lee**
Executive Vice President
Hewlett Packard

Mr. Walter E. Morrow, Jr.
Director, MIT Lincoln Lab

Dr. William J. Perry
H & Q Technical Partners, Inc

Gen. Samuel C. Phillips,
USAF, Retired
Private Consultant

Ambassador Seymour Weiss*
President, SY Associates

* New members to original SDM panel
** Non participants in this review