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DSB 250/2

6 February 1959

MEMORANDUM FOR DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING

SUBJECT: Summary of the More Important Actions Taken by the Defense Science Board

INTRODUCTION

Early in 1956, Dr. G. C. Furnas, then Assistant Secretary of Defense (Research and Development), canvassed the scientific community, by letter and by personal interview, on the desirability of establishing a top level Defense advisory group, generally in line with the recommendations of the Hoover Commission (1955) on Organization of the Executive Branch of the Government. Specifically, the Hoover Commission endorsed the Kelly Task Force recommendation:

Date 2 AUG 1985
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Authority EO 12358
Name... Chief, Declas
Rec. Mgt. Div, WHS

"That the Assistant Secretary of Defense (Research and Development) appoint a standing committee, reporting directly to him, of outstanding basic and applied scientists. This committee will canvass periodically the needs and opportunities represented by new scientific knowledge for radically new weapons systems. The Assistant Secretary of Defense (Research and Development) will appropriately implement this committee's recommendations where action is indicated."

Dr. Furnas received enthusiastic support on the desirability of setting up such a body and he proceeded to take the necessary steps to establish a Defense Science Board to advise the Department on scientific and technical matters relating to its mission. To form a core of men already acquainted with the military sphere, he drew upon the chairmen of the then eleven technical advisory panels in the OASD (R&D) and the chairmen of the senior advisory committees of the Army, Navy and Air Force. For members associated with governmental sciences in other areas, he called upon the directors of the National Science Foundation, the National Bureau of Standards, and the National Advisory Committee on Aeronautics. Finally, to tap the scientific and technical resources of the country at large, provision was made to include on the Board the President of the National Academy of Sciences and seven members-at-large, bringing the initial membership of the Board to a total of 25.

As its initial assignment, the Board was asked to give major and immediate attention to the program and administration of basic research, component research and advancement of the state-of-the-art in areas of interest to the Department of Defense.

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The Board's first meeting was held on 20 September 1956. Its charter was formally issued on 31 December 1956, citing the Board as advisory to the Assistant Secretary of Defense (Research and Development). Following the consolidation of the offices of the Assistant Secretaries of Defense for Research and Development and for Engineering, the Board was reconstituted as an advisory body to the Secretary of Defense, through the Assistant Secretary of Defense (Research and Engineering), with a slight increase in authorized membership (total of 28) to provide ex officio membership by the chairman of the President's Science Advisory Committee, the General Advisory Committee of the Atomic Energy Commission and the Scientific Advisory Committee in the Office of the Director of Guided Missiles, OSD. This revised charter was issued on 30 October 1957, TAB A. The present scope of the Board's mission and its operations are set forth in Sections III and IV of the Charter.

PRESENT CONSTITUTION OF THE BOARD

As presently constituted, the Board numbers 27 members, 7 of whom are members-at-large and the balance ex officio (see Charter, TAB A, Section II). TAB B provides a recapitulation of the members by status and, where applicable, date of appointment.

MEETINGS AND OPERATION

The Defense Science Board has held ten meetings of the full membership since its organizational session on 20 September 1956, and one special meeting. In addition, Task Groups and an Ad Hoc Group from among the Board's membership have been established for special areas of interest; these meet more frequently in response to the needs of the assignment.

Meetings of the Board are convened and conducted by formal agenda. Substantive minutes of the sessions are prepared and issued, reporting on presentations heard, discussion thereon, and actions taken by the Board.

RESUME OF THE MORE IMPORTANT ACTIONS

I. ON ORGANIZATION

A. Establishing the New Post of Director of Defense Research and Engineering (FOR OFFICIAL USE ONLY)

During its Sixth Meeting in December 1957, and the Seventh in March 1958, the Board gave attention to organizational means for strengthening research and development management in the Department of Defense. A prime consideration was the unanimous conviction among the Board members on the desirability of creating a new post in the Office

of the Secretary of Defense, presumably on the level of a Deputy Secretary of Defense, to whom the Assistant Secretary of Defense (Research and Engineering), the Director of Guided Missiles, the Assistant for Atomic Energy, the Director of ARPA and possibly other officials would be responsible for the research and engineering aspects of their work. The Executive Committee of the Board discussed these views with Secretary McElroy on 10 January 1958, following Board action taken on 19 December 1957. In March 1958, in the course of the Board's Seventh Meeting, Secretary McElroy, Deputy Secretary Quarles and Mr. Charles Coolidge met in executive session with the Board to discuss Defense reorganization and particularly the role of research and engineering in the over-all picture. The Board noted with interest the Secretary's plans to create the new post of Under Secretary of Defense for Research and Engineering (subsequently presented to Congress by the President as the Director of Defense Research and Engineering), and expressed the belief that these plans constituted a basis for a satisfactory solution.

At its Eighth Meeting in May 1958, Secretary McElroy and Deputy Secretary Quarles again met with the Board for discussion of the extent of authority in supervision and direction of the official in this new post. The Board noted with satisfaction the Secretary's comment that the language of the President's message on the authority and responsibility of this official is controlling regardless of implications that may be drawn from organization charts or position titles.

B. Improving the Effectiveness of Military Research and Development, both in Time and Quality (UNCLASSIFIED)

The Board invited the senior civilian and military officials of the Military Departments responsible for the direction and management of research and development programs to meet with it during its Ninth Meeting on 10 and 11 September 1958. A full day was devoted to methods for the generation of new concepts and for reduction of the time cycle in research and development from concept to prototype. The Board's deliberations were particularly benefited by a comprehensive review and consideration of the experiences of the Departmental officials from their vantage points of day-to-day responsibilities in conceiving, planning and administering the research and development programs within their departments. A comprehensive record of these presentations and the discussion thereon is provided in the minutes of this meeting of the Board (DSS 3/9, ITEM 5).

At its Tenth Meeting in December 1958, the Board reached agreement on certain principles bearing on research and development administration. Recognizing that alternative courses of action undoubtedly exist, the Board nonetheless offered its suggestions on procedures which, if adopted, would in its opinion offer good promise in effecting needed improvements in research and development administration.

Following the Tenth Meeting, the Chairman formally transmitted the Board's action in this respect to the Secretary of Defense, through the Assistant Secretary of Defense (R&E), by memorandum (DSB 210/3, TAB C).

II. TECHNICAL ADVICE ON PROBLEMS IN OPERATIONAL AREAS

A. Continental Air Defense (SECRET)

At its Third Meeting in February 1957, the Board devoted a substantial portion of its session to briefings on operational exercises seeking to expose to view the technical deficiencies requiring research and development effort. These briefings were arranged in response to the Board's concern as to the effectiveness of research and development in providing combatworthy weapons systems for continental defense.

At its Fifth Meeting in September 1957, the Board considered further a series of operational trials of technical weaknesses of the air defense system, proposed by the Office of Planning OASD (R&E), and the then current plans of the Weapons Systems Evaluation Group for operational trials of elements of the air defense system.

The Board in particular expressed deep concern over the omission of operational tests to evaluate the kill potential (i.e., the destruction capability) of the air defense system. Accordingly, the Board addressed a paper (DSB 205/1, TAB D) to the Assistant Secretary of Defense (R&E) on aspects of operational trials of air defense systems.

B. Limited Warfare (SECRET)

At its Sixth Meeting in December 1957, the Board heard a report from Dr. L. T. E. Thompson outlining a concept of development planning to achieve greater selectivity and more discrimination as to programs deserving primary emphasis. The Board, responding to the approach and mechanism of study outlined in this paper, established a task group of three from among its membership to look into studies and evaluations bearing on limited warfare for the purposes of both (1) a case study of a recognized important field and (2) identification of technical guidelines that can profitably be applied to research and development planning in this field.

This DSB Task Group on Limited War (Dr. Thompson, Chairman; Dr. Root and General Simon, members) rendered a final report to the Board at its Ninth Meeting in September 1958. A substantive report was published by the Group as Volume I of a series (DSB 220/3, TAB E); Volume II was devoted to the reports of special working groups contributing to the over-all effort, and Volume III contains in detail the reference material considered by the Task Group.

To accord consideration of this study the time deserved, a full day's session of the Board was scheduled on this topic. Further, at the request of the Board Chairman, the Assistant Secretary of Defense (R&E) arranged for the participation of the senior civilian officials and military chiefs responsible for research and development management in the Military Departments. Experts in this area from operational research organizations (MEMO, RAND, ORO, ORO and OAO) were also invited to hear the Group's report and to participate in a critique of the findings.

The Task Group on Limited Warfare reached the following conclusions:

- (1) Our ability to deal successfully with limited wars is vital to national security.
- (2) Complete reliance on the use of nuclear weapons in limited wars is too narrow a policy.
- (3) We are not now prepared to fight foreseeable limited wars without nuclear weapons.
- (4) Changed R&D emphasis would increase limited-war capabilities.
- (5) We can afford a limited-war capability.
- (6) Limited-war R&D needs continuing over-all attention.

As to technical areas warranting additional effort, the Group's detailed recommendations are given under Section III-B, pp. 6-8, of the report (TAB E).

In discussion, the Board gave particular emphasis to the potential of non-lethal biological and chemical weapons as a possible means of accomplishing national aims and objectives in limited war situations. Operationally effective non-lethal agents, if at all attainable through a well-conceived research and development approach, would indeed afford an opportunity deserving consideration for exploitation in lieu of nuclear and other weapons in specific operational instances.

Acting on the recommendations of its Task Group on Limited War, the Board invited the attention of the Assistant Secretary of Defense (R&E) to the substantial evidence adduced that research and development effort in certain areas requires an increase in emphasis to meet the immediately foreseeable needs of our military posture for conducting limited war. The Chairman's formal action in this respect (DSB 220/4) is attached as TAB F.

In line with the emergence of non-lethal biological and chemical weapons as potential instruments in limited war situations, the Board established a Task Group on Biological and Chemical Weapons Development (Mr. E. Durr Reeves, Chairman; Dr. L. T. E. Thompson, Dr. Frank L. Horsfall and Dr. Wilbur Schramm, members). The Group was given the task of uncovering promising research and development areas by examining the operational capabilities of such weapons in a range of tactical situations, taking into account the psychological and sociological problems raised by their use.

C. Biological and Chemical Weapons Development (SECRET)

The Task Group on Biological and Chemical Weapons Development organized a 5-day symposium at RAND, 1 to 5 December 1958, bringing together representatives from most of the agencies concerned with these problems, but omitting the State Department at this time. The plan of the symposium was carried out in four phases:

1. review of the technical status of the agents and their weapons systems
2. examination of the usefulness of these agents and weapons systems by four separate war-gaming panels
3. examination of the non-military consequences of use of such weapons, i.e., psychological and political problems
4. a final session to receive and to integrate the reports from the separate working groups.

At the Board's Tenth Meeting in December 1958, the Task Group reported on the symposium and the conclusions reached:

1. Chemical or biological warfare, even in the present state of development, can inflict devastating casualties on unprotected personnel, both military and civilian.
2. Protective measures, at best, require rigorous training, restrictive equipment, and a constant state of readiness. This is most unlikely in the case of civilians, and is far from certain with military personnel.
3. Chemical or biological warfare can be developed to the point where it will constitute an extremely effective or controlling weapons system.

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4. It is known that such systems, and protective measures against them, are being developed by the enemy.
 5. Our posture, in cold- or limited-war situations, requires the immediate development of a full range of chemical and biological agents and weapons systems, particularly non-lethal persistent CW agents capable of attacking through the skin, and capable of producing temporary incapacitation for one to three weeks.
 6. The development and/or use of BW or CW weapons systems will undoubtedly create serious problems with regard to public opinion and public support. These problems are not, however, insurmountable, nor thought to be controlling with respect to the need for such weapons systems.

Board members spoke strongly on the need for affirmative actions at this time and agreed to consider the recommendations of this Task Group and to act thereon. Particular note was taken of the coincidence of the findings with those developing in other quarters, for example, the panel of the President's Science Advisory Committee under the chairmanship of Dr. Paul Weiss. Dr. Weiss in particular underscored the areas of agreement by his panel and this Task Group, adding that this strongly suggests some tangible value in the conclusions reached.

Specifically, the Board adopted the following recommendations:

1. That the Secretary of Defense take immediate steps to acquaint the Joint Chiefs of Staff and the individual Services with the findings and conclusions of the symposium.
2. That the Secretary of Defense urge the Services to develop and establish requirements for chemical and biological warfare weapons systems.
3. That the Secretary of Defense take such steps as are necessary to provide appreciably increased effort on chemical and biological warfare research, particularly with respect to non-lethal agents, agents not protected against by masks, and effective defensive measures.
4. That the programs of research be paralleled by extensive efforts to develop more effective weapons systems and use doctrine through cooperative efforts

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between the Technical Services and the using arms. This should include not only research and development, but also detailed war gaming and field trials.

5. In order to facilitate and implement the above recommendations, it is essential that programs and techniques be developed to secure public acceptance and support for the development and use of such weapons systems. This should include:
 - (a) steps to declassify information concerning chemical and biological warfare in order to attain the needed advantages in research and development
 - (b) publication of information on Russian activities in this area
 - (c) the description of techniques for minimizing civilian casualties.

Currently the DSB Task Group on Biological and Chemical Weapons Development is preparing a substantive report on the symposium and the findings, conclusions and these recommendations. When that report is in hand (by 1 March 1959 on the basis of present estimates), the Chairman will transmit it to the Director of Defense Research and Engineering, in accordance with action taken by the Board at its Tenth Meeting.

D. Psychological Aspects of Defense Activities (UNCLASSIFIED)

At its Fourth Meeting in December 1958, the Board considered briefly some research objectives in the psychological and social sciences related to the effectiveness of weapons when those weapons are not used. The problem has its essence in the following questions: In carrying out a program of military preparedness and military operations, how does a nation minimize the adverse effects on the peoples of the world: Through a show of force, does it unwittingly impugn the honesty of its claim that it wishes thereby to maintain the peace?

The Board agreed to establish an Ad Hoc Group to consider, in the light of these questions, some research objectives in the psychological and social sciences and to prepare appropriate actions for the Board's consideration at the next meeting. Dr. Dael Wolfe was named chairman of this Group and Dr. Cairns and Dr. Schramm, members.

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III. ON RESEARCH POLICY

A. Statement of Position on the Research Needs of the Department of Defense (FOR OFFICIAL USE ONLY)

At its Second Meeting in December 1956, the Board gave attention to the attainment of a balanced research and development program meeting the critical immediate needs and the problems of the future. Discussion included expression of concern on the true effectiveness of research and development in providing combatworthy weapons. In an era in which the speed of the carrier is undergoing a rapid change, piece-meal approach along discrete technological lines leads to strains between the potential of the carrier, the search and detection device, and the lethal power of the destructive device. Ingenuity in the technical sense is not realized if our weapons systems do not prove combatworthy. There is a real need to test our weapons systems to demonstrate and evaluate their points of weakness rather than their points of strength, the consequences of which will be better direction of and more attention to the needs of the research and development program; indeed, perhaps leading to some highly unconventional approaches to warfare.

The Board adopted a statement of position on a defense research effort that looks toward the next generation of weapons (TAB 6).

B. DCD Policy on Basic Research (UNCLASSIFIED)

At its Fifth Meeting in September 1957, the Board considered the responsibilities and interests of the Department of Defense in basic research, in part as a follow-up to previous meetings and in large measure due to Cabinet attention to the Federal support level of research and development and, particularly, the level of Government sponsorship of basic research. A critical situation current at the time was the serious effect on the nation's scientific institutions, principally the universities, of an order to limit expenditures to certain rates, the consequence of which was the interruption of valuable basic research effort.

The Board adopted the following resolution after hearing and considering the effect of expenditure limitations on Defense research and development programs:

"RESOLVED THAT:

"It is the unanimous conviction of the Board that the application of current expenditure ceilings is doing serious and irreparable harm to the DCD basic research programs, and thus to the effectiveness of future development and production programs. The situation is especially critical in respect to the contract programs at universities

and other non-profit research organizations. Important projects are being seriously curtailed or even terminated for momentary want of funds and research staffs are being dispersed. Although monetary support may be available later, many programs will thus be permanently damaged or terminated by the effects of the present fiscal situation.

"It is strongly recommended that the basic research programs of the Armed Services be freed from the effects of the blanket order on expenditure ceilings and that the Services compensate for the consequent relatively small expenditure increases by corresponding reduction in other expenditures."

This resolution was promptly transmitted by the Chairman to the Assistant Secretary of Defense (R&E).

To effectuate the maintenance of support for Defense basic research at sustained levels, the Board agreed that it was timely to urge the promulgation of a Department-wide policy on basic research that recognizes the value of this effort as an essential ingredient in potential military power as opposed to military power in being. A strongly-worded policy statement was drafted and introduced by the Assistant Secretary of Defense (R&E) at a meeting of the Joint Secretaries for consideration and adoption. Following this meeting the Secretary of Defense issued a DOD Directive setting forth the principles and the Department of Defense policy relating to the support of basic research (TAB I).

IV. ON RESEARCH NEEDS IN SPECIFIC AREAS

A. High Energy Physics Research (UNCLASSIFIED)

At its Third, Fourth, and Sixth Meetings, the Board considered the valid interest and the responsibility of the Department of Defense in the support of the field of high energy physics vis-a-vis the Atomic Energy Commission and the National Science Foundation. At its Fourth Meeting in June 1957, the Board agreed that the Department of Defense should:

- (1) Look to the National Science Foundation to continue to provide a mechanism for general review and over-all coordination of the plans and programs of the individual Federal agencies involved; and
- (2) Participate in developing and directing the nation's research program in the field of multi-BEV physics.

In addition, at its Sixth Meeting in December 1957, the Board added the conviction that, if a national program in high energy physics is to be undertaken, the Department of Defense interest should indeed be great enough to provide for active Defense participation.

B. Research in Special Operations (UNCLASSIFIED, in context as presented below)

At its Third Meeting in February 1957, the Board heard a presentation by Dr. Wilbur Schramm, then Chairman of the OASD (R&E) Advisory Panel on Special Operations, on research needs in the area of psychological warfare, unconventional warfare, social science aspects of civil affairs and military government, and related intelligence and planning operations. The Board expressed more than concern over the lack of support by the Military Departments for research in special operations, but was not ready to plead the funding requirements nor the echelon of technical supervision, the latter contingent to a substantial degree on policy considerations that bear on the whole area of special operations as an instrument of national policy and aims.

At its Fourth Meeting in June 1957, the Board was advised that the Assistant Secretaries (or nearest equivalents) for Research and Development in the Military Departments would, together with the ASD (R&E), endeavor to develop a strong statement for the Secretary of Defense on the need for a clear definition of national policy in the area of special operations.

C. Research in the Medical Sciences (UNCLASSIFIED)

At its Fourth Meeting in June 1957, the Board heard a report from the OASD (R&E) Advisory Panel on Medical Sciences on factors leading to the curtailment of Defense medical research and the need for increased support. The point was made that military medicine is broadening as a direct result of tremendous advances in weapons and environmental factors to which the military man is exposed, while programs in civilian medicine have objectives and solutions which are not of the kind Defense is seeking for its needs. It was argued that a 25% increase of the then current budget was needed merely to maintain military medical research at the on-going level; and that beyond this, the program must be promptly and sharply increased to meet the needs foreseen.

The Board endorsed these views by adding its conviction of the need for additional research but referred to the Assistant Secretary of Defense (R&E) the problem of weighing the budgetary aspects.

The Board again heard the case of need for increased support for militarily-related medical research at its Tenth Meeting in December 1958, and agreed that the Chairman should transmit a memorandum to the

Secretary of Defense inviting attention to medical problems specific to the military and which are not being met by civilian agencies; this was done by memorandum DSB 203/1, dated 30 January 1959.

D. Planned Support Levels for Basic Research (UNCLASSIFIED)

At its Seventh Meeting in March 1958, the Board heard a status report on augmentation of the FY-58 DOD basic research program to the extent of \$50 million for projects deserving immediate funding. It was noted that a major defect in the university contract program is lack of stability, and that the remedy is long-term financing by the Army and the Air Force, similar to the longevity program authorized OMB some years ago. Longevity financing was defined as a three- to five-year contract obligation strengthening the continuity of effort and the productivity in basic research undertakings.

The Board recommended to the Assistant Secretary of Defense (ASD) that he take such steps as practicable to provide longevity financing in each of the Services by 1 July 1958 for the DOD contract basic research program and that, more specifically, a fund on the order of \$20 million be provided the Army and the Air Force for longevity financing.

Signed - George D. Lukes

George D. Lukes
Executive Secretary
Defense Science Board

cc Lukes 1/20/59 Jul 59
DSB - 352-27 x 54154

30 January 1959

PRESENT CONSTITUTION OF
THE DEFENSE SCIENCE BOARD

Members-at-Large

Dr. H. P. Robertson, Chairman
Dr. C. C. Furnas
Dr. Frank L. Horsfall, Jr.
Dr. A. B. Kinsel
Dr. L. Eugene Root
Dr. Wilbur Schramm
Maj. Gen. L. E. Simon, USA (Ret.)

Date of Appointment

19 June 1957
18 February 1957
3 June 1957
9 July 1957
2 December 1957
29 September 1958
19 November 1957

Members Ex Officio

(a) By Virtue of Serving as Chairmen of the Advisory Bodies Named:

Mr. William Littlewood
Mr. Harry A. Winne
Mr. E. Duer Reeves
Dr. Elmer W. Hagstrom
Dr. W. J. Sweeney
Dr. R. W. Cairns
Dr. Kay Jeffries
Dr. Richard A. Kern
Dr. L. T. R. Thompson
Dr. Dael Wolfe

Mr. Richard S. Morse
Dr. Frederick Seitz

Lt. Gen. Donald L. Pett, USAF (Ret.)
Dr. Clark B. Millikan

Dr. James R. Killian, Jr.
Dr. Warren C. Johnson

(b) Representatives of Other Agencies:

Dr. Allen V. Astin
Dr. Detlev W. Bronk
Dr. Hugh L. Dryden
Dr. Alan T. Waterman

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Atomic Energy
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Army Scientific Advisory Panel
Naval Research Advisory Committee
(Vice Chairmen)
Air Force Scientific Advisory Board
Scientific Advisory Committee,
Office of the Director of
Guided Missiles, OSD
President's Science Advisory Committee
General Advisory Committee, AEC

Director, National Bureau of
Standards
President, National Academy
of Sciences
Deputy Administrator, National
Aeronautics and Space Administration
Director, National Science Foundation