

# TECHNOLOGY STRATEGY

*Report of the Defense Science Board*

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For Open Publication**

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February 2019

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**DEFENSE SCIENCE  
BOARD**

**OFFICE OF THE SECRETARY OF DEFENSE  
3140 DEFENSE PENTAGON  
WASHINGTON DC 20301-3140**

**MEMORANDUM FOR THE UNDER SECRETARY OF DEFENSE FOR RESEARCH  
AND ENGINEERING**

**SUBJECT: Final Report of the Defense Science Board (DSB) Task Force on  
Technology Strategy**

We are pleased to forward the final report of the Defense Science Board Task Force on Technology Strategy, carried out as a "quick look" at selected technologies, capabilities, systems, and missions relevant to the Office of the Under Secretary of Defense for Research and Engineering. For each area, the DSB identified objectives not being pursued-or not being pursued sufficiently-which would be of significant value for national defense and with particular attention to those that would benefit from a research and engineering focus.

As this assessment was done over a short timeline, it depended on DSB member expertise and built on the extensive archive of previous DSB studies. These assessments summarized the members' deep knowledge and captured relevant DSB efforts to identify what should be done most urgently in each area. This report also includes an estimate of the broad timeline and investment needed to achieve the desired technical capabilities.

We agree with the recommendations detailed in this report and urge the Department to move quickly towards their adoption.

A handwritten signature in black ink, appearing to read "Craig Fields".

**Dr. Craig Fields  
Co-Chair**

A handwritten signature in black ink, appearing to read "Eric Evans".

**Dr. Eric Evans  
Co-Chair**

# Executive Summary

**The DSB recommended objectives to USD(R&E) for each of the 10 priority technology domains not being pursued—or not being pursued sufficiently.**

The objective of this "quick look" study was to provide timely recommendations across 10 priority areas—technologies, systems, and missions—selected by the Under Secretary of Defense for Research and Engineering (USD(R&E)). For each area, the Defense Science Board (DSB) was asked to help identify objectives not being pursued—or not being pursued sufficiently—which would be of significant value for national defense and which are technologically achievable. For each of these priority areas, the DSB has described feasible objectives that will have a significant impact on specific Department of Defense (DoD) missions and national security.

This assessment, which took place in mid-2018, depended on the expertise of DSB members and built on the extensive archive of previous DSB studies.

Research and technology areas of concern begin with chapter 1, cybersecurity and chapter 2, microelectronics, that underpin the functionality of every defense component and subsystem. Three emerging technologies of significant promise follow in chapter 3, quantum science and computing; chapter 4, machine learning (ML) and artificial intelligence (AI); and chapter 5, directed energy (DE).

Advanced capabilities of concern to the USD(R&E) begin with chapter 6, command, control, and communications (C3), a capability that enables every defense mission. This report also encompasses four critical defense capabilities in chapter 7, space offense and defense; chapter 8, hypersonic offense and defense; chapter 9, missile defense; and chapter 10, nuclear deterrence.

In many areas, the assessments include what should be done most urgently with an estimate of the broad timeline and investment needed to achieve the desired technical capability.

Further reading is encouraged. Reports discussed herein are available from the DSB office or at: <https://www.acq.osd.mil/dsb/reports> or <https://atl.osd.smil.mil/coi/DSB/>

Additional information exists at a higher classification level available to those with appropriate access. Please contact the DSB office for more information.

# Study Membership

## Study Chairs

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# Terms of Reference



RESEARCH  
AND ENGINEERING

## THE UNDER SECRETARY OF DEFENSE

3030 DEFENSE PENTAGON  
WASHINGTON, DC 20301-3030

MEMORANDUM FOR CHAIRMAN, DEFENSE SCIENCE BOARD

SUBJECT: Terms of Reference - Defense Science Board Task Force on Technology Strategy

The objective of the Defense Science Board (DSB) task force on Technology Strategy is to provide timely recommendations (no later than 1 Jul 2018) to the Department of Defense (DoD) on specific elements of a technology strategy for each of the ten Under Secretary of Defense for Research and Engineering (USD(R&E)) priority technology domains: hypersonics; directed energy; command, control, and communications; space offense and defense; cybersecurity; artificial intelligence/machine learning; missile defense; quantum science and computing; microelectronics; and, nuclear modernization.

The DSB will recommend to USD(R&E) objectives for each of the ten priority technology domains that are not being pursued or pursued sufficiently; which would be of significant value for national defense; and which are technologically achievable. The resulting recommendations should include, but are not limited to: the threat to be met or the technological opportunity to be grasped; evidence of the achievability of the recommended objective; how this objective would enhance or enable specific DoD missions; what should be done most urgently to maximize benefit to national security; and, if possible, estimate the broad timeline and investment needed to achieve the desired technical capability.

This DSB Task Force will be sponsored by me as USD(R&E). I am authorized to act upon the advice and recommendations of the DSB. The current DSB Chairman, Dr. Craig Fields, and Vice-Chairman, Dr. Eric Evans, will serve as co-chairmen of this board-level study. Mr. Edward Gliot, acting Executive Director, will serve as the Executive Secretary and DSB Secretariat Representative.

The study members are granted access to those DoD officials and data necessary for the appropriate conduct of their study. The USD(R&E) will serve as the DoD decision-maker for the matter under consideration and will coordinate decision-making as appropriate with other stakeholders identified by the study's findings and recommendations.

The study will operate in accordance with the provisions of Public Law 92-463, the "Federal Advisory Committee Act," and DoD Directive 5105.04, "DoD Federal Advisory Committee Management Program." It is not anticipated that this study will need to go into any "particular matters" within the meaning of title 18, United States Code, section 208, nor will it cause any member to be placed in the position of action as a procurement official.

Michael D. Griffin

A handwritten signature in blue ink, appearing to read "Michael D. Griffin", with the date "4/20/2018" written below it.