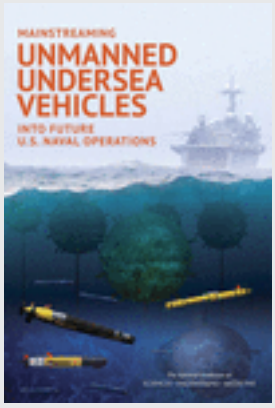


# Mainstreaming Unmanned Undersea Vehicles into Future U.S. Naval Operations



**DETAILS**

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Abbreviated Version of a Restricted Report

Committee on Mainstreaming Unmanned Undersea Vehicles into
Future U.S. Naval Operations
Naval Studies Board
Division on Engineering and Physical Sciences

*The National Academies of*
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# Abbreviated Version of a Restricted Report

At the request of the former Chief of Naval Operations, the National Research Council (NRC)[1] appointed an expert committee to assess the potential of unmanned undersea vehicles (UUVs) in enhancing future U.S. naval operations. The Department of the Navy has determined that the final report prepared by the committee is restricted in its entirety under exemption 3 of the Freedom of Information Act (5 USC § 552 (b) (3)), via 10 USC § 130 and therefore cannot be made available to the public. This abbreviated report provides background information on the full report and the committee that prepared it.

Copies of the report will be made available to authorized individuals in the government from the NRC's Naval Studies Board (http://sites.nationalacademies.org/DEPS/nsb/index.htm). Other requests for the report should be submitted to the Department of the Navy.

The project that is the subject of this report was approved by the Governing Board of the NRC, whose members are drawn from the councils of the National Academy of Sciences, the National Academy of Engineering, and the National Academy of Medicine. The members of the committee responsible for the report were chosen for their special competences and with regard for appropriate balance. The study was supported by a contracting agreement (ref. N00014-10-G-0589, DO # 12) between the National Academy of Sciences and the Department of the Navy.

[1]Effective July 1, 2015, the institution is called the National Academies of Sciences, Engineering, and Medicine. References in this report to the National Research Council are used in an historical context identifying programs prior to July 1.

## BACKGROUUND

Given the complexity of the undersea domain, the breadth of missions identified for UUVs, and the array of distinct Navy communities with interests in UUVs, the committee was not surprised to discover disparate UUV development efforts across the Navy and contributing academic and private sector entities. Recently, the Department of Defense and the Navy released several vision documents and roadmaps to guide the development and coordination of unmanned systems[2] generally and unmanned undersea vehicles specifically.[3] However, many of the key communities are mission-based, and coordination of available platforms and vehicles, as well as component technologies, is challenged along mission lines. Despite these challenges, however, the committee identified several communities in which UUVs are operational to such an extent to consider them mainstreamed. Consistent with the study's terms of reference presented below, the report offers guidance to the Navy on the future potential of UUVs, including a discussion of missions, environments, and threats to assist the Navy in developing effective operational concepts, technological capabilities, and acquisition processes.

The specific terms of reference for the study (i.e., the committee's charge) were as follows:

(1) Identify the missions and environments in which UUVs might be called upon to operate, as well as any issues or barriers (e.g., policy, operational, technical) that might inhibit mission success;

[2]Department of Defense, 2013, *Unmanned Systems Integrated Roadmap, FY2013-2038,* Washington, D.C., December 26.

[3] Department of the Navy, 2004, *The Navy Unmanned Undersea Vehicle (UUV) Master Plan,* Washington, D.C., November 9.

(2) For each of the identified missions, assess desired UUV size, quantity, and level of coordination with other unmanned and manned counterparts;

(3) Review the Department of the Navy's efforts for UUVs in comparison to (1) and (2);

(4) Evaluate the Department of the Navy's technology activities for UUVs, including its vision documents and its science and technology roadmaps (e.g., in areas of autonomy, endurance, communications, sensor capabilities, weaponry, launch and recovery) against criteria selected by the committee, such as the relevance for conducting future missions, cost and time scale for deployment, scientific and technical quality, and related technology activities outside of the Navy; and

(5) Recommend operational, technical, and acquisition approaches, excluding organizational changes, that would lead to mainstreaming UUVs into future U.S. naval operations at a faster deployment schedule—to the extent needed—than currently planned.

## Acknowledgment of Reviewers

National Research Council reports are reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the NRC's Report Review Committee. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the

deliberative process. We wish to thank the following individuals for their review of the draft (final) report:

Arthur B. Baggeroer, Massachusetts Institute of Technology;
George R. Cotter, Edgewater, Maryland;
Henry Cox, Lockheed Martin;
Anita K. Jones, University of Virginia;
Paul J. Kern, GEN, USA (RET.), Washington, D.C.;
James Ward, Lincoln Laboratory, Massachusetts Institute of Technology;
David A. Whelan, The Boeing Company; and
Charles B. Young, RADM, USN (RET.), Charleston, South Carolina.

Although the reviewers listed above have provided many constructive comments and suggestions, they were not asked to endorse the findings or recommendations, nor did they see the final draft of the report before its release. The review of this report was overseen by Stephen E. Fienberg, Carnegie Mellon University, and Dennis Bushnell, NASA Langley Research Center, who were responsible for making certain that an independent examination of this report was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of the report rests entirely with the authoring committee and the institution.