Executive Summary
Science and Technology

The 1992 Naval Research Advisory Committee (NRAC) Summer Study Panel on Science and Technology (S&T) examined the Department of the Navy (DoN) S&T enterprise and assessed its ability to serve effectively during the next two decades. This assessment considered recent changes in the world situation, combined with significant changes within the DoN and Department of Defense (DoD), including realignment and consolidation of the Navy's laboratories into Warfare Centers under the direction of the Systems Commands, reassignment of the Office of Advanced Technology (OAT) from the Staff of the Chief of Naval Operations (OPNAV) to the Office of the Chief of Naval Research (OCNR), and increased focus and direction from DoD on S&T strategy.

Maintaining technological supremacy of our weapons systems provides the basis for an effective deterrent and warfighting capability, permits accurate assessment of the capability of others, and retains a cadre of defense oriented scientists and engineers that is difficult to reconstitute. Therefore, the Panel concluded that there is still a requirement for a strong DoN S&T base. However, the Panel recommends changes to the way the DoN S&T program is executed, areas of new or expanded investment, new and revised roles for the Navy's Warfare Centers, and changes in the organization and management approach of OCNR.

The McNamara paradigm of an orderly serial transition of investment from Basic Research (6.1), to Exploratory Development (6.2), to Advanced Development (6.3), to procurement was created to bring financial accountability to a very large and complex acquisition process. In the future, it will be more appropriate to have a new paradigm that blurs the line between 6.1 and 6.2 and eliminates the distinction between 6.2 and 6.3. The Defense Advanced Research Projects Agency (DARPA) has operated effectively in this manner for some time, and the Chief of Naval Research's (CNR's) present scope of responsibility permits the DoN to evolve toward this new paradigm.

The Panel highlights several technologies for new or increased emphasis: development of prototyping methodologies, simulation and modeling techniques, and the study and adaptation of commercial manufacturing methods to focus on reducing the cost of operations and acquisition; and utilization of autonomous or remotely operated vehicles to offer opportunities to reduce casualties. In addition, the DoN should maintain experimental test beds for investigating platform improvements. Also, the DoN should promote the emerging technologies of effective generation, storage, and distribution of electrical power as a key enabler for future military systems, and advances in smart materials.

Some changes are recommended for the new Warfare Centers that exploit the breadth of the resident expertise and strengthen the S&T base: in-house laboratory/industry cooperation can be expanded by requiring a laboratory/industry partnership on every Advanced Technology Demonstration (ATD) program; Warfare Centers analysis

capabilities should be used by the CNR to perform trade-off studies, operations analyses, and the marginal utility evaluations; the Warfare Centers and Naval Research Laboratory (NRL) should establish small cadres of scientists and engineers to monitor and exploit S&T worldwide; and approximately five percent of the DoN S&T resources should be allocated to the Warfare Centers to be used at their discretion.

The organizational structure and the management processes of OCNR were intensively reviewed. The Panel concluded that the present organization is not well suited to the new paradigm for S&T and recommends that the CNR create a nearly seamless organization that has an integrated Planning and Assessment staff and a set of Program Directors, organized along the lines of the S&T customers, that manage funds from all three appropriations (6.1, 6,2, 6.3A). Within this new structure the CNR should use a management approach that is similar to that currently employed in the Office of Naval Research (ONR) and DARPA, i.e. programs directed by a headquarters (HQ) group of highly talented, respected technical experts that champion the case for resources to conduct S&T programs and determine the people and facilities to execute them.