Executive Summary
Command Center of the Future

In January 2000 the Naval Research Advisory Committee (NRAC) was tasked by the Honorable H. Lee Buchanan, Assistant Secretary of the Navy (Research, Development and Acquisition) [ASN(RD&A)] to assess Department of the Navy (DON) strategy for developing a next generation Maritime Command and Control (C^2) Capability that would ensure that the associated Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C^4ISR) functions are capable of providing embarked Joint Force Commanders with capabilities to receive, process and analyze information and to communicate and direct subordinate forces to achieve mission success. The tasking included a review of Joint Command organizations, potential operational missions and employment practices, communications support infrastructures, and related technologies. The panel was asked to review the Joint Maritime and Command Control Capability of the Future [JCC(X)] mission needs statement and requirements in order to comment upon and evaluate materiel alternatives and identify applicable emerging and existing technologies. To address the tasking, a panel of nine NRAC members and associates was augmented with four experts from industry and three retired flag/general officers with extensive C^2 experience.

Currently, the Department of Defense (DoD) is issuing new policies on information management to produce a globally interconnected, end-to-end set of information resources that will serve all of its military, business, and intelligence elements. This is called the Global Information Grid (GIG). It will significantly influence the Joint Maritime Command and Control (JMCC) Capability of the future.

Future missions will increasingly require joint operations. The JMCC must capably support the Joint Force Commander as well as the embarked subordinate component commanders with secure, robust communications as well as up-to-date decision support and display capabilities, for forces in contingencies and conflicts ranging from small to more expansive operations, up to major theater war (MTW). Technical complexity appears to be geometrically related to the employment of larger forces which causes the C^4ISR resources to become more burdened.

The DON has the opportunity to create a unique JMCC Capability that will provide flexibility and meet future C^2 needs. To do this, the architecture must be top down and joint. It is essential for the DON to use a "clean sheet of paper" approach as opposed to cobbling together legacy subsystems.

In the panel's opinion, the choice of platform(s) is not yet clear. It is clear, however, that the JMCC C^4ISR package must meet the requirements for Joint operations. The panel believes that the performance of the system will be driven by the C^4ISR package, and this

is where the DON should focus its effort. The information technology that underpins the C^4ISR payload is changing more rapidly than ship technology. In the end, the functionality and capability of the C^4ISR payload will justify the existence and the characteristics of the afloat platform(s), rather than the reverse. To accomplish this, the first step is to define the detailed joint requirements, incorporating inputs from the other services, the DoD, and Coalition Forces. The architecture should be scalable to handle the broad range of potential conflict scenarios. The panel believes that this task should be accomplished now.

Naval forces currently conduct exercises that demonstrate a considerable degree of distributed communication links within the Fleet. The JMCC Capability will need to achieve net-centric connectivity with command centers and areas outside the Area of Responsibility (AOR) through communication links. Some reach back capability and distributed connectivity already exist. Future technology will enhance our capabilities and connectivity possibilities. Naval forces should use operational exercises, and modeling, simulation and stimulation (MS&S) to determine the appropriate centralized/distributed mix. The tools under development used in conjunction with fleet exercises will continue to provide opportunities to exploit advances in communication and sensor technologies, and allow the DON to further experiment with various command center alternatives. These experiments can change culture, devise more effective procedures, train people, and develop the requirements for a deployable JMCC before committing resources to a new design, and/or dedicated command ship.

Future technology will permit locating a Joint Command Center virtually anywhere in the world. The panel examined several parameters that bear on the issue of location. While none of the location options present an optimum solution when viewed from various perspectives, on balance, the panel recommended a forward deployed command center as the best option. Further, the most effective command center in any area where a major forward deployed presence does not already exist should be afloat. It does not necessarily follow that there must be a dedicated command ship.

A forward deployed, afloat JMCC Capability provides the ability to quickly ensure a robust C^4ISR capability in many geographic areas where that is the only realistic solution. A forward presence can also be a stabilizing influence. Command center scenarios range from distribution on multiple warfighting ships, through one or two small, fast, dedicated platforms with significant reach back, to the four or five large dedicated platforms tied to the Fleet Commanders. As technology improves in all relevant areas over the next decade, it will facilitate significantly better distribution flexibility. The correct system approach needs to be refined through analysis and experimentation, including the cost performance trade-offs. A modular C^4ISR package would readily lend itself to supporting C^4ISR requirements aboard any platform.

The panel recommends using a Command Center System Integration and Test Facility as an essential tool for the JMCC Capability to ensure that technology infusion will be constant over the life cycle. This facility will provide the ability to assess the impact of technology insertion and refreshment, maintain configuration control, verify and validate requirements and system performance, determine training requirements, evaluate doctrine and policy, and demonstrate interface compatibility and interoperability.

The panel also recommends that the DON leverage commercial technology and conform to GIG architecture to achieve interoperability with Joint and Combined Components. Further, the panel recommends the employment of open systems architecture and widely used commercial standards and technology to reduce life cycle costs and ease technology insertion and refreshment and promote interoperability. The report provides additional detail on system design philosophy, C^2 decision flow, research and development (R&D) and industry trends, key communication technology, C^2 evolution, risk reduction, operational considerations, logistics and training trends, and acquisition strategy.