Executive Summary
Automation of Ship Systems and Equipment

The panel was tasked to study the automation of ship systems and equipment, and to determine those functions most readily and appropriately automated aboard future surface combatants. It was also tasked to assess available and reliable technologies with direct applicability to the automation of shipboard functions, and to suggest candidates for additional research and development to further improve warfighting capability while reducing manpower requirements.

The approach to achieving the tasking was to: 1) evaluate the current state and availability of technology; 2) identify functional areas of potential application; 3) develop a philosophy for the application of technology for automation; and 4) identify and prioritize near- and far-term applications that have potentially high payoffs. As part of this effort, the panel scheduled briefings from industry, academic and governmental sources, and reviewed a number of reports and studies prepared by recognized authorities in the field of automation.

The panel drew a number of conclusions as a result of this study.

1. Automation will be essential to ensure survivable and effective surface combatants in the warfare environment of the next century.
2. High payoff automation technologies are available and reliable. They can enhance combat effectiveness, reduce manpower costs, and reduce manpower skill requirements. At the same time, they can increase systems availability, and may be introduced in a phased manner.
3. Simplification and rationalization of shipboard processes and functions are prerequisite to efficient automation. The systems engineering discipline is essential to the selection of processes and functions to be automated.
4. Excessive use of standards and specifications will inhibit cost-effective implementation of automation technology.
5. Systems engineering design and implementation of integrated, complex shipboard systems requires a single program manager with authority, responsibility and accountability for the entire ship.
6. Critical enabling technologies for shipboard automation include:
   - Fiber optics;
   - Smart sensors;
   - Expert systems;
   - Distributed processing and Local Area Networks (LANs); and
   - Computer-Aided Logistics Systems (CALS).
7. Insufficient emphasis has been placed on advanced technology demonstration programs and facilities to assure effective transition of automation into the fleet.
8. Models and other analytical tools to adequately assess the cost and warfighting benefits of automation do not now exist.

Although in the past automation technology may not have been mature enough for reliable application to ship systems, the panel is convinced that today's technology can be effectively and profitably applied. The panel recommended that the Secretary of the Navy (SECNAV) promulgate policy endorsing shipboard automation, and establish a Plan of Action and Milestones (POA&M) to:

- Immediately introduce existing low risk automation into the fleet;
- Provide a surface ship dedicated to research and development with the capability to accommodate rapid prototyping of automated systems;
- Facilitate the introduction of new technologies and automated capabilities, exploiting modularity to accommodate backfit;
- Limit ship design standards to hardware functions and interfaces, and to software languages;
- Cooperate with industry and academia to support vigorous research and development in the information and computing sciences; and
- Fund a continuing advanced technology demonstration program as a mechanism for transition of automation into the fleet.