2004-01

The Logbook, A Publication of the Wayne E. Meyer Institute of Systems Engineering / January 2004

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Wayne E. Meyer Institute of Systems Engineering

THE LOGBOOK

A Publication of the
Wayne E. Meyer Institute of Systems Engineering
www.nps.navy.mil/meyerinstitute

January 1, 2004
Volume 6

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Expeditionary Warfare Force Protection

In early December, students from the NPS Systems Engineering and Analysis (SEA) curriculum presented a system of systems conceptual solution for expeditionary warfare force protection to an audience of various DoD command representatives. Students presented findings from the 2003 Integrated Project, which represented the combined efforts of approximately 60 students and 15 faculty members from various NPS departments.

The first phase of the study began in 2002. That study identified and defined capability gaps, developed platform solutions, and generated conceptual design requirements for an expeditionary warfare family of ships, a heavy lift aircraft, and other systems designed to be capable of fully implementing the Ship to Objective Maneuver and Sea Basing doctrines identified as the future concepts of operation.

December 2003 SEA Students

At the request of OPNAV N7, the 2003 Expeditionary Warfare Force Protection Integrated Project developed a system of systems conceptual solution to provide force protection for the conceptual Sea Base developed in the 2002 study. The task was accomplished through the use of a distinct systems engineering and analysis methodology (defining the problem, creating a scenario, conducting analyses, and using modeling and simulation tools to draw conclusions and determine results).

Conclusions, results, and a recommended system architecture were based on the following:

- **Attributes of Force Composition.** Two force compositions were studied: 1) a CRUDES-based (cruiser-destroyer) protection force consisting of three CGs, three DDGs, three FFGs, and one SSN; and 2) an LCS-based protection force consisting of one CG, one DDG, 12 LCSs, and one SSGN.
- **Sensor and Weapons Architecture**. Two sensor and weapons architectures were defined: point and distributed.
- **Weapons Type**. Current and conceptual weapons were analyzed.

The key findings of the study were:

- The distributed sensor and weapons architectures improve force survivability by providing increased available reaction times and more engagement opportunities. These architectures are particularly effective against Undersea Warfare (USW) threats because submarines can be detected and engaged prior to closing within effective torpedo ranges. Limited torpedo defense capabilities were identified as the primary cause of mission kills in the point sensor architecture.

- Conceptual weapons, when paired with distributed sensors, improve survivability by increasing available reaction time. Conceptual weapons included higher-speed, longer-range variants of existing weapons, and a free-electron laser. Detecting threats at greater ranges provides commanders with more time to evaluate threats before committing weapons.
- The distributed architecture conserves weapons by detecting targets at ranges close to the maximum range of the interceptor. The longer detection ranges, in conjunction with the increased maximum ranges of the conceptual weapons, allow threat platforms to be engaged before they can launch their weapons. For example, if an aircraft capable of launching four anti-ship cruise missiles is destroyed before launching those missiles, then only one interceptor is used instead of four. Also, the greater reaction time provided by the distributed sensors allows for improved targeting, which contributes to the conservation of weapons.
- The CRUDES-based and the LCS-based force compositions were tactically equivalent. Ultimately, other measures of effectiveness, such as manning, life cycle costs, etc., would have to be used to select a preferred concept.

Additional information is available in the final report and presentation, which will be available after 1 January 2004 at http://www.nps.navy.mil/SEA/SeaBaseDefense/.

December 2003 Award Winners

2003 Award Winners

The December 2003 Meyer Award for Significant Contributions to the Integrated Student Research Project was awarded to LCDR Ron Higgs, LT Colin Echols, LTJG Zafer Elcin (Turkish Navy), and Professor John Osmundson.

The Northrop Grumman Award for Excellence in Systems Engineering was presented to LCDR Higgs, Professor Osmundson, and Captain Jeff Kline, in recognition of their contributions to the Integrated Student Research Project. The Northrop Grumman Award is made possible by a generous grant to the NPS Foundation by Northrop Grumman.