



3 April 2017

Memorandum for Systems Engineering Analysis Cohort 26 (SEA26)

Subj: FY2017 SEA26 Capstone Projects: Tasking and Timelines

Enclosures:

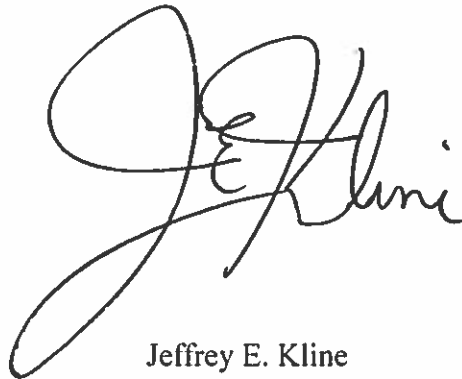
Tab A: Developing An Alternative Naval Force Structure using Set Based Design

Tab B: NPS Warfare Innovation Continuum “Strengthen naval power at and from the sea”

Tab C: IRB Student Checklist

1. This memorandum provides the FY2017 guidance for the conduct of the Systems Engineering Analysis (SEA) integrated project, which is required as partial fulfillment for the SEA degree. SEA students will deliver completed project reports and final briefing materials to faculty advisors in accordance with the following plan and milestones. Each group will:
 - a. Develop project proposals and management plans during the Spring Quarter AY2017. These proposals and plans will serve to focus initial research and analysis. These plans will be reviewed and updated frequently as research progresses.
 - b. Conduct project reviews approximately every six weeks, finishing with a final brief to interested stakeholders on and off campus.
 - c. Assign a report lead from each team. Work closely with faculty advisors to prepare the final reports for faculty advisor signature by four work-weeks before graduation. The final reports are then due to the SEA chairman one week later; and to the Operations Research and Systems Engineering department chairmen one week before graduation.
2. SEA students are expected to identify and integrate students and faculty from across the campus – and also from outside NPS – to participate directly in the project or to provide source documents, technical knowledge and insights, and knowledge of evolving requirements, capabilities, and systems. This participation could include students who would join project groups; students doing related individual thesis topics from TSSE, TDSI, OR, IS or SE; faculty inside or outside NPS who have expertise related to the project; and appropriately engaged government agencies and industry developers. It is the students’ responsibility to integrate the efforts of outside participants in the projects. Faculty advisors and the SEA Chair will, of course, significantly assist in these efforts.
3. Prior to commencing the formalized systems engineering and analysis process including stakeholder analysis, **the SEA team will consult with Dr. Larry Shattuck, Chairman of the NPS Institutional Review Board and submit to him** Tab A, a general description of the team’s systems and analytical approach to address the tasking, a completed IRB student research form (Tab C) and a list of candidate questions for stakeholders to Dr. Shattuck to review. The intent is to ensure questions are oriented about the “what” of the systems and not about the “who” of the stakeholder.

4. The analysis will employ the systems engineering and operations research methodologies presented in class work and from the project advisors. The role of the SEA students is that of the lead project systems engineering team, working closely with other members of the project engineering teams from TDSI and other campus curricula. SEA students will be expected to define the functions and performance of systems, develop alternative architectures to meet those functions, and evaluate the alternative architectures for performance and cost. In executing these tasks, students will be defining and understanding the overall project requirements, recognizing that the definition process is iterative and will evolve as the project progresses.
5. Grades are assigned to the participants in these projects. Although work is performed as part of a team, individual performance will be the basis for this evaluation. Successful completion and documentation of the project is a degree requirement.
6. The SEA26 project will build on, possibly challenge, but not replicate, other DOD, Navy and SEA projects. SEA26 will coordinate their study efforts, participate and occupy leadership roles in other FY17/18 efforts at NPS aimed at strengthening naval power at and from the sea. These activities, coordinated by the Chair of Systems Engineering Analysis are described in Tab B.



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Distribution: SEA26 students; Profs. Hughes, Jacobs, Giachetti, Hatch, Whitcomb, Stevens, Solitario, Kline, Harney, Papoulias, Porter, Boger, Brutzman, Buettner, McDowell, President Route; Provost Hensler; Deans Wirtz, Scandrett, McCormick, Paduan, and Moses, CAPT Daniel Verheul; Dr. Shattuck; LCDR Naccarato, RDML Williams, RADM Ellis, Mr. Paul Lluv (OPNAV N9B), RADM Fanta (OPNAV N9I), Mr. Mike Novak (OPNAV N9IB), Mr. Chuck Werchado (N81B), and Ms. Kathie Cain

TAB A

SEA 26 Tasking Developing a Fleet Architecture and Design.

Design an alternative fleet architecture (platforms, support) and design (concept of strategic employment) to the programmed force for the 2030-2035 timeframe. Consider the anticipated dynamics of future naval combat, emerging technologies, and potential advisories trends in systems which threaten U.S. sea control. To the maximum extent possible, use set base design to meet capability, capacity, and mission set requirements articulated in *A Design for Maintaining Maritime Superiority* and *A Cooperative Strategy for 21st Century Seapower*. The fleet architecture should include the numbers, kinds, and sizes of vessels, numbers and types of associated manned and unmanned vehicles, and the basic capabilities of each of those platforms. Assess your fleet architecture and design against the programmed force costs, technical risk, and their ability to satisfy national and maritime strategy.

Advisors:

Dr. Fotis Papoulias, Systems Engineering Department

Dr. Robert Dell, Operations Research Department

On Campus Subject Matter Experts:

Dr. Cliff Whitcomb, Dean, GSEAS (Set Based Design)

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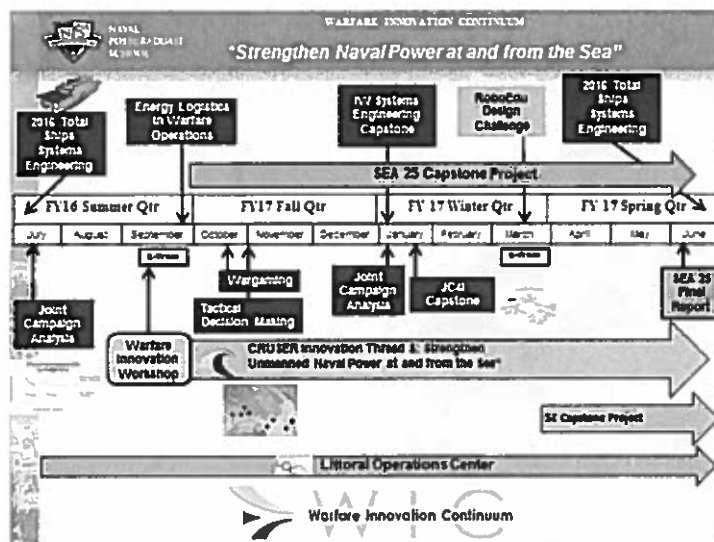
OPNAV N81 Mr. Chuck Werchado

TAB B

NPS Warfare Innovation Continuum
A Coordinated Naval Postgraduate School Cross-Campus Project FY16-17
“Strengthen naval power at and from the Sea”

Purpose: Coordinate and execute a series of cross-campus educational and research activities synchronized by the Chair of Systems Engineering Analysis with a central theme of exploring innovations to strengthen naval power at and from the sea per the CNO’s A Design for Maintaining Maritime Superiority. A primary objective is to further emerging technologies integration into fleet operations and explore alternative fleet designs and concepts to integrate manned and unmanned platforms. Focus will be to further advance and ingrain information warfare including developing the Electromagnetic Maneuver Warfare (EMW) concept by extending research in electronic warfare, spectrum management, assured C2, integrating planning and web fires, and training systems to support employment of these technologies.

Background: Emerging technologies in unmanned systems; autonomy; missile systems; undersea systems; long-range, netted and multi-domain sensors; and networks create a new environment for operations on and over the sea. This changing technology environment both challenges traditional fleet operations and provides opportunities for innovative tactics, techniques, and procedures to achieve naval objectives in sea control, power projection and counter Anti-Access Area Denial (A2AD) strategies. The NPS Warfare Innovation Continuum is a series of independent, but coordinated cross-campus educational and research activities to provide insight into the opportunities for warfighting in the complex and electromagnetically contested environment at sea and near the sea-land interface. It will address opportunities in unmanned systems technologies to support web fires and tactically offensive operations, and further develop the concept of electromagnetic maneuver warfare as an asymmetric advantage. The larger research question is **“Will emergent technologies innovatively employed strengthen naval capabilities in contested environments?”**



TAB C

IRP Student Research Check list is found at:

http://my.nps.edu/documents/103449465/105822173/IRB_Student_Research_Checklist.pdf/4fe273c8-af1f-42e8-9d72-5a750f3736df