Current Projects

Ongoing Funded Projects

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Early Stage System Design

Research Objectives

- Development of a process to facilitate consideration of the impact of platform constraints on combat system and weapon development throughout the system lifecycle.
- Evaluation of system operational effectiveness as the primary driver of early stage system design, rather than synthesis or physical feasibility of a candidate design.
- Development of simulation models that link a system’s operational effectiveness to the physical platform characteristics to rapidly visualize the relationship between operational effectiveness and physical system characteristics.

Expeditionary Energy

Research Objectives

- Explore new and alternative methods and tactics that could be employed by the U.S. Marine Corps or the U.S. Navy which reduce the energy usage across a broad range of operational scenarios.
- Develop operational simulation models of USMC operations (with particular focus on amphibious operations) that allow for integration and comparison with existing USMC fuel and energy models.
- Assess the primary drivers and fuel consumers in USMC operations, with particular focus on those drivers that minimally impact operational performance.

Hypervelocity Projectile (Railgun)

Research Objectives

- Based on a specific operational concept, how are engagement envelopes to be defined for HVP in gun-based defense?
- What doctrinal/operational/tactical changes should be introduced and employed to allow for best weapon-target pairing in complex threat scenarios?
- How can HVT gun-based defense best be complemented employ electric weapons and conventional munitions to allow for successful missions?
- What benefits to overall operational effectiveness are provided by the employment of a railgun on an LPD-17 ship?
- What are the most significant factors (to include salvo size, repetition rate, timing...) in determining the contribution to operational effectiveness of the LPD-17 by the presence of a railgun?
- What are the most significant ship impacts from implementation of Electric Weapons onboard current or future large deck platforms?

Joint Fires

Research Objectives

- How can Joint Fires capabilities be best employed for Sea Control and establishing friendly anti-access/area denial (A2/AD)?
- How can the existing Joint Fires System, used to call for Naval Fires, and evolving concepts of Joint Fires be used to support Joint Fires in support of Maritime Operations?
- What are the primary operational and functional requirements necessary for the implementation of Joint Fires in support of Sea Control, Strike operations, and to allow ground units to call for Navy Fires?
Ongoing Major Research Themes

Distributed Maritime Operations

Research Objectives

- Analyze the potential utility of candidate systems as enablers to the Distributed Maritime Operations (DMO) concept. Particular focus is current dedicated to the role of Unmanned Surface Vehicles (USVs) and the America Class LHA
- Analyze the potential for conflicting operational and force design requirements when implementing DMO concepts simultaneously with Integrated Air and Missile Defense (IAMD) operations
- Develop a systems architecture of the concept of Distributed Maritime Operations (DMO) applied to a Navy task force applied to a complex maritime mission. The will include a functional, physical, and allocated architecture.
- Develop a systems architecture of the concept of logistical support of DMO applied to a Navy task force assigned to a complex maritime mission.
- Develop a systems architecture for Command and Control (C2) to examine how well this DMO concept can be supported and sustained throughout the length of an operational mission, as implementation of DMO concepts may mean wide dispersion of forces and the inherent challenges of providing sufficient C2 support to this force.

Mine Warfare

Research Objectives

- Use MBSE to explore MIW through the examination of an aspect of the projected future global maritime mining threat.
- Collaborate with stakeholders in the development of an operational concepts and appropriate mission scenarios, as well as thorough understanding of capabilities of possible and proposed MIW systems to be used in the next five years.
- Determine the associated system requirements, capabilities and priorities for development and /or sustainment of the US Navy’s MIW capabilities in the 2040 time frame.
- Consider capabilities across all warfare domains (space, air, surface, subsurface), multi-tasking /multi-use of vehicles/platforms (manned or unmanned) across warfare areas, and interoperability with joint/allied force capabilities.
- Develop a systems architecture, determine appropriate metrics, develop and analyze an operational simulation, and examine cost, risk, and sustainment as appropriate.

Previously Funded Projects

Seabed Warfare and Undersea Infrastructure Defense

Research Objectives

- Development of a definition of Seabed Warfare as a unique warfare area
- Examination of the relationship between Seabed Warfare/Undersea Infrastructure Defense and existing doctrine regarding Undersea Warfare
- Definition of an operational concept and enabling systems related to Seabed Warfare
- Analysis of the role of unmanned systems, in particular the Extra Large Unmanned Underwater Vehicle (XLUUV) as an enabler of Seabed Warfare
Engineered Resilient Systems

Research Objectives

- Development of a collection operational simulation models for utilization in assessment of the resiliency of both U.S. Army design elements and organizational elements
- Definition and development of an analytic method for assessing the operational performance of a U.S. Army design and organizational elements across a range of scenarios
- Determination of a method for evaluation and display of multi-dimensional data that reflects the design and operational resiliency of U.S. Army units

USMC Operational Reach

Research Objectives

- Development of an operational model of transportation alternatives for the United States Marine Corps Forces Pacific
- Performance analysis and trade-off analysis based upon expediency of expeditionary forces arriving at a designated seabase and/or land location (i.e., travel time from home station to designated seabase and/or land location) and energy efficiency (i.e., measured in fuel consumption planning)
- Examination of alternatives to amphibious shipping to deploy to a seabase
- Identification of the critical factors impacting sealift transportation operations