Terms of Reference
How Autonomy can Transform Naval Operations
NRAC Summer Study 2012

Objective

This study by the Naval Research Advisory Committee (NRAC) will endeavor to clarify the potential of autonomy to transform naval operations. The study will explore the current and anticipated potential of technology to achieve various levels of autonomous operations. The study will also consider potential naval uses of autonomy, with emphasis on maritime systems, and the challenges associated with realization of these applications.

Background

The growing demand for naval forces and an increasingly constrained fiscal environment require hard choices today - and will require the Navy to evolve and innovate for the future.

The most concerning area for naval capability development is the fielding of A2/AD capabilities by nations and non-state groups. These capabilities include mines, submarines, anti-ship cruise and ballistic missiles, anti-satellite weapons, and communications jamming. These weapons are designed to support aggression and coercion against neighbors while preventing intervention by U.S. or allied forces. The Navy is investing in research and development efforts and procurement programs to overcome these threats to access, and assure the ability of the Joint force to project power in support of our allies and partners and protect U.S. interests.

An important element of overcoming threats to access and maximizing the fleet's capacity is unmanned systems. As a result, autonomy and unmanned systems have been identified by Naval and DoD leadership as a high priority. However, specific pathways for the introduction of technologies that enable greater levels of autonomy have not been identified.

Scope

The study will consider autonomy as a capability which is enabled by a set of technologies, such as sensing, intelligence, reliability, endurance, etc. These technologies comprise the attributes that permit an autonomous system to make decisions in the framework of an operational mission. The study will assess the state of the art of autonomy and identify technical shortfalls or opportunities to significantly advance the capability. The goal is to identify where autonomy has high potential to enable Naval missions; however, implementation of autonomous systems also introduces operational challenges, such as affordability, policy, doctrine, etc. The study will also consider these factors and make recommendations to facilitate the introduction of autonomy capability into the Fleet.

This study will be conducted at a classification level consistent with the information considered and the sensitivity of the study findings.

Specific tasking includes:

- Define/characterize "autonomy" as applied to Naval missions and identify contributing technologies to autonomy capability.

- Identify classes of autonomy for military applications, such as ISR, information management, decision making, logistics, weapon systems, etc. Particular emphasis will be placed on maritime systems and coordination between manned and unmanned systems.

- Review relevant technologies and ongoing naval research and development (RDT&E) of autonomy systems/subsystems to evaluate the readiness of autonomy capability for introduction into maritime systems. Examine the potential for future technology opportunities to introduce autonomy capability into current, near-term of next generation systems. This examination should include technologies for non-military applications, such as gaming, and international technology advances.

- Identify critical issues/barriers that impact the employment of autonomy in maritime systems, such as environmental, cultural, affordability, policy, doctrine, etc.

- Recommend technology solutions, investments and developments required to best leverage the use of autonomous systems in the maritime environment.