Behavior Automation for UxV Networked Control Systems

**Problem Statement**

- With a hybrid autonomous/semi-autonomous UxV Networked Control System is it possible for rapid integration of user-defined behaviors?
- How to define abstract behaviors for a UxV NCS?
- How to simultaneously retain system performance while integrating many potential behaviors?

**Candidate Solutions**:

- AI/ML Behavior Trees and Robust Logistical Dynamic Systems

**Impact**

- The ability to rapidly integrate horizontal and vertical behaviors offers the potential to rapidly increase autonomy in UxV NCS.
- While designed initially for expeditionary forces this applies to a wide set of DoD missions.
- Abstract behavior with UxV NCS specification permits independent behavior development.

**Transition**

- USSOCOM is aggressively looking at integrating UxV NCS into Special Operations missions
- PMS-406 Unmanned Systems has a variety of systems that can be combined to form an UxV NCS to improve a wide selection of maritime mission objectives
- USMC is actively pursuing UxV teaming for expeditionary mission objectives

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**Components for Behavior Automation of a UxV NCS**

- Hierarchy Protocol – manages vertical conflict resolution
- Priority Protocol – manages horizontal conflict resolution
- Behavior Tree manages execution

**Atomic primitives:**

- Path planning
- Obstacle Avoidance
- Position Estimation

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