

Topic: N151-020

## Daniel H. Wagner, Associates, Incorporated

Fusion and Optimization for C2 of Unmanned Systems (FOCUS)

Effective use of manned/unmanned teams in complex contested environments requires a revolutionary change in mission planning technology to achieve desired mission management and execution capabilities. Our tools, built on formal methods and contextual messaging, will enable such complex mission planning and execution tasks. Planning details will be intuitively obtained from the user, and then formal methods will be utilized to produce provably correct plans that can be initially transmitted and dynamically changed using very limited bandwidth. We expect that this revolutionary technology will transition to one or more manned/unmanned cooperative planning and execution systems. Daniel H. Wagner Associates, Inc. has long been and continues to be at the forefront of DoD C2 efforts, with emphasis on optimal mission planning and information flow optimization.

### Technology Category Alignment:

Human/Autonomous System Interaction and Collaboration

Scalable Teaming of Autonomous Systems

Advanced Computing/Software Development

Human Computer Interfaces (HCI) for Decision Making

Networks and Communications

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**SYSCOM:** NAVAIR

**Contract:** N68335-16-C-0346

 Corporate Brochure: [https://navystp.com/vtm/open\\_file?type=brochure&id=N68335-16-C-0346](https://navystp.com/vtm/open_file?type=brochure&id=N68335-16-C-0346)

# Department of the Navy SBIR/STTR Transition Program

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NAVAIR 2017-729

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## WHO

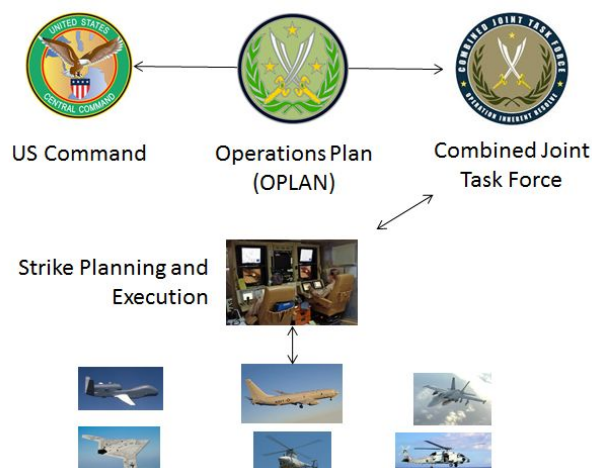
**SYSCOM:** NAVAIR

**Sponsoring Program:** PMA-281

**Transition Target:** Joint Mission Planning System (JMPS), Common Control System (CCS), UxS platform programs

**TPOC:**  
(301)757-1884

**Other transition opportunities:**  
Mission planning systems across all services and echelons;  
manned/unmanned cooperative planning and execution systems



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## WHAT

**Operational Need and Improvement:** Effective use of manned/unmanned teams in complex contested environments requires a revolutionary change in mission planning technology in order to achieve desired mission management and execution capabilities.

**Specifications Required:** In order to achieve dynamic mission management using manned/unmanned teams, provably correct mission behaviors must be definable as part of planning and execution management capabilities.

**Technology Developed:** Mission planning tools based on formal methods (e.g., functional programming), mission execution tools based on formal methods and data fusion, and mission communication tools that don't just send data, but information in context.

**Warfighter Value:** 1) FOCUS will improve mission planning by providing tools to define provably correct plans, using formal methods and functional programming that are hidden from the mission planner under a user-friendly domain-specific language.

2) FOCUS will improve mission execution by supporting provably correct dynamic re-planning based on all available information.

3) FOCUS will improve communications by sending information in context, significantly reducing the number and size of messages required for C2.

## WHEN

**Contract Number:** N68335-16-C-0346 **Ending on:** December 28, 2017

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Provably correct mission planning	High	Prototype tool demonstration	3	December 2017
Dynamic communication, monitoring, and re-planning of provably correct plans	High	Prototype tool demonstration	4	December 2018
Dynamic communication, monitoring, and re-planning of provably correct plans using all available information	High	Successful test in FNC or other experiment/testbed	5	December 2020

## HOW

**Projected Business Model:** Daniel H. Wagner Associates designs, develops, markets, implements and provides training for custom mission planning, data fusion, decision support, and resource optimization software. Our goal is to support Navy program offices and collaborate with defense contractors to integrate these advanced solutions. Examples of successful transitions include:

1) Acoustic Mission Planner (AMP) in rotary wing avionics system and shipboard Mission Planning System (MPS).

2) Net-Centric Data Fusion (NCDF) and Data Fusion Engine (DFEN) in Undersea Warfare Decision Support System (USW-DSS).

3) Mission Optimization Configuration Item (MOCI) Web Service in USW-DSS.

We have also implemented distributed data fusion/information flow optimization systems for swarms of unmanned surface vehicles (USVs) for the Office of Naval Research (ONR) and swarms of unmanned aerial vehicles (UAVs) for the Defense Advanced Research Projects Agency (DARPA).

**Company Objectives:** Rapidly and cost-effectively integrate FOCUS tools into Multiple Domain Mission Management capability.

**Potential Commercial Applications:** Mission planning and execution across the military, other government, and commercial enterprises will benefit from our approach to creating, communicating, monitoring, and re-planning provably correct plans. We see the potential for broad application of this concept across most Enterprise management systems that include complex dynamic execution management of resources.

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