

INDUSTRY DAY CONFERENCE:

DARPA/TTO will host an unclassified industry day conference in support of an anticipated, yet-to-be released DARPA Broach Agency Announcement (BAA) for the Anti-Submarine Warfare (ASW) Continuous Trail Unmanned Vessel (ACTUV) program (DARPA-BAA-10-43) on February 16, 2010. The ACTUV Industry Day will be held at the Liberty Conference Center, 4075 Wilson Boulevard, Suite 350, Arlington, Virginia, 22203 from 10:30 a.m. to 4:00 p.m. Registration begins at 10:00 a.m. and the conference will start promptly at 10:30 a.m. The purpose of this conference is to provide information on the ACTUV program, address questions from potential proposers, and to provide a forum for potential proposers to present their capabilities for teaming opportunities. Attendance will be restricted to U.S. citizens and permanent residents representing U.S. entities only. In addition, DARPA/TTO will host a classified (secret-level) sidebar before the main session at the same location from 8:00 a.m. to 10:00 a.m. Registration for the classified sidebar will begin at 7:30 a.m. and the meeting will start promptly at 8:00 a.m. Any questions related to this announcement should be sent to DARPA-BAA-10-43@darpa.mil.

The Industry Day announcement does not constitute a formal solicitation for proposals or proposal abstracts. Attendance at the Industry Day is voluntary and is not required to propose to any potential, subsequent Broad Agency Announcement or potential research solicitations on this topic. DARPA will not provide reimbursement for any costs incurred to participate in this Industry Day.

PROGRAM OBJECTIVE AND DESCRIPTION:

The Anti-Submarine Warfare (ASW) Continuous Trail Unmanned Vessel (ACTUV) program seeks to develop and demonstrate an independently deploying unmanned surface vessel optimized to provide continuous overt trail of threat submarines. The program is architected to achieve three primary objectives. The first program objective is to design, build, and demonstrate an X-ship based on clean sheet design approaches founded on the assumption that no person steps aboard at any point in its operating cycle, enabling beyond state-of-the-art platform performance characteristics. The second program objective is to demonstrate the technical viability of an independently deploying unmanned naval vessel under sparse remote supervisory control to enable a new class of maritime system. The third program objective is to leverage the unique platform performance and unmanned system characteristics of ACTUV, combined with a novel suite of sensors capable of robustly tracking quiet modern diesel electric submarines, to demonstrate a game changing ASW operational capability and to facilitate rapid transition of that capability to the Navy in response to critical operational demands.

Current unmanned surface vessel systems and concepts are operated as close-adjuncts to conventional manned ships – they are launched and recovered from manned ships, tele-operated from manned ships, and are limited to direct support of manned ship missions. The ACTUV system will be a first of its kind unmanned naval vessel that is designed and sized for theater or global independent deployment. It is envisioned that ACTUV will operate under a sparse remote supervisory command and control model, with a shore

based supervisor providing high level mission objectives and monitoring autonomous performance through an intermittent beyond line of sight communications link. A key program focus will be on the ability of the system to demonstrate safe navigation at sea within the framework of maritime law and the International Regulations for Avoiding Collisions at Sea. Additionally, the system will need to autonomously employ its sensor suite consistent with situational awareness and mission objectives, and implement appropriate tactics in response to both target behaviors and external environmental factors. Finally, the ACTUV system will require robust internal state awareness and adaptation to generate the high levels of system reliability necessary to achieve months-long deployments with no underway human maintenance or repair opportunity.

Beyond simply being an unmanned system, the ACTUV program will define new platform performance potential by re-envisioning surface craft design to fully exploit opportunities created by eliminating all crew support requirements. Conventional naval architecture tenants should be examined in this unmanned system context, which in addition to recouping first order crew support overhead, may offer second order benefits such as relaxed reserve buoyancy margins, dynamic stability limits, and even new platform orientation assumptions. The objective is to demonstrate disproportionate platform capabilities in terms of speed, endurance, sea keeping, and maneuverability. The program will also maintain a strong focus on exploiting novel system architectures and internal arrangements enabled by being unmanned to explore new construction methods and maintenance approaches to achieve disproportionately low system procurement cost and efficient inter-deployment maintenance.

The ability to achieve robust propulsive overmatch in a low cost, unmanned platform creates a disruptive change in ASW operational risk calculus, opening the door to unconventional missions, tactics, and sensor employment. ACTUV system design activity will be underpinned by a set of real world operational objectives to deliver propulsive overmatch against threat submarines and to support tracking over the entire duration of a target submarine's deployment. It is not intended as an ASW search capability. ACTUV relies on conventional force structure to provide a target cue, but then prevents those search assets from being tied up in intensive trail operations. The system design activity will include identification and development of novel sensor modalities and employment methods that can take advantage of the unique unmanned platform configurations and characteristics to achieve robust performance against the most challenging quiet submarine targets.

While the ACTUV concept was first explored under a DARPA study titled "Unmanned Naval Vessel (UNV)," the results of which will be provided in an annex to DARPA-BAA- 10-43, there is no intent to constrain the ACTUV solution space to this initial concept configuration. Proposers will be encouraged to independently explore and validate operational requirements for the intended mission and define their own optimal system concepts. However, the UNV Study does offer insight into potential approaches to achieve program objectives, identification of key system parameters, and examples of relevant system performance assessment. Preliminary key system characteristics include:

Overall System

- Clean sheet design based on no person stepping aboard at any point in its operating cycle
- Innovative application of unmanned platform performance and operational risk tolerance to achieve mission objectives
- Operations from a shore base
- High system reliability for long duration missions in the harsh maritime environment without opportunity for underway human maintenance or repair
- Architected to support low unit production cost, such as functional modularity, and non-traditional fabrication methods and facilities
- Architected to support efficient inter-deployment turnaround and low lifecycle cost
- Capable of near-term transition to operational employment

Platform Performance

- Size optimized for mission requirements with disproportionate performance for displacement relative to conventional surface platforms
- Sufficient range for independent theater or global deployment
- Extended loiter endurance to support forward operational prepositioning
- Speed, maneuverability, and endurance advantage over target set
- Seakeeping sufficient to maintain mission effectiveness through high sea states
- Advantaged sensor support

Autonomy

- Independently deployable unmanned system
- Sparse shore-based remote supervisory command and control model
- Capable of autonomous risk-based mission continuation through command and control interruptions
- Adaptive constraint set based on strategic context, mission phase, internal state, and external conditions
- Compliance with the Convention on the International Regulations for Preventing Collisions at Sea (COLREGS) and maritime law
- High fidelity surface navigation and situational awareness sensors
- High fidelity internal state awareness and dynamic performance assessment

Mission Requirements

- Optimized for quiet diesel electric submarine track and trail; not a wide area ASW search system
- Ability to close datum quickly to target cue location in order to minimize area of uncertainty growth
- Ability to localize target within area of uncertainty of handoff cue
- Ability to track target through its entire operating envelope in adverse environmental conditions
- Ability to maintain target trail over submarine operational deployment length
- Ability to provide continuous target location and activity reporting

- Resilience to foreseeable countermeasures and countertactics
- Leveraging of platform and sensor performance to safely maneuver within surface traffic while maintaining target track
- Minimized exploitable signatures

PROGRAM STRUCTURE:

While the program will be conducted in four phases, responses to DARPA-BAA-10-43 will be for Phase 1 only. Performers selected for Phase 1 concept exploration do not need to have capability to execute follow-on phases, and performance during Phase 1 is not required to be selected for follow-on phase awards. Follow-on phases will be competed under a separate solicitation following the conclusion of Phase 1.

In Phase 1, performer(s) will conduct concept exploration, system architecture studies, system concept design, and preliminary performance evaluations. Multiple phase 1 awards are anticipated to broadly explore the ACTUV concept space with a goal of developing highly innovative approaches and capabilities. Award values are expected to range from \$500,000 for limited architecture or concept studies, to \$2,000,000 for full system concept design and operations analysis. Phase 1 is expected to last for six (6) months. Within Phase 1, activities may include concept exploration and design, unmanned system architecture development, enabling technology surveys, wargaming, concept of operations development, concept performance simulation and assessment, system risk assessment, technology development planning, and system construction planning. A key deliverable from each performer in Phase 1 will be a preliminary performance specification, delivered with unlimited government rights such that it can be used as input to the ACTUV Phase 2 solicitation. In addition, performer(s) who complete system concept designs will be expected to develop a construction plan for their concept with an emphasis on innovative approaches and architectures to achieve low prototype and production costs.

Phase 2, not covered by DARPA-BAA-10-43, is anticipated to fund one award through Critical Design Review. Phase 2 is expected to have a duration of 18 months. As part of this phase, the performer should conduct system preliminary design, critical technology and construction process development, risk reduction demonstrations, detail design, and a high fidelity operational performance assessment. In addition to subsystem development and risk reduction testing, the performer should also conduct integrated hardware-in-the-loop (HWIL) testing capable of supporting in-water data collection. Phase 2 will culminate in a Critical Design Review.

Phase 3, not covered by DARPA-BAA-10-43, will build an integrated prototype vessel and conduct initial sea trials. Phase 3 is expected to have a duration of 18 months. This phase is expected to be awarded as a Firm-Fixed-Price (FFP) option under the Phase 2 solicitation with the intent that this constraint be a significant design driver in the preliminary and detail designs. Upon award the performer will begin construction of the prototype ACTUV including fabrication of the hull, subsystem integration, and initial in-water tests. The result of Phase 3 should be a prototype vehicle capable of further mission-oriented testing in Phase 4.

Phase 4, not covered by DARPA-BAA-10-43, is expected to conduct mission-oriented sea trials and experiments to support Navy military utility assessment. The duration of DARPA funding for Phase 4 is expected to be six (6) months, followed by full transition of subsequent test and acquisition activity to the Navy.

REGISTRATION INFORMATION: Participants must register no later than 2100 EST (9:00 pm EST) Thursday, February 11, 2010 at the following website:

www.schafertmd.com/conference/ACTUV. Directions to the facility and other materials are also available on the website. There is no registration fee for attending this conference. If space limitations are approached, organizations may be asked to limit attendance, but please contact DARPA-BAA-10-43@darpa.mil prior to making travel arrangements if there is a desire to send more than four representatives per organization.

The ACTUV industry day conference will be unclassified but restricted in attendance to U.S. citizens and permanent residents representing U.S. entities due to the inclusion of information controlled under the International Traffic in Arms Regulations (ITAR). The pre-conference sidebar will be classified at the DoD secret level. Visitors must check in at the Liberty Conference Center, 3rd Floor, Suite 350. Registration for the sidebar will suffice as registration for the main session. Visitors will not be admitted without proper photo identification and either a current visit request on file for classified attendees or other proof of U.S. citizenship or permanent residency for unclassified attendees. Please see the security link on the registration website for details.

The latter portion of the industry day will be set aside to allow attendees to present company overviews, discuss their technology expertise, and discuss teaming opportunities with the industry audience. Upon arrival, the attendees will receive their scheduled time for presenting to the industry audience. There will also be opportunity for closed sessions with Government representatives during the afternoon. The opportunity to present or meet will be afforded on a first come, first served basis. It is the presenter's responsibility to ensure that all proposed material, whether unclassified, classified, or otherwise sensitive, is reviewed by any originating authorities prior to being displayed at the conference. Presentations will be limited to ten (10) minutes each.

Proposers desiring to present at the industry day conference should send an electronic copy of all unclassified material to be presented to DARPA-BAA10-43@darpa.mil as soon as possible, but no later than 2100 EST (9:00 pm EST) Thursday, February 11, 2010. In the case of classified presentations, please contact DARPA-BAA10-43@darpa.mil. Requests for Government meetings should also be made to DARPA-BAA-10-43@darpa.mil.