Special Notice
DARPA-SN-15-20

Collaborative Operations in Denied Environment (CODE)
Tactical Technology Office (TTO)
Defense Advanced Research Projects Agency (DARPA)

This Special Notice (SN) from the Defense Advanced Research Projects Agency Tactical Technology Office is an invitation to participate in two meetings that are being held as part of the Collaborative Operations in Denied Environment (CODE) program. DARPA is inviting interested parties with capabilities, methodologies, and approaches that are related to CODE research and focused on revolutionary approaches to unmanned aircraft systems (UAS), autonomy, and collaborative operations to participate in the meetings. Responses (**due February 4, 2015** – see below for more details) to this SN will be used to select the participants and should not contain intellectual, confidential, proprietary, or other privileged information. This invitation to participate in the reviews is on a voluntary basis for entities not currently under contract. Invited entities will not be funded or reimbursed for the preparation or participation in the meeting(s).

OVERVIEW:

DARPA's CODE program is exploring concepts for advanced autonomy and collaborative operations that could be applied across existing and/or new unmanned aircraft to enhance effectiveness, survivability, and affordability. The program is currently in its first phase exploring and evaluating a broad range of solutions and defining an open architecture to support the program objectives (see below for further details). To this end, the program will hold two meetings scheduled for the **first week of March** (between March 2nd and 6th) in the Arlington, VA area. This Special Notice invites eligible interested parties to take part in either or both meetings. All interested parties are to respond with their interest and qualifications.

Open Architecture Meeting (OAM)
During the Open Architecture Meeting, the CODE Open Architecture Integrated Product Team (OA IPT) will brief the architecture plan and approach (real-time, segregated, multi-level security, operating system supported, etc.) for industry feedback and assessment along with the rationale. The objective of the OA IPT is to define a common framework that will facilitate the integration of third party modules and improve portability of the results of this program. One focus area of the OA IPT is to leverage current standards of warfighter communications (Link 16, JTRS, STANAG, FACE TSS, OMS) and DOD initiatives to standardize waveform development (*DoDI 4630.09)* in examining the information economy of collaborative autonomous teams. Another focus is to develop the technical justification for communication flows/content that are adaptable and situationally-relevant to collaborative autonomous teams at various levels of collaboration. At the end of the one-day meeting, the participants will be asked for suggestions regarding best approaches for broadening the support and impact of the CODE OA, including the possibility of repeating this meeting on a regular basis.

<u>Technical Interchange Meeting (TIM)</u>
The objective of the Technical Interchange Meeting is to present technologies to the track A performers (the CODE system integrators) for potential incorporation into in their overall solution to be demonstrated during Phases 2 and 3 of the program and ensure that CODE leverages the best available technologies from all possible sources. Selected presenters will be given 10 minutes to present their concept to representatives of the track A teams and of the CODE program office, with 5 additional minutes to address questions. Following their presentation, presenters may be invited by the Track A teams to a private side-bar for further conversation.

Due to space and time limitations, DARPA will select the participants based on the following process:
- For the open architecture meeting, a maximum of two participants per organization will be selected based on relevant background in open architecture for autonomous systems and on a first-come-first-served basis. Participants will be limited to U.S. persons who are representing U.S. entities because of International Traffic in Arms Regulations (ITAR) regarding technical information for UAS.
- For the technical interchange meeting, participants will be selected based on the CODE team's evaluation of the relevance of the concept/technology to be presented, as described in a one-page summary (see below for further details). DARPA will only notify the selected participants with specific time and instructions for their presentation.

CODE CONCEPT AND TECHNOLOGY DESCRIPTION:

Over the last 25 years, Unmanned Aircraft (UA, which in this concept includes cruise missiles, decoys, and other unmanned aircraft systems (UAS)) have proven to be very valuable tools for performing a wide range of missions from Intelligence, Surveillance, and Reconnaissance (ISR) to tactical strike, and the U.S. Armed Forces have invested heavily in a broad range of systems. However, most of the current inventory is not well matched to the needs of future conflicts, which DARPA anticipates being much less permissive, very dynamic, and characterized by a higher level of threats, contested electromagnetic spectrum, and re-locatable targets. In this environment, our current systems have several challenges:

- Systems have very limited ability to autonomously react to changes and either lack the flexibility to adapt to a changing situation (in the case of missiles) or are tightly tied to human operators (for UAS);
- Enhancing the survivability features of our current systems using traditional methods would be expensive or impossible;
- Systems at the tactical edge are working in isolation – instead of relying on nearby assets to augment their capabilities, they rely on distant strategic assets for critical functions such as navigation, off-board targeting, and communication;
- UAS are operated by large crews. This is expensive and incompatible with an organic system able to react quickly to a dynamic situation.

Collaborative autonomy has the potential to significantly increase the capabilities of legacy assets as well as to reduce the cost of future systems by composing heterogeneous teams of UA

that can leverage the capabilities of each asset without having to duplicate or integrate capabilities into a single platform. Using collaboration algorithms, UA can provide services to each other, such as:

- Geo-locating targets with long distance sensors and guiding less capable systems within their sensor range,
- Providing multi-modal sensors and diverse observation angles to improve target identification,
- Transmitting critical information through the network,
- Providing navigational aid to disadvantaged assets, or
- Protecting each other by quantitatively overwhelming defenses and other stratagems.

Through these collaborative behaviors and others, the UA teams can achieve greater mission efficiency by, for example:

- Increasing area coverage for target detection or rapid task execution,
- Dynamically assigning tasks, or
- Optimizing team composition and resource usage based on mission needs.

CODE Track A integrators' top level goals are to:

- Develop and demonstrate the value of collaborative autonomy in a tactical context;
- Rapidly transition the capability to the warfighter;
- Develop an enduring framework to expand the range of missions, platforms, and capabilities that can leverage collaborative autonomy; and
- Develop an open architecture that enables all members of the rich community of unmanned systems and autonomy researchers to contribute to current and future capabilities.

Further information may be found at: https://www.fbo.gov/spg/ODA/DARPA/CMO/DARPA-BAA-14-33/listing.html

REQUESTED INFORMATION AND SUBMISSION GUIDELINES:

Respondents to this SN should be concise and limit material to the most relevant input. DARPA will only review responses submitted electronically as described below.

All capable sources, including, but not limited to, private or public companies, individuals, universities, university-affiliated research centers (UARCs), not-for-profit research institutions, federally-funded research and development centers (FFRDCs), and U.S. Government-sponsored labs are invited to participate.

For participation in the open architecture meeting, send an e-mail to DARPA-SN-15-20@darpa.mil titled, "Open Architecture Meeting." The body of the e-mail should include organization name, participant names (up to two representatives), salutation, title, contact info, and a paragraph describing relevant experience in developing open architectures for autonomous systems.

For participation in the technical interchange meeting, send an e-mail to DARPA-SN-15-20@darpa.mil titled, "Technical Interchange Meeting." The body of the e-mail should include concept name, organization name, participant name(s), salutation, title, contact info, and, as an attachment, a Microsoft Word or pdf file providing a summary of the technology to be presented. The attachment shall consist of a cover page that includes the same information as the e-mail and a one page (11-point font or larger on 8.5 inch by 11 inch paper, with a 1 in margin on all sides) **non-proprietary** description of your concept for the CODE team (including the Track A performers) to review and assess. The summary shall define the capability to be presented, its potential benefits within the CODE context, an assessment of maturity, and a description of the integration needs/approach.

Mature ideas that have already been tested in a relevant context are more likely to attract the interest of the CODE team for integration into Phase 2 and 3 plans.

This announcement contains all information required to submit a response. No additional forms, kits, or other materials are needed.

Responses are due February 4, 2015, by 4:00 PM ET.

The contact information should include the responder's technical and/or administrative points of contact (names, addresses, phone numbers, fax numbers, and e-mail addresses) to enable potential clarification discussions. The program office will send out notifications no later than February 18, 2015 with the location and time of the OAM and TIM for selected organizations.

All technical and administrative correspondence and questions regarding this announcement and how to respond should be sent to DARPA-SN-15-20@darpa.mil. Please refer to "CODE SN: DARPA-SN-15-20" in all correspondence.

Point of Contact:
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DISCLAIMERS AND IMPORTANT NOTES:

This is a SN issued solely for information and program planning purposes; it does not constitute a formal solicitation for proposals or proposal abstracts. In accordance with FAR 15.201(e), responses to this notice are not offers and cannot be accepted by the Government to form a binding contract. Submission of a response is strictly voluntary and is not required to propose to subsequent Broad Agency Announcements (if any) or other research solicitations (if any) on this topic. No solicitation exists; therefore, do not request a copy of the solicitation. If a solicitation is released, it will be synopsized on the Federal Business Opportunities website. It is the responsibility of any potential offerors/bidders to monitor this site for the release of any solicitation or synopsis. DARPA will NOT provide reimbursement for costs incurred in responding to this SN or participating in any subsequent workshop (if any).

Submissions may be reviewed by the Government (DARPA and partners), support contractors bound by appropriate non-disclosure agreements, and by the CODE Track A performers.

Respondents are advised that DARPA is under no obligation to acknowledge receipt of the information received or provide feedback to respondents with respect to any information submitted under this SN. Responses to this SN do not bind DARPA to any further actions.