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Contracting Office Address

Department of the Army, Army Contracting Command, ACC - APG (W911NF) Research Triangle Park Division, 800 Park Office Drive, Research Triangle Park, NC 27709

Description

This modification references the ARL BAA, which can be found at Grants.gov or <https://beta.sam.gov/> : W911NF-23-S-0001.

Synopsis: The U.S. Army Combat Capabilities Development Command (DEVCOM), Army Research Laboratory (ARL) is looking for proposed research and development solutions under the ARL Broad Agency Announcement (BAA) W911NF-23-S-0001 for Basic and Applied Scientific Research topic Network Sciences, “Autonomous Sensing and Information Fusion for Advanced Indications and Warnings” (ARL-BAA-0064)¹. The Topic for this Special Notice is “Call for literature review on information architectures in sensor networks for decision making in coalition operations”, and funding for the award is expected to be provided by both the U.S. Army and the U.K. Ministry of Defence (MOD), hereafter “Governments”. Upon receipt, the Governments will review compliant proposals through a technical and programmatic review process in accordance with the evaluation criteria referenced in the ARL BAA to determine which proposal may be awarded a Grant under this topic.

The Governments reserve the right to cancel this special notice without award for any reason or for no reason. Issuance of this notice does not commit the Governments to pay for any preparation costs incurred in compiling a response. As a general matter, all requirements referenced in BAA W911NF-23-S-0001 apply to this effort.

The Governments intend to award one grant to support a literature review on information architectures in sensor networks for decision making in coalition operations outlined in the project description below. Proposals should include an overview of the focus, themes, and scope of the planned literature review, and highlight the team members and the specific strengths that each brings to the effort. Proposal should include no more than five pages of technical content (in addition to required attachments)

This research aligns with the main objectives and complements the research in the U.S. /U.K. Project Arrangement concerning Distributed Analytics and Information Sciences – International Technology Alliance², and the U.S. DEVCOM Army Research Laboratory’s “Internet of Battlefield Things” Collaborative Research Alliance³. The outcome will contribute to the Architectural Approaches research in Dstl’s Sensor Fusion and Management project.

Background: The structure of where and when in a network to fuse information, including a specification of how information is shared and combined between different nodes, can be called the

¹ <https://sam.gov/opp/427c652546d34f30972650dda01b4a93/view>

² <https://arl.devcom.army.mil/cras/completed-alliances/>

³ <https://www.arl.army.mil/business/collaborative-alliances/current-cras/iobt-cra/>

information architecture. Traditionally, information fusion in sensor networks has occurred by processing all information in a central node. This is commonly called centralized fusion. However, in the military context, sensing assets are subject to adversarial action, and centralized architectures may lack robustness and resilience. Alternative ways of processing data and information within a network potentially have some attractive features of survivability, adaptability, security and scalability, while posing some technological and algorithmic challenges.

The various non-centralized information architectures tend to fall within classes denoted as decentralized or distributed fusion. Typically, decentralized fusion architectures share and process data in a manner that every node has the centralized estimate, whereas distributed fusion considers a hierarchical flow of information leading to partial fusion that progressively incorporates more information up to the root node that contains the full fusion solution. The development of such architectures for low level fusion such as detection, tracking and classification is far more mature than for high level fusion tasks requiring situation and threat assessment. Furthermore, with the prevalence of coalition operations consisting of partners with overlapping but not completely aligned objectives as well as heterogeneous capabilities, the management of data flow within the network is a great challenge. Due care must be paid to mission parameters and constraints which may vary across a coalition, relating to, for example, privacy and security concerns.

Scope of the Call: This Special Notice invites proposals for a funded literature review on the topic of “Information architectures in sensor networks for decision making in coalition operations”, as part of the ARL BAA, for up to \$100k total in U.S. Army and U.K. MOD funding and up to 9 months in duration.

This call invites a review and analysis of the literature that will clarify the significant alternative information architectures, relevant to information fusion with networks of heterogeneous sensors that enable coalitions to achieve effective decision-making. From 2016-2021, Dstl- and DEVCOM-ARL-sponsored Distributed Analytics and Information Sciences International Technology Alliance (DAIS ITA) program made headway in the problem of distributed analytics and information science for support of coalition operations. The review should survey advances from this program along with recent findings in the literature from other research efforts. As a matter of clarifying existing challenges, it should define a clear taxonomy of information architectures that deliver the necessary information for disparate coalition decision makers. It should refer to fusion at different ‘levels’⁴, or at different stages of information processing, which might be imposed by mission constraints, or may be preferable for reasons of efficiency or exigency. It may also encourage the community to adopt alternative precise definitions. Additionally, the review will set out with respect to alternative information architectures what is known and what are the significant research challenges on the topics of:

- survivability and adaptability of a network to passive and active⁵ adversarial activity, including robustness and resilience to failure of nodes and communication links;
- scalability, with respect to network size, numbers of targets, and numbers of coalition partners;
- quantification of uncertainty;
- attainment of convergence and consensus across nodes as possible in light of security/privacy sharing constraints;

⁴ See for example the JDL Data Fusion Model: <https://apps.dtic.mil/sti/tr/pdf/ADA391479.pdf>

⁵ Passive adversarial activity might include hiding or changing one’s appearance to mislead a classifier. Active adversarial activity could mean seeking to damage or interfere with node’s sensing or communication capability, e.g. by jamming or dazzling,

- autonomous sensor management over heterogeneous nodes over multiple network domains;
- autonomous scheduling of computation;
- the appropriate level of processing at which, or after which, to undertake data or information fusion within the architecture;
- other issues as seen fit.

It can be assumed that the purpose of the network is to obtain either a global picture or overlapping local pictures of an environment for the various coalition partners. Objectives may include: prediction of enemy intentions; assessment of vulnerabilities; targeting; battle damage assessment; warning and alerting. Distinctions may be made for how information architectures affect or facilitate different classes of algorithms.

Approach: The aspiration is for the review to be a definitive paper, clarifying what is known, and setting out research challenges for a 5 – 10 year time-frame. It is expected that this report would be published in a peer-reviewed journal.

Application Process

Eligibility: Funding for the award will be provided by the Army Futures Command Forward Element – Atlantic (AFC-ATL), Army Research Lab, and the U.K. Ministry of Defence (MOD) Defence Science and Technology Laboratory (Dstl). Due to the international funding organizations, applicants are encouraged to be led by a U.K. host University or eligible Research Institute. However, for this call we will follow the eligibility requirements of the U.S. DEVCOM ARL BAA⁶. Should you require clarity regarding the eligibility of a particular institute, please send a request to one of the contacts detailed in Section 8.

Number of Awards: 1

Duration of Award: Award will be for up to 9 months.

Funding: Total funding not to exceed \$100k (USD). There is no fixed amount awarded and the value of award will vary depending on proposal and associated budget. Proposals are expected to be submitted at a cost commensurate with the level of effort. Awards cover allowable research expenses in accordance with US Title 2 Code of Federal Regulations, Part 200 (2 CFR 200).

Evaluators: Will be U.S. Army and U.K. MOD Government employees that are subject-matter experts in the topic area, jointly nominated by the Governments. Award will be made by the US Army Contracting Command.

Closing Date: The deadline for applications for award is 15 March 2024. Proposals received after 11:59 PM GMT on 15 March will not be evaluated or considered for award. It is the responsibility of the submitting party to confirm receipt of submissions.

How to Apply: Proposals for funding must be submitted by 15 March 2024 by sending all application materials to US.Army.Grants@army.mil. The BAA lists several other options for submitting proposals; however, proposals not submitted via this email address will not be considered. Queries relating to the technical, managerial, contractual, and submission aspects of the call should be addressed to those individuals identified in section 8.

⁶ <https://arl.devcom.army.mil/collaborate-with-us/opportunity/arl-baa/>

Proposals should contain the following elements, and not exceed 5 pages:

- Detailed descriptions of the various emerging research areas that will be reviewed and how they address the Call
- Team structure and team roles
- Cost breakdown (to include institutional cost-share)
- CVs of each member of the team (outside 5-page limit)

Evaluation Criteria

Proposals will be evaluated under the evaluation criteria of the U.S. Army BAA. The proposal will be evaluated for the literature review plan's scientific merit and potential contributions of the effort to the Army mission and the interests of the U.K. MOD. Required documentation is outlined in the BAA document. To facilitate rapid processing of the award, templates and instruction documents are included in Appendix A.

Additional conditions

Conditions for award, including intangible property and publication requirements will be included as terms in the award and in compliance with the Department of Defense R&D Terms and Conditions⁷. In addition to the conditions in the BAA, the authorities for this joint proposal can be found within the US/UK Memorandum of Understanding Concerning Cooperative Participation in Research and Development Projects⁸.

For projects funded by this Award, the investigators are encouraged to publish the results of the research in accordance with the normal academic practice but are required to allow the Governments to view material prior to submission to ensure there is no inadvertent release of sensitive material. There is a requirement for a mid-point progress report from the Award, covering the work and successes of the project, together with the final report/publication.

Key Dates

<u>Activity</u>	<u>Date</u>
Deadline for Proposals	15 March 2024
Anticipated Award start date	30 June 2024

Contacts

Below is a list of contact information for additional information related to the call for proposals. Please copy Wilveria Sanders on any correspondence with other parties.

- Submission questions:
 - Jonathon Brame, U.S. Army (Jonathon.a.brame.civ@army.mil, 01895 626528)
- Technical Questions:
 - Lance Kaplan, U.S. Army (lance.m.kaplan.civ@army.mil, +1 (301) 394-4282)
 - Alasdair Hunter, Dstl, Architectural Approaches Lead, Sensor Fusion and Management project. (ahunter@dstl.gov.uk, 01980 952938)
- Contracting Questions:
 - Wilveria Sanders, Army Contracting (wilveria.a.sanders.civ@army.mil, +1 (919) 549-4328)

⁷ <https://www.nre.navy.mil/work-with-us/manage-your-award/manage-grant-award/grants-terms-conditions>
SEPTEMBER 2023 R&D General Terms and Conditions, Property- Article VI – Intangible Property

⁸ <https://2009-2017.state.gov/s/l/treaty/tias/2000/126269.htm>

Appendix A

Additional documentation as part of a complete proposal will include the following items (with templates for each provided as attachments):

1. Table of Contents
2. Publicly Releasable Project Abstract
3. Army Research Office Proposal Cover Page (ARO Form 51)
4. Protection of Proprietary Information During Evaluation and After Award (For Educational Institutions / Non-Profit Organizations) (ARO Form 52a)
5. Project Description (proposal document – not to exceed 5 pages)
6. Biographical Sketch (for all PIs on the project)
7. Bibliography
8. Current and Pending Support (for all PIs on the project)
9. Facilities, Equipment, and Other Resources
10. Summary Proposal Budget (ARO Form 99)
11. Contract Facilities Capital Cost of Money (DD Form 1861)
12. SF Form 424 (R&R)
13. Research and Related Senior/Key Person Profile (for all PIs on the project)
14. Research and Related Other Project Information
15. Representations Under DoD Assistance Agreements: Appropriations Provisions on Tax Delinquency and Felony Convictions