

W911NF-23-S-0010

SOURCES SOUGHT NOTICE

REQUEST FOR WHITE PAPERS

BAA TOPIC II A.2-.b.4: Assessing and Developing Junior Leader Competencies for
Multidomain Operations

“Tactical Decision-Making Exercises to Assess and Develop Leader Critical Thinking
Competencies”

INTRODUCTION

Broad Agency Announcement (BAA) W911NF-23-S-0010 was publicized on FedBizOpps and [Grants.gov](https://www.grants.gov) on 01 May 2023. This Sources Sought Notice calls for White Paper submissions in reference to the BAA Topic II A.2.b.4: Assessing and Developing Junior Leader Competencies for Multidomain Operations. The United States Army Research Institute for the Behavioral and Social Sciences (ARI) Broad Agency announcement W911NF-23-S-0010, issued under the provisions of paragraph 6.102(d)(2) of the Federal Acquisition Regulation, provides for the competitive selection of basic and applied research and that part of development not related to the development of a specific system or hardware procurement. A Proposal submitted in response to this BAA and selected for award is considered to be the result of full and open competition and in full compliance with the provisions of Public Law 98-369, “The Competition in Contracting Act of 1984,” and subsequent amendments. Funding of research and development (R&D) within ARI areas of interest will be determined by funding constraints and priorities set during each budget cycle. Any award related to the submission of a White Paper and subsequent Proposal requested by this Notice is subject to funds availability and priorities. ARI may choose not to select any new award due to unavailability of funds or other factors.

The sequence of steps leading to an award is:

- 1) Request for White Paper initiated by ARI through this Sources Sought Notice
- 2) Submission of a timely White Paper **no more than six pages in length (one page is the cover page)** to the POC for the U.S. Army Contracting Command, wilveria.a.sanders.civ@army.mil, and copy furnish (CC) the ARI Technical Point of Contact (TPOC), jayne.l.allen3.civ@army.mil.
- 3) The ARI will provide written or telephonic feedback for whitepapers submitted and will provide a response with either “encouraged to submit a proposal” or “not encouraged to submit a proposal”. as per established criteria presented in Part III.
- 4) If the White Paper merits it, a request of a formal proposal initiated by ARI
- 5) Submission of a timely, formal proposal
- 6) Evaluation of the formal proposal as per established criteria presented in Part III
- 7) Award for selected proposal based on availability of funds or other factors

This sequence allows earliest determination of the potential for funding and minimizes the labor and cost associated with submission of a full proposal that has minimal probability of being selected for funding. Note that an interested Applicant **must** submit a White Paper electronically in order to be eligible to submit a formal proposal under this Notice. This Notice requires that a White Paper be submitted electronically no later than **17 August 2023, 5:00 PM Eastern Daylight Time**. See Part V, Deadlines, for additional details. BAA W911NF-23-S-0010 allows several potential instrument types (e.g., contract, grant, cooperative agreement) to result from a successful proposal. For this Notice, the intention of the Government is to award a contract.

THOSE SUBMITTING A WHITE PAPER/PROPOSAL ARE CAUTIONED THAT ONLY A GOVERNMENT CONTRACTING OR GRANTS OFFICER CAN OBLIGATE THE GOVERNMENT THROUGH AWARD OF A LEGAL INSTRUMENT INVOLVING EXPENDITURE OF GOVERNMENT FUNDS.

This Sources Sought Notice for a Requested White Paper consists of seven parts as follows:

- Part I: Research and Development Interests of the Requested White Paper
- Part II: Preparation and Submission
- Part III: Evaluation Criteria
- Part IV: Feedback
- Part V: Deadlines
- Part VI: Inquiries
- Part VII: References

ACC (APG) RTP Agency Point of Contact:

The POC for the US Army Contracting Command (Aberdeen Proving Ground) Research Triangle Park Division is: Ms. Wilveria Sanders, (919) 549-4328, wilveria.a.sanders.civ@army.mil.

ARI Agency Point of Contact:

The ARI POC for technical matters for this White Paper topic is: Dr. Jayne L. Allen, (706) 761-7611, jayne.l.allen3.civ@army.mil.

I. RESEARCH AND DEVELOPMENT INTERESTS OF THE REQUESTED WHITE PAPER:

The United States Army Research Institute for the Behavioral and Social Sciences is the Army's lead agency for the conduct of research, development, and analyses for Army readiness and performance via research advances and applications of the behavioral and social sciences that address personnel, organization, training, and leader development issues. ARI contracts with educational institutions, non-profit organizations, and private industry for research and development (R&D) in different areas, including the areas specifically identified in Section II - B W911NF-23-S-0010. Efforts funded under this White Paper request will only include Applied Research and/or Advanced Technology Development.

Applied Research provides a systematic expansion and application of knowledge to design and develop useful strategies, techniques, methods, tests, or measures that provide the means to meet a recognized and specific Army need. Applied Research precedes system specific technology investigations or development, but it should have a high potential to transition into the Advanced Technology Development (ATD) Program.

The ARI ATD Program includes the development of technologies, components, or prototypes that can be tested in field experiments and/or simulated environments. Projects in this category have a direct relevance to identified military needs. These projects should demonstrate the general military utility or cost reduction potential of technology in the areas of personnel selection, assignment, and retention; training strategies and techniques; leader education and development; performance measurement; and team and inter-organizational mission effectiveness. These projects should be focused on a more direct operational benefit and if successful, the technology should be available for transition.

WHITE PAPER TOPIC: “Tactical Decision-Making Exercises to Assess and Develop Leader Critical Thinking Competencies”

As leaders conduct missions and make decisions, they are constantly building and modifying their understanding of the world around them to facilitate critical thinking and forward planning. While this is a complex cognitive activity, previous research efforts might provide a means of understanding what processes are involved and how those processes might lead to success or failure. For example, studies focused on the science of comprehension have used networks of semantically interconnected propositions to explain how elements of incoming information, combined with an individual’s background knowledge, shape the way individuals infer meaning from an ongoing flow of events (Kintsch, 1988; Doane & Sohn, 2000). Making matters more complicated than they might be in other contexts, Army leaders must make complex decisions with incomplete information based on data sources that may differ greatly in their precision and reliability. To prepare leaders to deal with such demands, the Army invests in training them in areas such as doctrine, tactics, troop leading procedures, etc.; but due to constraints of time and resources there are limited opportunities to probe leaders’ deep understanding of such material and its impact on their ability to form accurate representations of the problems they face (i.e., what Kintsch would call “comprehension models”). Tests can provide information about what a student-leader knows (i.e., the answer is wrong or right), and field exercises can provide information about what a student-leader knows how to do (e.g., the chosen avenue of approach affords concealment, or it does not). While these assessments are useful, they do not provide information about the student-leader’s decision-making process. In a math problem where a student can “show his/her work,” the instructor has an opportunity to see—and correct if needed—the rationale with which the student approached the problem as well as the steps the student then took in executing the solution. In other words, the math instructor has the student’s representation of the problem-space in front of him or her, and the quality of that representation is directly linked to the decisions the student made during problem-solving. To optimize leaders’ learning and development, the Army must identify a method that can be used at scale to understand student-leaders’ comprehension of situations and provide feedback targeted toward correcting errors in their representations of the problems they face.

One way to approach this challenge is to consider the development of critical thinking competencies across the career trajectory. To what extent does the development of critical thinking rely on the creation of more nuanced problem representations, and what errors in critical thinking can be expected when these representations are incomplete and/or incorrect? Striving to address these questions, the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) is seeking to leverage advances in artificial intelligence to develop a diagnostically focused tactical decision-making system. This system should present tactical decision-making exercises in such a way that a student-leader is required to explain his/her thought process, thus allowing instructors to diagnose misconceptions and knowledge

gaps at a deeper level than traditional testing allows. In this way, a model of critical thinking development across the career trajectory may be developed.

This research should be theory-driven and pursue the goal of building purposeful training exercises that can probe individuals' task-relevant problem representations in order to diagnose specific misconceptions and knowledge gaps. This may involve building a set of small-scale tactical decision-making exercises focused on isolating specific aspects of a problem-representation (or particular knowledge gaps or misconceptions) as well as a set of larger scale tactical decision-making exercises where multiple knowledge elements are brought together to make more complex decisions. Once individuals' problem-representations are mapped, predictions can be made about their individual tendencies to make specific choices (Sohn & Doane, 2002), and feedback can be tailored to refer to knowledge elements (propositions) a person has access to, ensuring appropriate knowledge scaffolding is available. Additionally, with recent advances in AI technology, the building of individual problem-representations can be guided by having student-leaders describe their thought processes during decision-making episodes and allowing an AI agent to interpret that input and convert it into a human-readable problem representation (e.g., a proposition network), much like what happens when researchers take notes during 'think-aloud' task-execution sessions. This research will move the state of the art in knowledge elicitation forward. It will also allow for more tailored training experiences as individual knowledge is coded into a format that can be used to determine the best sequence of training exercises that will expose leaders to situations that optimally use their existing knowledge as a scaffold for new, as yet unlearned, knowledge.

The award will be approximately a 36-month period of performance (12-month base [FY24 \$350,000] with two 12-month option years [\$350,000 and \$250,000 respectively] with a budget not to exceed \$950,000.

The Army Contracting Command- Aberdeen Proving Ground, RTP Division has the authority to award a variety of instruments, to include contracts, grants, and cooperative agreements. The ACC (APG) RTP Division reserves the right to use the type of instrument most appropriate for the effort proposed (contract, cooperative, or grant).

II. PREPARATION AND SUBMISSION OF A WHITE PAPER:

Preparation of White Paper

A White Paper should focus on describing details of the proposed research for both the base and if applicable, option (s) approach, including how it is innovative and how it could substantially advance the state of the science. Army relevance and potential impact should also be described, as well as an estimate of total cost for both the base and option approach. White Papers should present the effort in sufficient detail to allow evaluation of the concept's technical merit and its potential contributions to the Army mission.

A White Paper must be limited to six (6) pages (page one is the cover page) and an addendum in which the Applicant must include a biographical sketch (up to 300 words per individual) of all key personnel (i.e., Principal Investigators and Co-Principal Investigators) who will perform the research, highlighting their qualifications and experience as discussed below. All files and forms must be compiled into a single PDF file or MS Word document before submitting. Reviewers will be advised that they are only to review the cover page and up to five pages plus the addendum. Any pages submitted in excess of the six (6) page limit will not be reviewed or evaluated.

TECHNICAL INFORMATION FOR A WHITE PAPERS:

1. Technical Approach: A detailed discussion of the effort's scientific research objectives, approach, relationship to similar research, level of effort, and estimated total cost; include the nature and extent of the anticipated results, and if known, the manner in which the work will contribute to the accomplishment of the Army's mission related to this request and how this would be demonstrated.
2. Requests for Government Support: The type of support, if any that the Applicant requests of the Government (such as facilities, equipment, demonstration sites, test ranges, software, personnel or materials) shall be identified as Government Furnished Equipment (GFE), Government Furnished Information (GFI), Government Furnished Property (GFP), or Government Furnished Data (GFD). The Applicant shall indicate any Government coordination that may be required for obtaining equipment or facilities necessary to perform any simulations or exercises that would demonstrate the proposed capability.
3. Key Personnel Biographical Information: As an addendum to the White Paper, the Applicant must include a biographical sketch (up to 300 words per individual) of all key personnel (i.e., Principal Investigators and Co-Principal Investigators) who will perform the research, highlighting their qualifications and experience.

RESTRICTIVE MARKINGS ON WHITE PAPERS:

1. The Applicant must identify any proprietary data the Applicant intends to be used only by the Government. The Applicant must also identify any technical data or computer software contained in the White Paper that is to be treated by the Government as limited rights or restricted rights respectively. In the absence of such identification, the Government will assume to have unlimited rights to all technical data or computer software presented in the White Paper. Records or data bearing a restrictive legend may be included in the White Paper, but must be clearly marked. It is the intent of the Army to treat all White Papers as procurement sensitive information before the award and to disclose their contents only to Government employees or designated support contractors for the purpose of procurement related activities only. Classified, sensitive, or critical information on technologies should not be included in a White Paper.
2. An Applicant is cautioned that portions of White Papers may be subject to release under terms of the Freedom of Information Act, 5 U.S.C. 552, as amended.

Submission of White Paper

White Papers must be submitted by e-mail to the POC for the U.S. Army Contracting Command, wilveria.a.sanders.civ@army.mil, and cc'd to the ARI Point of Contact (POC), jayne.l.allen3.civ@army.mil, in electronic MS Word document format or PDF file format. Cite “**ARI BAA W911NF-23-S-0010, Tactical Decision-Making Exercises to Assess and Develop Leader Critical Thinking Competencies**” in the e-mail subject line.

III. EVALUATION CRITERIA:

A White Papers and full Proposals received in response to this request will be evaluated by the ARI designated point of contact identified in this request using the following factors/criteria:

1. Scientific and Technical Merit- The overall scientific and/or technical merits of the proposed research.

2. Potential Contribution- The potential contributions to ARI's mission.
3. Qualifications/Capabilities- Proposed principal investigator and key personnel qualifications, capabilities, related experience, and techniques and also institutional resources and facilities.
4. Cost- Addresses the level of support requested. Will be considered for realism, affordability, and appropriateness, and may be grounds for rejection independent of evaluation on other factors

The request for a proposal will be made based on the overall evaluation of a White Paper using the four criteria listed above. The overall scientific and/or technical merit of the proposed approach will be weighted more strongly than all of the other non-cost factors combined. All evaluation factors/criteria other than cost, when combined, are significantly more important than cost or price. A request for proposal may not necessarily be made to the lowest proposed price. During the evaluation of White Papers, ARI's POC for technical matters may request a telecon with an Applicant, but telecons are not guaranteed nor required for competition and award purposes. ARI's POC for technical matters reserves the right to evaluate a White Paper and request a proposal without discussions. The Applicant's initial submission should contain the Applicant's best terms from a technical and price standpoint. Once a full proposal has been requested, all communications must go through the POC for the U.S. Army Contracting Command.

If the White Paper evaluation results in the request and submission of a full proposal, the proposal will be evaluated by a panel of scientific peers using the same factors/criteria as those listed above under Evaluation Criteria. A request for a full proposal does not guarantee an award. The decision to award will be based on feedback from the panel, considerations presented by ARI's POC for technical matters identified in this document, and other factors like budgetary constraints. ARI may choose not to select any award due to unavailability of funds or other factors.

IV. FEEDBACK:

Written or telephonic feedback will be provided to the Applicant regarding the White Paper's scientific merit and potential contributions to the ARI's mission. If the Government decides to request a full proposal, a written request will be sent to the Applicant. The Written Request will, at a minimum, invite a full proposal. The request may also include feedback intended to improve the proposal's potential for award.

V. DEADLINES:

Electronic versions of the White Paper must be received by the POC for the U.S. Army Contracting Command and the ARI POC, with e-mail subject line **"ARI BAA W911NF-23-S-0010, Tactical Decision-Making Exercises to Assess and Develop Leader Critical Thinking Competencies"** by e-mail no later than **5:00 PM Eastern Daylight Time on 17 August 2023**. Any extension to the White Paper submission deadline will be posted to SAM.gov and Grants.gov as an amendment to this Notice. Note that a timely White Paper received under this Notice will be evaluated and considered for proposal requests throughout the period beginning **3 July 2023**, and ending **17 August 2023**. **An extension of this timeline may be granted based on the number of White Papers submitted or other factors out of the control of the designated point of contact reviewing the White Papers. An Applicant will be notified by email if the White Paper evaluation timeline is extended beyond 17 August 2023.**

Please refer to the BAA, W911NF-23-S-0010 for instructions for the submission of a full Proposal.

An Applicant is responsible for submitting an electronic White Paper or full proposal so as to be received and accepted at the Government site indicated in this Notice no later than the date and time specified above. When sending electronic files, an Applicant shall account for potential delays in file transfer from the originator's computer to the Government website/computer server. An Applicant is encouraged to submit their response early (48 hours if possible) to avoid potential file transfer delays due to high demand or problems encountered in the course of submission.

An Applicant should receive confirmation of delivery at the Government site, not just successful relay from the Applicant's system. Acceptable evidence to establish the time of receipt at the Government site includes documentary and electronic evidence of receipt maintained by the Government site. All submissions shall be submitted before the deadline identified above in order to be considered – no exceptions.

If an emergency or unanticipated event interrupts normal Government processes so that a White Paper or full proposal cannot be received at the site designated for receipt by the date and time specified above, then the date and time specified for receipt will be deemed to be extended to the same day and time specified in this Notice on the first work day on which normal Government processes resume.

An Applicant agrees to hold the terms of their White Paper and any subsequent proposal valid for 180 calendar days from the date of submission.

VI. INQUIRIES:

ACC (APG) RTP Agency Point of Contact (Contractual Questions)

The POC for the US Army Contracting Command (Aberdeen Proving Ground) Research Triangle Park Division is: Ms. Wilveria Sanders, (919) 549-4328, wilveria.a.sanders.civ@army.mil.

ARI Agency Point of Contact (Technical Questions)

The ARI POC for technical matters for this White Paper topic is: Dr. Jayne L. Allen, (706) 761-7611, jayne.l.allen3.civ@army.mil.

VII. REFERENCES:

Doane, S. M., & Sohn, Y. W. (2000). ADAPT: A predictive cognitive model of user visual attention and action planning. *User Modeling and User-Adapted Interaction*, 10, 1-45.

Kintsch, W. (1988). The role of knowledge in discourse comprehension: a construction-integration model. *Psychological review*, 95(2), 163.

Sohn, Y. W., & Doane, S. M. (2002). Evaluating comprehension-based user models: Predicting individual user planning and action. *User Modeling and User-Adapted Interaction*, 12, 171-205.