

## 2023 Phase I Call for Research Proposals

### Digital Acquisition and Acquisition Integration and Interoperability (AI2)

**Proposals are due June 15, 2023, by 11:59pm EDT**

**[Submit your proposal on the AIRC website](#)**

The following is an open call to all faculty, fellows, and research staff at SERC/AIRC<sup>1</sup> universities for 2-page **fall semester Phase I studies** research proposals up to \$75,000 related to innovative ideas to improve the integration and interoperability of acquired defense systems.

#### Research Areas

1. **Governing** *Cross-Organizational Integration and Interoperability Efforts*. What governance structures can address distributed and de-centralized enterprise capabilities? Integrated, centralized enterprise capabilities? (see p. 5)
2. **Acquiring** *and Integrating Interoperable Capabilities Across Organizational Boundaries*. What acquisition entity/structure can address enterprise capabilities? (see p. 5)
3. **Requirements** *Setting and Managing Requirements that Cut Across Organizations*. What approaches could be introduced (e.g., increased direct combatant commander involvement)? (see p. 6)
4. **Budgeting** *and Financial Resources for Cross-Organizational Integration and Interoperability*. What new budgeting approaches could be pursued (e.g., enterprise and portfolio budgets)? (see p. 6)
5. **Incentivizing** *Integration and Interoperability Across Organizations*. What changes to incentives can drive progress in the four areas above? (see p. 7)

**Request Details.** This is not a government solicitation. Instead, this is a SERC/AIRC request to existing and potential colleagues within its academia partnership. Your research proposals will be peer reviewed and assessed for funding from the SERC/AIRC primary sponsor as incubator research projects for the fall semester of 2023. **Proposals are due June 15, 2023, by 11:59pm EDT.**

It would be greatly appreciated if you would also forward this Call to your faculty colleagues who may have an interest in these topics.

**Proposers Meeting:** The SERC/AIRC will hold a virtual meeting to help explain this research funding opportunity, clarify the simple process involved, and answer any questions. [Register here](#) for the meeting to be held on **May 17, 2023, at 1:00pm EDT (10:00am PDT)** on ZoomGov.

**Background:** The "Incubator" process solicits and incubates out-of-the-box applied ideas from academia for solving broad DoD challenges. This process is an integral part of the AIRC strategy for creating innovative improvements in defense acquisition. AIRC is seeking proposals for fall semester preliminary (Phase I) studies in academia to design and propose applied demonstrations and pilot programs of innovative acquisition approaches, policies, and practices for the specific application areas outlined below. Proposed approaches should have a strong potential for breakthrough results in improving the

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<sup>1</sup> The Systems Engineering Research Center (SERC) is a Department of Defense (DoD) University-Affiliated Research Center (UARC)—see [sercuarc.org](http://sercuarc.org). The Acquisition Innovation Research Center (AIRC) is a center established within the SERC by the DoD in response to 10 U.S. Code 4142.

defense acquisition mission through applied piloting and experimentation while also resulting in seminal/journal quality publications.

**Opportunity: Phase I Seedlings.** Subject to available funding, several high-quality proposals will receive initial seed funding, not to exceed \$75,000 per contract award. Selection will be made by the AIRC sponsors in the June–July 2023 timeframe, with awards targeted for the fall of 2023 (depending on when funds are received from the DoD). Contract funds can only be disbursed to universities and their centers—not companies, startups, or government labs.

*Topics.* The proposed research topics must address one of the research challenge areas further discussed on pages 6-8. Please identify the area you are responding to in your proposal.

*Expected Outcomes.* Expected activity and outcomes of the Phase I studies include the development of novel ideas and concepts; active engagement with relevant DoD and other experts during the study; the possible inclusion of preliminary proof-of-concept exploration/experiment (as time and resources allow); and the development of a proposal for a Phase II application pilot, prototype, or experiment for consideration by government champion(s). Out briefs of Phase II proposals for successful Phase I studies will be held in January 2024.

*Preferences.* Preference will be given to proposals that leverage novel and interdisciplinary approaches, to include business, public policy, education, economics, law, engineering, and science. Diversity of engagement from different universities is also sought. Accordingly, teaming across multiple universities and academic disciplines is encouraged to bring novel multi-disciplinary approaches to bear on the identified challenges and needs.

**Phase II Projects.** In the second phase of this incubator program, a small number of research proposals will be selected by the DoD from successful Phase I seedlings. Selection will be based on significance and uniqueness of the research approach as well as relevance to the targeted DoD acquisition field and its enduring and evolving challenges. These Phase II research projects may have a significantly higher level of funding for 3–12 months (with Phase III options) as a function of research scope (e.g., ranging from \$100K to \$1M, depending on the proposal's scope, challenging nature, and value to the DoD). Emphasis is on early applications for continued testing and proofs of concept. The number and scope of Phase II awards will depend on the relevant value to the DoD user community, novelty of the approach, and available funding.

Depending on the nature of the approach and the maturity of the concepts involved, Phase II plans may discuss the need for non-academic organizations to be funded by the DoD separate from the proposed Phase II AIRC project (i.e., in parallel to and coordinated with). Such inclusions should discuss how, when, and why such external partners should be involved. Remember that the focus of AIRC is to engage the best minds in academia on the most challenging problems facing defense acquisition systems. Consideration of transition and institutionalization approaches as well as potentially using innovative technologies from industry can strengthen the proposals if they do not devolve to business consulting or pre-existing solutions.

*Expected Phase II Outcomes.* Expected outcomes of the Phase II studies include demonstrated utility to the DoD users (champion metrics), leave-behind capabilities (when possible), and scaling and institutionalization by 2024–2025, along with journal publications.

**Submission Instructions:** To apply for Phase I incubator funding, submit a short description of your proposed research concept, addressing the first six **Heilmeier Catechism** criteria<sup>2,3</sup> used to "help Agency officials think through and evaluate proposed research programs," namely:

1. What are you trying to do? Articulate your objectives using absolutely no jargon.
2. How is it done today, and what are the limits of current practice?
3. What is new in your approach and why do you think it will be successful?
4. Who cares? If you are successful, what difference will it make?
5. What are the risks?
6. How much will it cost (for Phase I)?

Proposals and all supporting material must be concise; **proposals must be no longer than two (2) pages in length**. An additional page can be included to contain endnote references, graphics, and URL links to faculty/researcher bios or CVs. Include the names of the research team, lead university, partner universities (if any), and research challenge area with the title of your proposed research task. Format should be text-extractable PDFs or Microsoft Word files.

The overall value of the submissions will be judged based on several criteria, including:

- intellectual merit
- clarity of the vision
- novelty
- past performance of the investigators
- the potential strategic impact on and importance for the DoD, and
- the extent the approach takes advantage of academia's multi-disciplinary research capabilities.

For past performance, please include references to previous relevant research reports and published papers. If there are other sponsors within the DoD who may be interested in your proposed research and might provide matching funds or project guidance, please include this information as well!

Submissions should be made through the [AIRC website submission form](#). **Research proposal responses are due by June 15, 2023, by 11:59 pm EDT**. Please contact Ms. Kara Pepe at [kpepe@stevens.edu](mailto:kpepe@stevens.edu) if you have any questions about this research opportunity or the proposal response format.

We look forward to your ideas!

Sincerely,

*Dinesh Verma*

Dinesh Verma, Ph.D.  
Executive Director, SERC and AIRC  
Stevens Institute of Technology

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<sup>2</sup> See [www.darpa.mil/work-with-us/heilmeier-catechism](http://www.darpa.mil/work-with-us/heilmeier-catechism).

<sup>3</sup> Note: If your Phase I seedling is successful, the Phase II proposal generated during Phase I will need to address all criteria in the Heilmeier Catechism, including the last two:

7. How long will it take?
8. What are the mid-term and final "exams" to check for success?

## Digital Acquisition and Acquisition Integration and Interoperability (AI2)

Below are five fundamental challenge areas related to acquiring interoperable or integrated defense capabilities that cut across the organizational boundaries of the military services (Army, Navy, U.S. Marine Corps, Air Force, and Space Force). Each military service acquires systems and capabilities as part of its function "Organize, train, and equip forces to contribute unique service capabilities to the joint-force commander..."<sup>4</sup> While they have a responsibility to serve such joint forces, they often lack organizational resources to focus on joint, cross-service capabilities.

This call for proposals from SERC/AIRC universities seeks approaches in one or more of the challenge areas to address such cross-organizational challenges to achieving truly joint<sup>5</sup> or enterprise capabilities—including insights from commercial organizational practices or other areas. The DoD will benefit from your fresh ideas and approaches, especially as they tap into academic disciplines that have had little application to the DoD in the past. Your involvement will provide interesting intellectual challenges to expand your field through research, application, and publication.

**Desirable Features.** The following illustrate aspects that can improve the practicality of proposed approaches while still seeking innovative, out-of-the-box solutions.

- Approaches that can be applied and introduced in the DoD without wholesale reorganization of the DoD or its major functions.
- Approaches that allow the military services to continue addressing the needs of their individual warfighting domains while also layering on to address cross-domain integration and interoperability.
- Approaches for which needed data, inputs, transition conditions, users, and success criteria are (or should be) readily available to the researchers in academia.
- Approaches that can be tested in applied pilots and scaled to apply broadly across the DoD.
- Approaches expected to be piloted in Phase II sooner (e.g., early results in 6 months) rather than later (e.g., 2 years away).
- Approaches that will not require extensive statutory or regulatory changes (although some such changes are possible if the pilots or experiments show strong value).

Engagement with government users and functional experts likely will be important to understand the DoD's problems and efforts. Leverage and identify your contacts, and AIRC can help with outreach to the DoD during Phase I.

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<sup>4</sup> DoD Directive [DoDD 5100.01, Functions of the Department of Defense and Its Major Components, December 21, 2010, Change 1, September 17, 2020 \(whs.mil\)](#).

<sup>5</sup> "Joint" in DoD terms means capabilities that cut across the military services (Army, Navy, Marine Corps, Air Force, and Space Force).

## Area 1. Governing Cross-Organizational Integration and Interoperability Efforts

One major challenge lies in the existing governance structure within the DoD. Every large organization must have some degree of specialization and organizational components to divide and conquer the overall mission, and the DoD is no different. The department is structured around five military services (Army, Navy, Marine Corps, Air Force, and Space Force) with oversight and policy from the Joint Staff, the Office of the Secretary of Defense, and cross-organizational support from the various Defense Agencies.

How can governance be better structured to address natural organizational boundaries, associated cultures, and their focus on internal responsibilities? Are there lessons from theory, industry, or other governments that could be adapted and applied in a practical way to the DoD?

### Potential Research and Pilot Approaches

Here are ideas to illustrate possible approaches; these are just examples to help get you thinking—not to constrain or bias your proposal.

- Examine and provide practical change recommendations on DoD governance structures considering theories from academia (e.g., Elinor Ostrom’s work on “Governing the Commons”). *(Example disciplines: organizational theory, business, political science, economics, incentives theory.)*
- Research how DoD can best leverage America’s decentralized operational philosophy and structures (e.g., compared to more centralized power structures, like China, Russia, North Korea). *(Example disciplines: organizational theory.)*

## Area 2. Acquiring and Integrating Interoperable Capabilities Across Organizational Boundaries

Acquiring, fielding, and sustaining DoD capabilities is generally conducted within the five military services. As with governance, while progress has been made, this service-centric acquisition tends to focus on intra-service missions and needs rather than inter-service integration and interoperability.

Are there acquisition community constructs, structures, or functions that can facilitate integration and interoperability for joint or enterprise capabilities? Are there lessons from large companies with different cost centers that acquire elements that must be integrated across the corporation to achieve broader mission goals?

### Potential Research and Pilot Approaches

Here are ideas to illustrate possible approaches; these are just examples to help get you thinking—not to constrain or bias your proposal.

- Explore organizational constructs to fix the misalignment and negligence of joint objectives in the DoD’s organizational acquisition construct (e.g., create a joint IT/C4ISR Service [*think*: space force, that integrates all space capabilities]; create a Joint Rapid Capability Office). *(Example discipline: organizational theory.)*

### Area 3. Requirements Setting and Managing Requirements that Cut Across Organizations

In the DoD, a separate body and process determines what needs to be acquired. Setting, approving, and managing these requirements is not only very time consuming (often taking years) but tends to be dissected into requirements for the military services, where most equipping happens.

How can the determination of truly joint or enterprise-wide capabilities be developed better (faster and with an eye to cooperation across services)? Are there lessons from companies or other countries on setting and managing requirements that cut across organizations?

#### Potential Research and Pilot Approaches

Here are ideas to illustrate possible approaches; these are just examples to help get you thinking—not to constrain or bias your proposal.

- Research tools/approaches for identifying joint, integration, or interoperability requirements by combatant commands, the joint staff, or at Integrated Acquisition Portfolio Reviews. *(Example disciplines: military science, systems engineering, architectures, mission analysis, operations research, computer science.)*
- Research on how prototyping in digital engineering or other environments can quickly illuminate unforeseen innovative capabilities needing joint, integrated, or interoperability requirements. *(Example disciplines: systems and software engineering [e.g., leveraging modular open-system architectures and embedded micro-service architectures].)*
- Research on approaches to decompose, assign, and manage enterprise functional requirements among organizational elements while ensuring the ultimate re-integration and interoperability of resulting system components (e.g., cross-functional cooperation and integration). *(Example disciplines: systems science, management science, organizational theory.)*

### Area 4. Budgeting and Financial Resources for Cross-Organizational Integration and Interoperability

In addition to requirements, an acquisition effort needs financial resources. Budgets, authorizations, and appropriations are mostly organized and provided to individual military services. While there are some DoD-wide budgets and appropriations, they are much smaller.

What approaches can be applied to the DoD to address truly joint or enterprise capabilities that do not fall mainly within the responsibility of a military department? How do companies make cross-organizational investment decisions when individual cost centers are designed to address their own needs?

#### Potential Research and Pilot Approaches

Here are ideas to illustrate possible approaches; these are just examples to help get you thinking—not to constrain or bias your proposal.

- Approaches for corporate funding across cost centers. *(Example disciplines: economics, management, business.)*
- Approaches for assessing and revealing the return-on-investment (ROI) for join, interoperable, and integrated systems. *(Example disciplines: economics, business, operations research.)*

### Area 5. Incentivizing Integration and Interoperability Across Organizations

Finally, underlying all the major areas discussed above is the challenge of incentivizing behaviors that serve the needs beyond a local organization or community. DoD organizations (e.g., military services and fourth estate entities) and even functional communities (e.g., programs, auditing, contracting, sustainment) all have local objectives and incentive structures that drive behavior. People act the way we train and incentivize them.

What approaches can help to balance local culture and incentives with larger objectives of the DoD (e.g., timely delivery of needed capabilities to the warfighter; seeking efficiency; providing joint and enterprise-wide capabilities)? What tools and approaches can be used to motivate cooperation and a focus on the overall DoD mission?

### Potential Research and Pilot Approaches

Here are ideas to illustrate possible approaches; these are just examples to help get you thinking—not to constrain or bias your proposal.

- Case studies or approaches on incentives to motivate interoperability, cooperation, and data sharing across heterogeneous functions and cost centers (e.g., intellectual property [IP]).  
*(Example disciplines: business, management, law, economics, sociology, psychology, IT/data science.)*
  - For example, could trusted systems address incentives and trust, as used to motivate interoperability for medical systems (ref. Ed Cantwell, [Center for Medical Interoperability](#)) and financial services industry (how did they go about getting on the “same network” and becoming this interoperable “Enterprise of Enterprises”).
  - Are there lessons in how NSF set up the convergence accelerator to facilitate research collaboration?
  - Could common enterprise contracting mechanisms, clauses, or vehicles motivate cooperation among the military services by introducing speed and cost incentives?
  - Can better articulation of overall mission motivate cross-functional cooperation and focus on enterprise (versus local) objectives? Can better visions and examples of interoperable or integrated enterprise systems provide a common motivating factor?
- Identify incentives to motivate jointness in military service actions, programs, and budgets.  
*(Example disciplines: Organizational theory; incentives theory.)*
- Identify options for performance criteria for military service leadership (secretaries & chiefs) to motivate integration and interoperability beyond their service. *(Example disciplines: Organizational theory; human resources.)*