Program Announcement (PA)

High-throughput Unmasking of Biological Interactomes with Binding Landscape Emulators (HUBBLE)

BIOLOGICAL TECHNOLOGIES OFFICE

DARPA-PA-27-01

Amendment 1

October 28, 2026

The purpose of Amendment 1 to DARPA-PA-27-01, the HUBBLE Program Announcement (PA), is to update Attachment B and the verbiage in Section 4.1.2 and Section 7.8 of the Program Announcement. Changes are highlighted below.

PROGRAM ANNOUNCEMENT OVERVIEW

- **Federal Agency Name** – Defense Advanced Research Projects Agency (DARPA), Biological Technologies Office (BTO)
- **Funding Opportunity Title** – High-throughput Unmasking of Biological Interactomes with Binding Landscape Emulators (HUBBLE)
- **Announcement Type** – Amendment
- Funding Opportunity Number – DARPA-PA-27-01
- Dates
    - Initial Announcement Date: October 8th, 2026
        - Amendment 1: October 28th, 2026
    - Industry Day: September 25th, 2026 https://sam.gov/workspace/contract/opp/db09554820024ba29b5eac591030ac22/view
    - Questions Due Date: November 3rd, 2026
    - Abstract Due Date and Time: November 5th, 2026, 3:00 PM ET
    - Oral Proposal Package (OPP) Due Date and Time: December 11th, 2026, 3:00 PM ET
- **Description of the funding Opportunity:** The Defense Advanced Research Projects Agency (DARPA) is soliciting proposals to develop an *in-silico* capability for mapping all protein-protein interactions. Utility of this capability will be demonstrated in identifying novel diagnostic and therapeutic targets within the interaction space underlying including traumatic brain injury.
- **Multiple awards are anticipated**.
- **Types of instruments that may be awarded** – Other Transaction for Research
- **Technical Point of Contact** – Dr. Abhishek Singharoy, DARPA/BTO
- **Agency Contact**

    The PA Coordinator for this effort can be reached at:
    Hubble@darpa.mil
    DARPA/BTO
    ATTN: DARPA-PA-27-01
    675 North Randolph Street
    Arlington, VA 22203-2114
- **Attachments**

    A. Abstract Template and Instructions
    B. Model Other Transaction (OT) for Research
    C. Cost Proposal Spreadsheet
    D. Schedule of Milestones and Payments
    E. Task Description Document
    F. Risk Matrix

PROGRAM ANNOUNCEMENT

Defense Advanced Research Projects Agency (DARPA)

1. FUNDING OPPORTUNITY DESCRIPTION

1.1. Background

For decades, the DoW has confronted a broad spectrum of "diseases of the mind", ranging from chronic neuropsychiatric conditions, like combat-related Post-Traumatic Stress Disorder and severe depression, to insidious neurodegenerative declines such as those triggered by Traumatic Brain Injury (TBI). Each of these conditions directly degrades operational readiness of the warfighter. Historically, military medicine has been forced to manage these complex cognitive and behavioral pathologies through a reactive lens, treating them either as subjective psychological symptoms or generalized neurochemical imbalances, due to a lack of objective diagnostic tools.

The requirement for novel diagnostic and therapeutic approaches is at its most acute when confronting TBIs**,** an instantaneous, mechanically induced catastrophe (due to blasts, collisions or exposure to directed energy from weapon systems) that leaves up to 96% of affected service members with poor outcomes 6-12 months post-injury. A Naval Health Research Center study found that mild, yet chronic TBI incidence was associated with 54% increased odds of military personnel being "not medically ready" for deployment and thus undeployable. Given the 436,895 cases of mild TBI documented from 2000-2025, mild TBI has a major impact on unit and force readiness. TBI treatment is currently limited by a lack of specific molecular biomarkers for diagnostics, no individualized prognostic capabilities, and a treatment plan consisting of 24 hours rest. With no early intervention, there is a significant risk of long-term disability and up to 77% incidence of depression in months post injury. To protect warfighter health and ensure rapid post-exposure rehabilitation, we propose a new approach in the HUBBLE (**H**igh-throughput **U**nmasking of **B**iological interactomes with **B**inding **L**andscape **E**mulators) program: a *transition from managing downstream behavioral symptoms to actively mapping the dynamic, molecular-level biological interactions that dictate cognitive survival and operational performance.*

HUBBLE's hypothesis is that TBI biochemical injury patterns can be defined and targeted by shifting the focus from static, isolated biomarkers to dynamic Protein-Protein Interactions (or PPIs)**.** By capturing context-aware interactomes, HUBBLE will model how a healthy, nominal brain operates and compare it directly to an injured brain subjected to simulated tactical blast conditions. In doing so, HUBBLE will provide the molecular-level fingerprints needed to deliver precise mild TBI diagnostics, accurate long-term prognoses, and targeted medical countermeasures before debilitating symptoms can compromise the force. In HUBBLE, TBI represents a complex physiological test case for the value of resolving complete interactomes. While diagnostics can be derived from sparse data, the mechanisms, information products and hence TBI protection modalities require probing a much larger cross section of the interactome than the **3–7% of this network** that is currently available. The comprehensive mapping of the human interactome beyond this small fraction of known interactions presents a challenge of scale and complexity that current methodologies are fundamentally ill-equipped to address.

Ultimately, HUBBLE seeks to construct a hypercatalog of >10 million interactions, creating a near-complete PPI atlas that can capture how these interactions change across unique contexts

and perturbations. If successful, HUBBLE's PPI capability could be applied to any complex physiology and enable a strong mechanistic understanding of the condition.

2. Program Theory

HUBBLE End of Program Goal: Generate a context-aware PPI hypercatalog for the human proteome capturing >10^7 new interactions

HUBBLE seeks to generate a comprehensive human interactome that accurately represents both healthy and perturbed physiologies. The combinatorial space of this interactome is astronomically large, scaling factorially (O(2N)) with the number of proteins (N) in the proteome. This complexity renders any attempt at exhaustive experimental mapping a multi-millennia endeavor. Existing high-throughput experimental techniques are subject to significant and well-documented biases. Such methods preferentially detect high-affinity, stable binary interactions, and are notoriously unreliable for capturing the transient, low-affinity, or allosterically regulated interactions that form the backbone of cellular signaling and dynamic regulation. Consequently, our current view of the interactome is not only incomplete but also skewed. At our current rate of experimental discovery our target of 10^7 novel PPIs for completing a hypercatalog will take us 1000 or more years. In HUBBLE, performers will take *in silico* approaches to overcoming these time and resource barriers.

From High-Dimensional Atomic Details to Low-Dimensional PPI Signatures.

HUBBLE posits that a physics-based signature governs PPIs: **the complex dynamics of interaction events can be effectively described by the topology of its "diffusive binding landscape".** This is an abstract, lower-dimensional free energy surface where the coordinates represent the relative positions and orientations of the interacting proteins. The essential "signature" of this landscape, and thus the interaction itself, can be parameterized by two key sets of topological features (Figure 1):

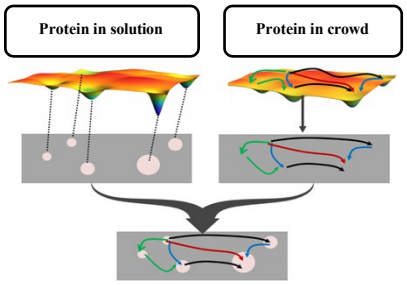

Figure 1. Physical rules of diffusion, interaction and oligomerization ensemble averages and therefore reducible to 'signatures or fingerprints'.

1. Metastable Minima: These are the local energy wells on the landscape, corresponding to thermodynamically stable or transiently populated binding configurations. Number, depth, and relative distribution of these minima define the interaction's thermodynamic profile.

2. Transition Pathways: These are the ensemble of dominant, low-energy trajectories connecting the unbound (diffusive) state to the bound minima. The properties of these pathways, including the height of the intervening energy barriers, dictate the system's kinetics—the rates of association and dissociation. This low-dimensional signature provides a compact, information-rich representation that captures the essential thermodynamic and kinetic identity of a PPI without requiring an explicit, computationally expensive description of its full atomic trajectory.

Simulation methods leverage different dimensionality-reduction methods to simulate interactions and diffusions. When applied to current databases of PPIs, these can be leveraged to generate signatures and embed them into a reduced representation. The integrated computations cumulatively bring down the computing time by at least 7 Orders of Magnitude (OOMs): 3-4 OOMs from reducing degrees of freedom, and 3 OOMs from squeezing timesteps, reducing computation time from 10^6 years = 10^{11} seconds to $10^{4\text{-}5}$ seconds, roughly months. An additional 2 OOM in speed-up is derivable from the error scaling law of statistical learning of these PPIs (Figure 2). Accordingly, given a set of proteins, HUBBLE will predict their latent biophysical signatures and then use those signatures to emulate the whole interactome.

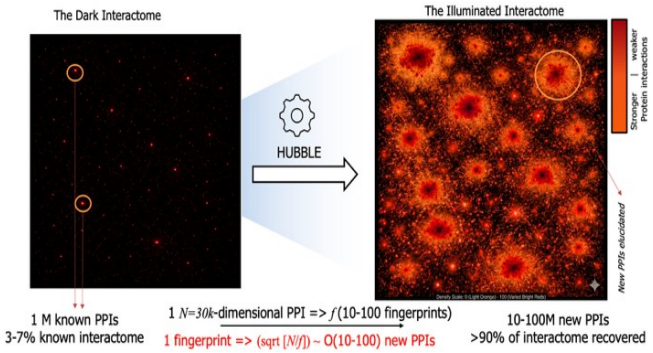

Figure 2. PPI signatures will be embedded from the known-known cases and generated for the known-unknown cases. If HUBBLE encodes an N-dimensional PPI model into f reduced dimensions, then these signatures can be decoded to yield $O(\sqrt{N/f})$ *new and unique PPIs.*

Dynamic perturbations of PPI Signatures can distinguish between healthy and injured states. HUBBLE's PPI hypercatalog offers a unique space for iteratively introducing molecular perturbations, gaging the response and designing biotechnologically exploitable solutions based on the responses of the interactome. This dynamic co-refinement of molecular perturbations with PPI responses is particularly suited for the problems that are mathematically *underdetermined* like TBIs. Starting with the 'healthy biological state', the physical constraints provided by the PPI network create a smooth "information funnel" that can overcome noise and find the injury-state of the warfighter due to gradients or changes induced by the TBI perturbations.

Sampling the responses to a larger number of perturbations offers larger PPI variations in capturing the difference between the healthy vs injured states, which improves the causal depth of HUBBLE's analysis. By taking advantage of the fact that all living cells share a large dynamic interactome – also called *ancillary interactome*, introducing dynamic perturbations improves the detection of true-positive PPIs further by 1 OOM.

2.1. Program Approach and Description

In Phase 1 of the program, HUBBLE seeks to leverage these approaches to capture an initial interactome for TBI associated proteins. This list of TBI targets will be provided to performers by HUBBLE's government team. If successful, this interactome will capture ~100,000 PPIs modeled over >10 conditions, spanning multiple time points, cell types, and environment contexts. Performer PPIs will be validated *in vitro* and *in vivo* by government T&E partners to benchmark the accuracy and recall of each performer capability. This initial phase represents a first proof of concept that the HUBBLE approach generates accurate and valuable PPI maps.

Phase 2 of the program will focus on scaling and increasing the throughput of Phase 1 strategies by increasing compute resources, leveraging AI strategies and implementing high-throughput PPI experimentation. Performers will achieve a PPI hypercatalog of 10 million unique interactions modeled over >50 unique cellular contexts. Internal and government team benchmarking will

evaluate the accuracy of such predictions with an end of phase metric at >50% accuracy novel PPIs and >90% for experimentally informed interactions. Performers are expected to capture stable dimers, transient interactions, multiprotein complexes, and biocondensate/ domain formation by end of performance.

Proposed solutions should address as many of the following 8 criteria as possible:

1. An *in-silico* approach for decreasing the dimensionality of PPI energy landscapes.
2. A scalable strategy for modeling PPIs across the entire human proteome. Preliminary data demonstrating the throughput of simulation and experimental approaches are encouraged. Include estimates of scaling required to fulfill program goals.
3. A strategy for modeling multiple system sizes: dimers, large complexes and multivalent condensates. Both transmembrane and soluble proteins must be captured.
4. Details of how the proposed approach will capture key binding variables: (e.g. contact residue identity, residence time - see Table 3 for a detailed list). Must move beyond binary (Yes / No) predictions of binding.
5. An internal benchmarking strategy to improve accuracy of PPIs throughout the program. Complete datasets should be explicitly described and feasible to access/ generate prior to implementation in the program.
6. A strategy for modeling how contextual perturbations to the system alter the energy landscapes of a PPI. (e.g. PTM changes, unique cell types, small molecule interventions, environmental contexts)
7. Preliminary results on PPI characterization strategies are encouraged.
8. Experience with the type of protein interactions (e.g. interactions between ordered and disordered proteins) related to neurotrauma is encouraged but not required.

The following approaches are considered out of scope:

1. Approaches that rely exclusively on experimental characterization of protein interactions for hypercatalog generation (>60% of budget).
2. Approaches that exclusively model *de novo* designed binders and fail to capture endogenous human proteins.
3. Proposers that are unable to operate at the requisite computing and experimental resources for the strategy proposed.
4. Approaches that fail to capture the throughput of PPIs necessary to achieve program metrics (section 2.3)

2.2. Program Structure

HUBBLE is structured as a 30-month program featuring a 12-month Phase 1, followed by an 18-month Phase 2 (Figure 3). Phase 1 will focus on generating an initial PPI capability that captures interactions in a lower dimensional space. It is expected that performers will leverage PPI data from publicly available databases at the start of the program to rapidly enable signature generation from experimentally validated sources. Towards the novel or "dark" PPI space, **both simulation and experimentation must be leveraged to model and benchmark PPIs via a rational and iterative expansion form the known**. In addition to performer's internal

benchmarking, model output of PPIs will be benchmarked with a ground truth experimental dataset delivered by DARPA to evaluate performance prior to end of phase. This latter benchmarking exercise is meant to determine the accuracy and predictive bounds of initial PPI finger printing capabilities. Prior to the completion of Phase 1, performer strategies will be applied to capturing a minimal interactome for mild TBI. During this phase performers will interact with government team members to iteratively refine a core set of protein interactors associated with TBI molecular targets and comprehensively capture the full scope of interactions for these molecular species across the proteome. At the conclusion of Phase 1 performance, proposer groups have the opportunity to form larger interdisciplinary teams to enhance their interaction modeling capabilities and expand PPI hypercatalog generation.

Phase 2 will focus on expanding the type and scale of PPIs that are captured in HUBBLE and will provide a more representative and comprehensive look at the TBI protein interaction space. It is expected that the throughput and level of compute will increase to populate a PPI hypercatalog orders of magnitude larger than Phase 1 efforts. The diversity of perturbations over which performer capabilities can predict PPIs will expand in number and class (e.g. new cell types, compartmentalization, PTMs and interventions). The accuracy of PPI predictions via HUBBLE's performer capabilities will be evaluated again on TBI molecular targets, but on expanded cellular and molecular contexts (e.g. time points, PTMs, etc.), achieving enhanced accuracy metrics outlined in section 2.3. Additional details of government team delivered data sets will be provided in Phase 2 proposal instructions. In parallel to this work, the government team members will validate diagnostic molecular features *in vivo* and test the predictive value of performer identified PPIs for predicting functional outcomes in mild TBI time course experiments.

If successful, the predictive feature sets identified in Phase 2 will enter early preclinical development by government team members and PPIs that are causally linked to physiological outcomes will undergo proof of concept testing for therapeutic potential. An FFRDC team will then work to integrate the performer capabilities and house the HUBBLE capability. A HUBBLE steering committee will be formed between performer teams, DARPA personnel and government team stakeholders to guide the final development and maintenance of the capability beyond the program.

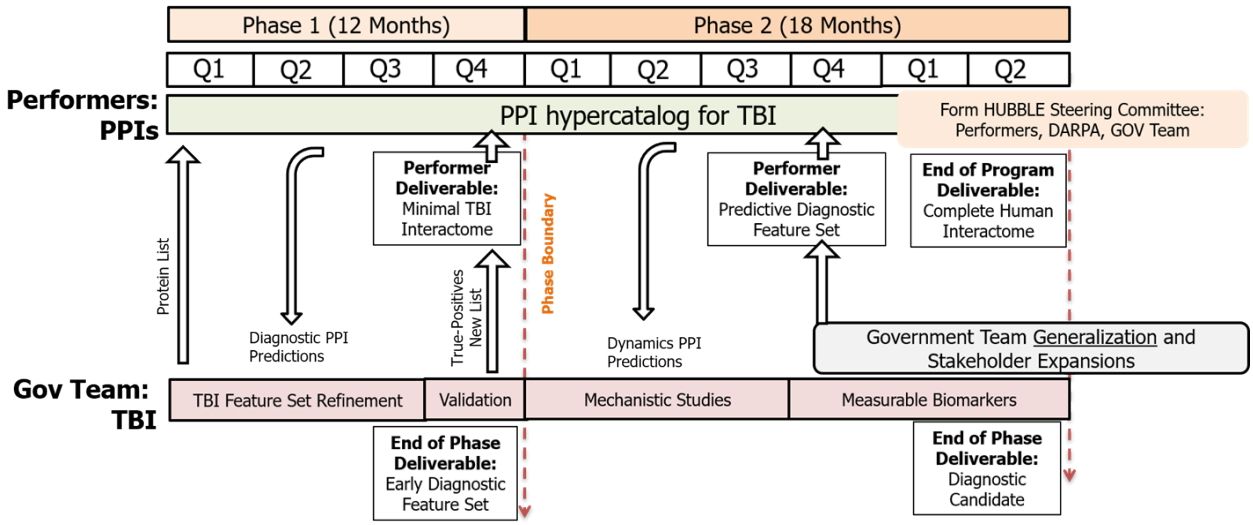

Figure 3. Program Structure. This announcement is only awarding Phase 1 proposals. Phase 2 and beyond are provided for proposal context and to inform the Phase 2 strategy summarized in the abstract instructions (Section 5 and Attachment A)

Meetings

A list of meetings with anticipated locations is provided in Table 1 below.

Table 1. List of anticipated meetings.

Meeting Type	Anticipated Location	Frequency
Kickoff	Arlington, VA	Once
Site visit	Performer site	Annually
PI meeting	Arlington, VA	6 months
Technical & Programmatic update	Teleconference/videoconference	Monthly

2.3. Program Metrics

Phase	1	2
PPI Hypercatalog Size	100k	10 M
Number of system perturbations	> 10‡	> 50‡
% Out of distribution Test Cases *(from 7% existing)*	> 30%	> 60%
Accuracy *(AUC/ROC)*	> 90%	> 90%
Total Inference Time	< 1 week	< 1 day

Table 2. High-level Program metrics

Performer capabilities must address progressive metrics across the period of performance. The generation of interaction signatures to populate HUBBLE's hypercatalog must increase in

throughput/ size, the diversity of contexts, in which these interactions are modeled over, and the accuracy of PPIs predictions (Table 2). Protein interactions vary by stability, affinity and stoichiometry depending on spatial, temporal and thermodynamic contexts. For each PPI a specific subset of parameters must be modeled with accuracy increasing from Phase 1 to Phase 2. Included are, binding energy, residence time, contact residue identify, confidence and number of unique contexts in which the interaction has been modeled (Table 3). Together, these features represent a well-defined PPI, ensuring that the utility of such information is actionable, rather than simply providing binary (yes/no) interaction predictions. Validation of these parameters will be done via both biochemical and *in vitro* cellular models. Perturbations to PPIs must minimally include the following variables by end of Phase 2: temporal changes, cell type specificity, small molecule interactions, post translational modifications and environmental context. However, Phase 1 perturbations must relate directly to the test case of TBI, and the cell types/ spatiotemporal variables therein.

Protein Interaction Accuracy Metrics	**Phase 1**	**Phase 2**
Binding Energy	< 5 kT	<2 kT
Number of interactors (System Size)	> 5	> 20
Residence Time > μs (Accuracy)	> 60%	> 90%
Contact Residues Identity	< 10% deviation	< 5% deviation
3D representation of PPIs (ipTM scores)	> 0.7	> 0.9
Confidence (Approach benchmarking against government team datasets)	> 90%	N/A
Number of unique contexts over which this interaction has been modeled	> 10	> 50

Table 3. PPI-Specific Accuracy Metrics. Modeling representation of PPIs must capture each of the following parameters for inclusion in the hypercatalog.

2.4. Government Team

HUBBLE success will be determined with the performers reaching the following Program metrics and our Government Team reaching specific TBI-relevant impact metrics. By the end of Phase 1, we will evaluate the accuracy and coverage of HUBBLE performers' mild TBI *interactome* (based on a minimal TBI target set identified by HUBBLE's Government team in Phase 1). We will aim for a recall accuracy of canonical PPIs in TBI > 90%, and accuracy of out of distribution PPIs > 30%. Experimentally, we will verify at least 20 PPI clusters, both *in vitro* and *in vivo.* If the Phase 1 Go/No-go decision is successful, performers will have the opportunity to form the appropriate teams for a future Phase 2 opportunity. Phase 2 will scale up our PPI database to 10 M (~10-fold larger than state-of-the-art databases) and perform phenotypic studies of the TBI interactome for offering information products for the warfighter. To substantiate the credibility of this information, HUBBLE performers must achieve > 60% accuracy for out of distribution protein targets by the end of Phase 2. In parallel, government team members will evaluate validated PPIs for causality in TBI. This will consist of *in vitro* and *in vivo* experiments that manipulate specific interactions and evaluate critical biochemical endpoints (e.g. presence of

neuroinflammatory markers, etc.). mTBI-associated PPIs that are reliable, quantified and indicative of negative downstream outcomes *in vivo* will be leveraged in a molecular diagnostic panel. This panel of interactions and molecular features will move towards preclinical development prior to end of program. If specific causal drivers are identified in the PPI space for mTBI by the end of Phase 2, these targets will be evaluated for therapeutic potential in animal models and enter pre-clinical development.

3. Acquisition Strategy

HUBBLE is using a **modified, two-stage, acquisition approach** (Abstracts and Oral Proposal Package (OPP)) to lower the administrative burden of entry, reduce program risk, foster competition and cooperation, and accelerate start dates for performer teams. This Program Announcement (PA) solicits proposal submissions for efforts covering an initial 12-month Phase 1 effort, ONLY. Proposers with successful abstracts will be invited to provide an oral presentation to describe their proposals to the DARPA HUBBLE program team. The Government will review all oral presentations, and selected proposers may be awarded an Other Transaction (OT) for Research, which provides eligibility to participate in future Phases of the program.

This PA encourages solutions from all responsible sources capable of satisfying the Government's needs, including large and small businesses, nontraditional defense contractors as defined in 10 U.S.C. § 3014, universities, and research institutions. **Only Phase 1 activities will be awarded in response to this PA**, but strategies must be proposed for Phases 1 and 2, to ensure seamless progression toward program end goals.

Phase 2 participants will be selected from Phase 1 performers. Performers are encouraged to team with other performer teams in Phase 2 submissions if the associated approaches synergize to increase feasibility of achieving overall program goals. Minimally, Phase 1 strategies must scale appropriately to Phase 2 program metrics. The decision to work independently or collaborate with others will not impact Phase 2 determinations. Instructions for Phase 2 submissions will be provided to performers by Month 8 of the program.

3.1. PA Procedure

In response to this solicitation, and after verifying eligibility, proposers are required to submit an abstract as described in Section 5. Additional instructions for abstract submission are contained within Attachment A. This process allows DARPA to ascertain (1) whether the proposers understand the key challenges of the HUBBLE program and (2) whether they are capable of executing their proposed concept. Specific evaluation criteria used by DARPA to make the assessment can be found in Section 5.3. If DARPA finds the abstract selectable, DARPA will invite the proposer to submit an Oral Proposal Package (OPP), and participate in an oral presentation to DARPA, **where the proposed technical solution will be evaluated.** Further details regarding the oral presentations will be sent with the request for submission of an OPP. After the oral presentations, DARPA will decide which proposers will be selected to participate in Phase 1 of the program. The Government will not pay proposers responding to this PA for the

costs associated with abstract submissions, OPP preparation, oral presentations, for Phase 1 or Phase 2 proposal development.

DARPA will use the following process to facilitate the HUBBLE source selection:

a. Industry Day: The Program Manager held an in-person Industry Day with a virtual option on September 25th, 2026, during which he described the program and its goals and solicited questions from the audience. Where possible, the Government provided answers in real time, and a comprehensive list of questions and answers was provided afterward via a question and answer (Q&A) document. Participation in the Industry Day was optional and was not a requirement for proposers seeking to submit an abstract. Additional details about the Industry Day were provided in Special Notice DARPA-SN-26-121, separate from this PA.

b. Program Announcement Questions and Answers (Q&A) (Informational Only): DARPA hosted a Q&A session during the HUBBLE Industry Day and will post a consolidated Q&A document. The Q&A document will be made available online at https://www.darpa.mil/research/programs/HUBBLE. Following Industry Day, questions can be sent to HUBBLE@darpa.mil.Questions must be submitted by the Question Due Date. DARPA will respond to any relevant and/or PA clarification question(s) prior to the Abstract Due Date and post a consolidated Q&As on the HUBBLE program page (https://www.darpa.mil/research/programs/HUBBLE).

c. Abstracts, Stage-One (Required): Abstracts shall be submitted as specified in Section 5.2 of this PA. The Government will review all submitted abstracts in accordance with the selection criteria in Section 5. Selected abstract proposers will be invited to provide an OPP and participate in an oral presentation (see Section 6) to the Government. **Note that proposers must submit an abstract in response to this solicitation to be considered for participation in the HUBBLE program.** Proposers will not be invited to submit an OPP, provide an oral presentation, or be included in any further progression of the program without participating in the abstract phase of the solicitation.

d. Oral Proposal Package (OPP)/Oral Presentation, Stage-Two (Invite Only): Oral presentations are anticipated to take place approximately six weeks after notification of selection and are by invitation only. OPP content and format, to include templates, submittal instructions for OPPs, and proposed presentation dates for oral presentations will be provided in the invitation to submit an OPP and participate in an oral presentation. The Government will review all OPPs, which will not be made public or provided to other proposers. Proposers must only propose an OT for Research with fixed payable milestones. (Note – Milestones (See Attachement D) represent a completed event. Milestone schedule is based on key observable events in the critical path to accomplish program objectives. Payments are triggered by successful performance of observable technical events. Fixed payable milestones are payments based on successful completion of the milestone accomplishments agreed to in the milestone plan. A Template Schedule of Milestones and Payments is included in Attachment D.)

e. Phase 1 (12 months): DARPA will review OPPs and oral presentations to determine which proposed solutions sufficiently meet the program's needs. Evaluation criteria for the OPPs

will be included with the OPP request and instructions. Upon favorable review, and subject to the availability of funds, the Government may award an OT for Research under 10 U.S.C. § 4021 with fixed, payable milestones for Phase 1 selectees.

f. Phase 2 (18 Months): This solicitation is for Phase 1 only. The following information is for planning purposes only. DARPA anticipates issuing proposal instructions for Phase 2 within the first 8 months of the program to Phase 1 Performers, with the anticipation of the Phase 2 awards by the end of month 12.

4. ELIGIBILITY INFORMATION

4.1. Eligible Applicants

4.1.1. Federally Funded Research and Development Centers (FFRDCs) and Government Entities

DARPA encourages technical solutions from all responsible sources capable of satisfying the government's needs. To ensure fair competition across the ecosystem, DARPA prohibits contractors/performers from concurrently providing Systems Engineering and Technical Assistance (SETA), Advisory and Assistance Services (A&AS), or similar support services and being a technical performer, unless the DARPA Deputy Director grants a written waiver. DARPA extends this prohibition to University-Affiliated Research Centers (UARCs) and FFRDCs including National Labs, who because of their specialized expertise and areas of competencies, are able to accomplish integral tasks that cannot be met by Government or contractor resources. Therefore, these entities are highly discouraged from proposing against this solicitation as awards to UARCs or FFRDCs will only be made by exception. UARCs and FFRDCs interested in this solicitation, either as a prime or a subcontractor, should contact the Agency Point of Contact (POC) listed in the Overview section prior to the proposal (or abstract) due date to discuss potential participation as part of the government team or eligibility as a technical performer.

4.1.2. Other Applicants

Non-U.S. organizations and/or individuals, or multiparty teaming arrangements may participate in accordance with applicable laws, regulations, and policies, including those pertaining to export controls and security.

4.2. Organizational Conflicts of Interest (OCI)

An organization cannot simultaneously provide SETA, A&AS, or similar support to DARPA and also be a performer on a DARPA research program.

If a prospective proposer believes a conflict of interest exists or may exist (whether organizational or otherwise) or has questions on what constitutes a conflict of interest, the proposer must send their contact information and a summary of the potential conflict via the specific e-mail address identified in this PA before time and effort are expended in preparing any submission documentation.

5. Guidelines for Abstracts

5.1. General Guidelines

- All proposal abstracts are required to be submitted via DARPA's Broad Agency Announcement Tool (BAAT). Please visit Proposer Instructions and General Terms and Conditions for instructions on how to submit your abstract through DARPA's BAAT.

Questions regarding Proposal Abstracts can be sent to Hubble@darpa.mil.Submissions sent through other mediums, channels, or after the prescribed Program Announcement deadline will not be considered, reviewed, or evaluated.

- Proposers providing abstracts that are not invited to an oral presentation will be notified in writing as soon as is practical.
- Do not include elaborate brochures; only include information relevant to the submission requirements or evaluation criteria.
- Use of a diagram(s) or figure(s) to depict the essence of the proposed solution is permitted.
- All abstracts shall be UNCLASSIFIED.
- Proposers are responsible for clearly identifying proprietary information. Submissions containing proprietary information must have the cover page and each page containing such information clearly marked with a label such as "Proprietary" or "Company Proprietary." *NOTE: "Confidential" is a classification marking used to control the dissemination of U.S. Government National Security Information as dictated in Executive Order 13526 and should not be used to identify proprietary business information.*

5.2. Abstract Content

The submitted abstract must follow the Abstract Template, Instructions and page limits as described in Attachment A.

5.3. Abstract Process and Basis of Evaluation

Abstracts will be evaluated by DARPA using the evaluation criteria listed below in descending order of importance. Abstracts are not evaluated against each other. Proposers are required to submit an abstract for evaluation by DARPA to be considered for any subsequent award.

1. ***Technical Comprehension:*** The proposed technical understanding is accurate, proposed approach is clearly described, and key technical challenges and risks are identified. Technical approaches to challenges are supported by brief calculations or physical estimates where possible.
2. ***Technical Ability:*** The proposer's team and organization demonstrate the ability to achieve the goals of the program.
3. ***Cost Rough Order of Magnitude (ROM):*** The proposed ROM is realistic, and affordable for the technical approach and accurately reflects the technical goals and objectives of the Program Announcement.

DARPA's policy is to ensure impartial, equitable, and comprehensive abstract evaluations based on the evaluation criteria listed above and to select the source (or sources) whose proposal meets DARPA's technical, policy, and programmatic goals. DARPA will conduct a review of each conforming abstract, and all evaluations will be based solely on the evaluation criteria in this section.

Using the evaluation criteria, DARPA will evaluate each conforming abstract in its entirety, documenting the strengths and weaknesses relative to the evaluation criteria. Based on the identified strengths and weaknesses, DARPA will determine whether an abstract is selectable. DARPA will not evaluate abstracts against each other during the scientific review process, but rather evaluate the abstracts on their own merit to determine how well the proposal meets the criteria stated in this PA.

For the purposes of this proposal evaluation process, DARPA defines a "selectable" abstract as follows:

- ***Selectable:*** *A selectable abstract is one that the Government has evaluated against the evaluation criteria listed in the PA, and the positive aspects outweigh the negative aspects.*

For the purposes of this proposal evaluation process, DARPA defines a "non-selectable" abstract as follows:

- ***Non-Selectable:*** *An abstract is considered non-selectable when the Government has evaluated it against the evaluation criteria listed in the PA, and the positive aspects do not outweigh the negative aspects*

6. Oral Presentation Package (OPP) Instructions & Process

If an Abstract is determined Selectable, DARPA will request an oral presentation, and the proposers will be asked to provide further details on their proposed solution. **Specific instructions (including content submission guidelines and deadlines) will be provided in the invitation to participate**. In the event the instructions in the invitation to submit an OPP and participate in an oral presentation deviate from the following list of expectations, the instructions in the invitation to participate take precedence.

Oral presentations are expected to be held in-person (encouraged) over the course of 1-2 days in December in the Washington, DC metro area. Virtual presentations will be allowed on a case-by-case basis, where in-person attendance is not possible. It's anticipated that each oral presentation will be scheduled for 60 minutes, allowing for a strictly limited 30-minute presentation time, and up to 30 minutes of questions and answers following. However, further details will be provided at time of the selection, and presentation times may be adjusted based on the number of participants.

Attachment B – Model OT for Research Agreement: Proposers must complete and submit the provided Model OT for Research as part of the proposal package in order to expedite the negotiation and award process. It is representative of the terms and conditions that DARPA

intends to award for HUBBLE projects and includes eight (8) major sections: 1) Task Description Document (Attachment E below); 2) Report Requirements; 3) Schedule of Milestones and Payments (Attachment D below); 4) Agreement Officer's Representative Appointment Memo; 5) Certifications for Agreement; 6) Property and Equipment list; and 7) Associate Performer Agreement template.

Proposers may suggest edits to the Model OT for consideration by DARPA and provide a copy of the Model OT **with tracked changes** as part of their proposal package. NOTE: For all requested edits to the OT, the proposer must provide rationale to justify the changes. Please note that DARPA may not agree to suggested edits. The Government reserves the right to remove a proposal from award consideration should the parties fail to reach agreement on OT award terms and conditions.

If edits to the Model OT are not provided as part of the proposal package, DARPA assumes that the proposer has reviewed and accepted the award terms and conditions to which they may have to adhere and the sample OT agreement provided as an attachment, indicating agreement (in principle) with the listed terms and conditions applicable to the specific award instrument. DARPA explicitly reserves the right to terminate awards if negotiations are not completed in a timely manner.

Attachment C - Cost Spreadsheet: Proposers must fully complete the Program Announcement Attachment C Cost Spreadsheet for HUBBLE, Phase 1. Use of the provided template is required.

Attachment D - Milestone and Payment Schedule: Proposers must only propose an OT for Research agreement with fixed payable milestones. Milestones represent a completed technical event, and the milestone schedule outlines key observable events in the critical path to accomplish the program objectives. Fixed payable milestones are payments made after successful completion of the milestones agreed to in the milestone schedule. Proposals may suggest modifications or additions to the Schedule of Milestones and Payments, though it is not guaranteed that these edits will be accepted by DARPA.

Technical Clarification Document (TCD): Proposers will submit a Technical Clarification Document no longer than six (6) pages in length as part of the OPP. The TCD should explain in detail responses to the DARPA team's requests(s) for technical clarification, which will be provided with or shortly after abstract decisions. This TCD should also include a risk assessment matrix where the probability and impact of the most important risks associated with the critical path are each assigned a number (Probability: 1-5; 1=low, 5=high; Impact: 1-5; 1=low, 5=high). A brief justification and mitigation must be provided in a risk summary able for each of these key risks. **A slide template for the risk matrix and summary table is included as attachment F.**

Attachment E – Task Description Document. Proposers should break down their research plan into specific tasks and subtasks. These tasks should lead to the technical milestones and deliverables outlined in the PA and Attachment D, Milestone and Payment Schedule.

Note: If the OPP instructions conflict with the PA instructions, the OPP instructions take precedence.

OPP Evaluation Criteria:

OPP evaluation criteria are listed in descending order of importance. The Government reserves the right to record presentations. Individual presentations will be evaluated against the evaluation criteria described below:

1. Technical Approach: The proposed technical approach is innovative, feasible, achievable, and complete. The proposal demonstrates an understanding of the HUBBLE challenge and provides an innovative yet feasible approach to address the identified technical risks and challenges to meet program metrics.
2. Relevant Qualifications: Personnel and/or company demonstrate the ability to meet the technical goals of the program, provide examples of past performance or projects in the relevant technical domain(s), and demonstrate capability to navigate regulatory and translation challenges anticipated in the program.
3. Proposed Contribution and Relevance to the DARPA Mission: The potential contributions of the proposed effort are relevant to the national technology base. Specifically, DARPA's mission is to make pivotal early technology investments that create or prevent strategic surprise for U.S. National Security. Any proposed intellectual property restrictions must not significantly impact the Government's ability to transition the technology.
4. Budget and Price: The proposed solution is realistic and affordable. The budget is realistic and accurately reflects the technical goals and objectives of the solicitation and reflects a sufficient understanding of the level of effort and staffing needed to successfully accomplish the proposed technical approach. Each price element provides commensurate technical, schedule, or execution value, and is necessary, appropriately scaled, and neither materially overestimated nor underestimated.

Review and Selection

DARPA's policy is to ensure impartial, equitable, and comprehensive proposal evaluations based on the evaluation criteria listed above and to select the source (or sources) whose proposal meets the Government's technical, policy, and programmatic goals. DARPA will conduct a review of each conforming abstract and OPP. All OPP evaluations will be based solely on the evaluation criteria.

Using the applicable evaluation criteria, the Government will evaluate each OPP in its entirety, documenting the strengths and weaknesses relative to the evaluation criteria. Based on the identified strengths and weaknesses, DARPA will determine whether an OPP is selectable. DARPA will not evaluate individual submissions against each other during the scientific review process, but rather evaluate each individual submission on its own merit to determine how well the proposal meets the criteria stated in this PA.

DARPA may make an award to a proposer whose OPP is determined to be selectable by the Government, consistent with applicable instructions and evaluation criteria and based on availability of funding.

7. AWARDS

7.1. General Guidelines

Upon favorable review of the OPP and subject to the availability of funds, DARPA may choose to negotiate an award an OT for Research agreement. The Government Agreements Officer reserves the right to negotiate directly with the proposer on the terms and conditions prior to execution of the resulting OT agreement, including payment terms, and will execute the agreement on behalf of the Government. Be advised, only a Government Agreements Officer has the authority to enter into, or modify, a binding agreement on behalf of the United States Government. To receive an award:

A. Proposers must have a Unique Entity Identifier (UEI) number and must register in the System for Award Management (SAM). Proposers are advised to commence SAM registration upon notification of entry of the competition.
B. Awardees will be required to submit invoices for payment electronically via the Wide Area Work Flow (WAWF) module in the Procurement Integrated Enterprise Environment at https://piee.eb.mil/, unless an exception applies. Registration in PIEE is required prior to any award under this PA. For assistance with PIEE, please contact 866-618-5988 or DARPAInvoices@DARPA.mil.
C. Proposers must be determined to be responsible by the Agreements Officer and must not be suspended or debarred from award by the Federal Government nor be prohibited by Presidential Executive Order and/or law from receiving an award.

7.2. Competition Sensitive Information

DARPA policy is to treat all submissions as competition sensitive, and to disclose their contents only for the purpose of evaluation. Restrictive notices notwithstanding, during the evaluation process, submissions may be handled by support contractors for administrative purposes and/or to assist with technical evaluation. All DARPA support contractors performing this role are expressly prohibited from performing DARPA sponsored technical research and are bound by appropriate nondisclosure agreements.

7.3. Intellectual Property Rights

HUBBLE may produce novel models, knowledge products, candidate diagnostics and therapeutics based on performer research. DARPA expects a minimum of Government Purpose Rights (GPR) for the technology developed under HUBBLE but is open to flexible intellectual property (IP) proposals from performers that are advantageous to the Government. IP proposals should, at a minimum, allow DARPA to:

- Flexibly brief U.S. Government stakeholders regarding technical progress and accomplishments,

- Allow validation of technical performance, capabilities, and accomplishments by independent technical (potentially non-Government) experts, subject to NDA restrictions,
- Facilitate discussion of technical challenges and applications with the broader technical community – for example, by starting a new DARPA program that attempts to solve a serious technical challenge that limits further progress,
- Support analysis of alternatives, and
- Support transition opportunities, including design and performance data required to support other acquisition activities. These latter activities may require the Government to conduct an independent performance analysis.

Proposers responding to this PA shall appropriately identify any potential restrictions on the Government's use of any intellectual property furnished by the proposer. This includes both Noncommercial Items and Commercial Items. Proposers are encouraged to identify these restrictions in a format like the table depicted below. If no restrictions are intended, then the proposer should state "NONE."

Technical Data, Computer Software To be Furnished with Restriction	Summary of Intended Use in the Conduct of the Research	Basis for Assertion	Asserted Rights Category	Name of Person Asserting Restrictions
(LIST)	(NARRATIVE)	(LIST)	(LIST)	(LIST)

7.4. Data Rights

The Government shall have a minimum of GPR in data, including technical data and software, first produced and delivered in the performance of this contract regardless of success or failure of work performed on the contract. Data includes manuals or instructional and training material for installation, operation, or routine maintenance and repair of items, components, or processes developed, delivered or furnished for use under this contract.

7.4.1. Release, publication, and use of data.

The Contractor shall, with prior approval of the Contracting Officer, have the right to use, release to others, reproduce, distribute, or publish any data first produced or specifically used by the Contractor in the performance of this contract.

7.4.2. Subcontracting.

The Contractor shall obtain from its subcontractors all data and rights therein necessary to fulfill the Contractor's obligations to DARPA under this contract. If a subcontractor refuses to accept terms affording the DARPA those rights, the Contractor shall promptly notify the Contracting

Officer of the refusal and shall not proceed with the subcontract award without authorization in writing from the Contracting Officer.

7.4.3. Copyrights

Contractor may, with prior approval of the Contracting Officer, assert copyright in scientific and technical articles based on or containing data first produced in the performance of this contract and published in academic, technical or professional journals, symposia proceedings, or similar works.

7.5. Procurement Integrity

All awards under this PA shall be treated as Federal Agency procurements for purpose of 41 U.S.C. Chapter 21. Accordingly, the competitive solicitation process and awards made thereof must adhere to the ethical standards required by 41 U.S.C. Chapter 21.

7.6. Human Subjects Research /Animal Subject Research Use (if applicable)

Proposers SHOULD NOT propose human subjects research. Proposers *are* able to use animals in research if well justified (small model animals only).

7.7 Fundamental Research Risk-Based Security Review Program (FRRBS)

DARPA's Fundamental Research Risk-Based Security Review Process (formerly CFIP, now FRRBS a.k.a. "FRRBS") is an adaptive risk management security program designed to help protect the critical technology and performer intellectual property associated with DARPA's research projects by identifying the possible vectors of undue foreign influence. DARPA will create risk assessments of all proposed senior/key personnel selected for negotiation of a fundamental research award. The DARPA risk assessment process will be conducted separately from the DARPA scientific review process and adjudicated prior to final award.

For additional information on this process, please visit Proposer Instructions: Other Transactions (https://www.darpa.mil/about/offices/contracts-management/proposer-transactions).

All submissions proposing to this solicitation must complete the biosketch and current/pending support forms. Forms can be found here and submitted in BAAT:

- Certified Biographical Sketches (https://www.nsf.gov/policies/nspm-33/common-form-biosketch)
- Current and Pending Support (https://www.nsf.gov/policies/nspm-33/common-form-cps)

7.8 U.S. Permanent Resident and Foreign National Participation in DARPA Programs and Related Events

Definitions

Foreign National (FN): A person who is not a citizen or national of the country in which they are living or visiting.

U.S. Permanent Resident (USPR): A non-U.S. citizen who has official legal authorization to live and work in the United States permanently.

Official Foreign National Visitor: An individual serving as an official military or civilian representative of their nation's government conducting government, diplomatic, or other official

business. These are official military or civilian representatives of their respective nations' government. (Note – these individuals are exempt from this process and must instead obtain a Visit Request through the U.S. State Department's Foreign Visit System. For an official visit to DARPA, contact DARPA International Cooperation to facilitate the visit.)

Requirements

All non-official FNs and USPRs working on DARPA programs are subject to screening requirements established under this solicitation, including the Principal Investigator (PI). If selected for award negotiation, the Notification Letter will provide instructions and a link for FNs and USPRs to register through DARPA. In addition to the PI and Senior Personnel, the requirements apply to employees, research assistants, postdoctoral researchers, graduate students, and undergraduate students who will directly support the HUBBLE program. The requirements must flow down to all subcontractors and apply to any other individuals ("affiliated personnel") who will perform work under the award.

The PI will:

1. Ensure all FNs and USPRs supporting the program us the link provided in the Notification Letter to register.
2. Maintain current records identifying all FNs and USPRs supporting the program, including affiliated personnel, and make such records available upon a written request from the Contracting Officer or Agreements Officer.
    a. Monthly reports identifying the current status of all FNs and USPRs supporting the program must be delivered in conjunction with the performer's regular monthly status report as required by the agreement or contract awarded.
3. Notify the DARPA Program Manager, Contracting Officer or Agreements Officer, and the DARPA Program Security Representative, in writing, within five (5) business days of any of the following events:
    - A USPR or FN (official or otherwise) joins or departs the program;
    - The residency or citizenship status of a USPR or FN (official or otherwise) changes; or
    - Information previously submitted during a registration for a USPR, or non-official FN materially changes.

The information submitted through the pre-award registration process will establish the initial baseline for identifying USPR or FN personnel supporting the program. This baseline will be used to track and report subsequent personnel additions, departures, and material changes during program performance.

7.9 Cybersecurity Maturity Model Certification Requirements

As codified in 32 CFR Part 170, the Cybersecurity Maturity Model Certification (CMMC) Program is designed to ensure Department of War (DoW) performers are properly safeguarding Federal Contract Information (FCI) and Controlled Unclassified Information (CUI) that is

processed, stored, or transmitted on performer information systems. FCI and CUI must be protected to meet evolving threats and safeguard nonpublic, unclassified information that supports and enables the warfighter. The CMMC Program provides a consistent methodology to assess a defense contractor's implementation of required cybersecurity requirements. Proposers are encouraged to visit the DoW Chief Information Officer CMMC Resources & Documentation site for more information on

CMMC: https://dodcio.defense.gov/cmmc/Resources-Documentation/.

This provision outlines the CMMC requirements pertaining to this solicitation, to include the required CMMC level and the corresponding proposal requirements. All DARPA-awarded Procurement Contracts and Other Transactions, including those involving Fundamental Research, at a minimum require prime performers and subcontractors to demonstrate compliance with CMMC Level 1, which focuses on the protection of FCI and consists of the security requirements that correspond to the 15 basic safeguarding requirements specified in 48 CFR 52.204-21.

A. Required CMMC Level

The required CMMC level for this solicitation is: CMMC Level 1 (Self-Assessment). Level 1 focuses on the protection of FCI and consists of the security requirements that correspond to the 15 basic safeguarding requirements specified in 48 CFR 52.204-21.

B. Eligibility for Award

To be eligible for award under this solicitation, the CMMC Unique Identifier (UID) associated with the prime proposer must reflect a current CMMC status (representing either Final or Conditional status) posted in the Supplier Performance Risk System (SPRS) indicating compliance at the required level above. Additionally, the proposer must have a current annual CMMC affirmation, submitted by an authorized Affirming Official, posted in SPRS. Further, as some entities may have multiple business segments, multiple CAGE codes, etc., DARPA must reasonably be able to relate the CMMC UID in SPRS to the proposing entity.

(Note: SPRS is housed within the Procurement Integrated Enterprise Environment https://piee.eb.mil; an additional resource on SPRS is located here:

https://dodcio.defense.gov/Portals/0/Documents/CMMC/CMMC-SPRS.pdf)

C. Subcontractor Flow-Down

Prime proposers are responsible for verifying subcontractor compliance. In the proposal, the prime proposer must attest that all subcontractors who will process, store, or transmit FCI or CUI under a resultant award will meet the applicable CMMC level required by 32 CFR § 170.23. The proposal must also describe the verification method the prime proposer will use to ensure subcontractors have the required CMMC status in SPRS prior to subcontract award.

Specifically:

If the Subcontractor will process, store, or transmit...	...the Subcontractor's Minimum Required CMMC Level is:
Federal Contract Information (FCI) only CMMC Level 1 (Self-Assessment)	CMMC Level 1 (Self-Assessment)

8. PA Glossary

- A&AS: advisory and assistance services
- BAAT: Broad Agency Announcement Tool
- CMMC: Cybersecurity Maturity Model Certification
- CUI: Controlled Unclassified Information
- DARPA: Defense Advanced Research Projects Agency
- DOD: Department of Defense
- ELSI: Ethical, Legal, Social Impacts
- FCI: Federal Contract Information
- FFRDCs: Federally Funded Research and Development Centers
- FRRBS: Fundamental Research Risk-Based Security Review Program
- GPR: Government Purpose Rights
- IP: Intellectual Property
- IV&V: Independent Validation and Verification
- NDA: Non-Disclosure Agreement
- OCI: Organizational Conflicts of Interest
- OT: Other Transaction
- OPP: Oral Proposal Package
- PA: Program Announcement
- PPE: Personal Protective Equipment
- Q&A: Question and Answer
- ROM: Rough order of Magnitude
- SAM: System for Award Management
- SETA: Scientific, engineering and technical assistance
- TBD: To Be Determined
- TCD: Technical Clarification Document
- TR: Technical Representatives
- UID: Unique Identifier
- USG: United States Government
- WAWF: Wide Area Workflow

9. RESEARCH OTHER TRANSACTIONS (OT) AUTHORITY

Research OT projects are awarded under the authority of 10 U.S.C. § 4021. OTs are award instruments that are generally not subject to the Federal laws and regulations governing procurement contracts. OTs are not subject to the Federal Acquisition Regulations (FAR), the Defense Federal Acquisition Regulations Supplement (DFARS), or any regulations governing grants or cooperative agreements. OT awardees are also not subject to the FAR/DFARS cost accounting standards. As a result, the use of OTs should streamline the award process, making it faster than the traditional Government contracting process and more akin to a commercial contract award timeline. For additional information on OTs and how they are used in the Department of War, please go to acquisitioninnovation.darpa.mil.