Program Solicitation

Network of Optimal Dynamic Energy Signatures (NODES)

BIOLOGICAL TECHNOLOGIES OFFICE

DARPA-PS-25-30

July 31, 2025

PROGRAM SOLICITATION OVERVIEW

- **Federal Agency Name** – Defense Advanced Research Projects Agency (DARPA), Biological Technologies Office (BTO)
- **Funding Opportunity Title** – Network of Optimal Dynamic Energy Signatures (NODES)
- **Announcement Type** – Initial Announcement
- **Funding Opportunity Number** – DARPA-PS-25-30
- **Dates -**
    - Posting Date: **July 31, 2025**
    - Proposers' Day: **August 1, 2025**
      https://sam.gov/opp/28aaa90a28f049c48ba6748fafc5851f/view
    - Questions Due Date: **August 15, 2025**, 1200 EST
    - Abstracts Due Date and Time: **August 29, 2025**, 1200 EST
    - Full Proposal/Oral Proposal Package (OPP) Due Date and Time: **October 7, 2025**
- **Description of the funding Opportunity:** The Defense Advanced Research Projects Agency (DARPA) is soliciting proposals to develop computational models that will input protein sequences and predict their associated functions based on protein movements (dynamics) observed during folding, protein binding, and/or allosteric interactions. The ability to predict protein function will also be tested across a range of scenarios defined by DARPA. In addition to simulating, learning, and generating molecular dynamics, the program performers will be required to create an Application Programming Interface (API) for general usage by the community, as well as appropriate guardrails to ensure the safety of both the models and the interpretation of the predicted protein functions. Together, these efforts will bolster the Department of Defense's (DoD) ability to probe the limitless space of *de novo* protein sequences, provide a tool to expedite threat characterization when the nation or warfighters are introduced to an unknown agent, and shorten the time to developing Medical Countermeasures (MCMs). Finally, the Network of Optimal Dynamic Energy Signatures (NODES) program will support biomedical research by providing expedited ways to understand infectious, protect crops, develop new pharmaceuticals, and elucidate mechanism of disease.
- **Multiple awards are anticipated**.
- **Types of instruments that may be awarded** – Other Transaction for Prototype
- **Total Funding** – Not to Exceed $1.7M per award for Phase I (12 Months)
- **Technical Point of Contact** – Dr. Abhishek Singharoy
- **Agency Contact**

  The Solicitation Coordinator for this effort can be reached at:
  NODES@darpa.mil
  DARPA/BTO
  ATTN: DARPA-PS-25-30
  675 North Randolph Street
  Arlington, VA 22203-2114

- **Attachments**
  - A. Abstract Template and Instructions
  - B. Model Other Transaction (OT) for Prototype, Fixed Support
  - C. Controlled Unclassified Information (CUI) Guide

PROGRAM SOLICITATION
Defense Advanced Research Projects Agency (DARPA)

1. PROGRAM INFORMATION

1.1. Background

Proteins are essential building blocks of life, playing a crucial role in countless biological processes. The universality of proteins across lifeforms makes them a powerful tool in medicine, where their tunable properties can be harnessed to develop life-saving treatments. Conversely, proteins are also implicated in toxic functions and their misuse can prove detrimental to life. The determination of protein functions, therefore, offers the opportunity to develop a universal design tool for controlling biology in areas of early preparedness, rapid response, and derisking applications. Pushing the envelope in these areas is crucial to strengthen our bio surveillance, security, and attribution efforts.

Despite remarkable advances, characterization of protein function remains sparse, with current knowledge encompassing only 1-10% of the protein universe, which corresponds to >150 million protein sequences. From that subset, merely 1% of the functions are experimentally verified. The remaining protein functions are extrapolated and largely confined to seeking homologies with libraries of known structures and previously annotated functions. These libraries are rapidly depleting, and their growth is far slower than the rise in the number of novel protein sequences.

As noted above, traditional models for determining protein function rely on protein sequences. Recently, models have been translated to employ both sequence and structure, like in DeepFri.[1] However, the majority of protein functions do not follow sequence or structural homology.[2] Protein dynamics, on the other hand, correlate linearly with evolutionary changes,[3] and can track function from the molecular[4] up to the cellular levels.[5] To characterize the function of the majority of deposited proteins with unknown function (i.e., 90% of the protein universe, in addition to synthetic, novel, and uncatalogued proteins with biothreat potential), DARPA will create NODES: Network of Optimal Dynamic Energy Signatures. NODES is the first biophysics-guided deep learning tool that scans the universe of existing protein sequences, and

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[1] Gligorijević, V., Renfrew, P.D., Kosciolek, T. et al. Structure-based protein function prediction using graph convolutional networks. Nat Commun 12, 3168 (2021). https://doi.org/10.1038/s41467-021-23303-9

[2] Hamamsy, T., Morton, J.T., Blackwell, R. et al. Protein remote homology detection and structural alignment using deep learning. Nat Biotechnol 42, 975–985 (2024). https://doi.org/10.1038/s41587-023-01917

[3] Gilson AI, Marshall-Christensen A, Choi JM, Shakhnovich EI. The Role of Evolutionary Selection in the Dynamics of Protein Structure Evolution. Biophys J. 2017 Apr 11;112(7):1350-1365. doi: 10.1016/j.bpj.2017.02.029. PMID: 28402878; PMCID: PMC5390048

[4] Shekhar, Mrinal, Genki Terashi, Chitrak Gupta, Daipayan Sarkar, Gaspard Debussche, Nicholas J. Sisco, Jonathan Nguyen et al. "CryoFold: determining protein structures and data-guided ensembles from cryo-EM density maps." Matter 4, no. 10 (2021): 3195-3216.DOI: 10.1016/j.matt.2021.09.004

[5] Singharoy, Abhishek, Christopher Maffeo, Karelia H. Delgado-Magnero, David JK Swainsbury, Melih Sener, Ulrich Kleinekathöfer, John W. Vant et al. "Atoms to phenotypes: molecular design principles of cellular energy metabolism." Cell 179, no. 5 (2019): 1098-1111.

infers biological functions based on capturing signatures of protein movements combined with existing structural data banks (e.g., Protein Data Bank [PDB]).

NODES' founding principle is that a protein's dynamics is a universal determinant of its function (Figure 1), which extends the limits of seeking functions far beyond the realms of homologous protein sequences or stationary structures[6]. The causal relationship between protein function and dynamics has been demonstrated.[7] There is a strong, intrinsically linear correlation between dynamics and function. Across a database of 415 protein families (where each family has more than 20 structural homologs), this linear correlation is maintained.[8] This is because dynamics captures both system and context (surroundings) in any number of dimensions (Figure 1). By identifying patterns in the correlated molecular dynamics shared across diverse, traditionally unrelated families of proteins, NODES will elucidate novel functions for known proteins and

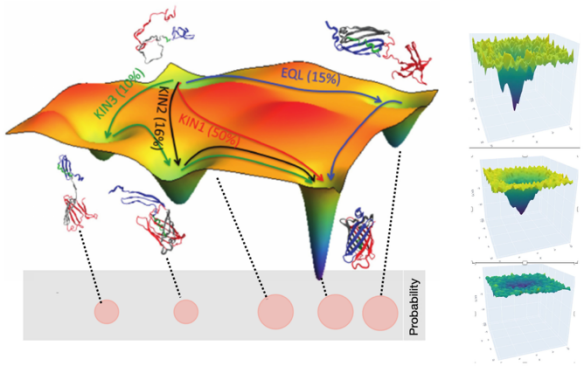

Figure 1. Interaction energy or fitness landscape offers a reduced dimensional representation of protein dynamics. The molecular dynamics (MD) approaches in NODES probe the low energy/high-probability regions of this landscape (red circles) to determine the signatures of protein dynamics (structure, energy, shape, solubility, pH, salt, pressure, temperature) greatly accelerating sequence-to-function assessments. Additional accelerations are determined from flattening or annealing of these landscapes, shown on the right.

assign functions to unknown ones.

The current speed for determining dynamic protein behaviors is a critical bottleneck. Even if it was possible to apply the world's total number of computing flops to this problem, the computational time needed to resolve all protein movements using Molecular Dynamics (MD) simulations would require >1000 graphic processing unit (GPU) years.[9] Therefore, NODES requires innovative approaches in accelerating largescale MD simulations and generalizing the outcomes by deploying Artificial Intelligence/Machine Learning (AI/ML) pipelines.

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[6] Chun Kit Chan, Christine Rajarigam, Patrick Jiang, Jacob Miratsky, Mustafa Demir, Melih Sener, Abhishek Singharoy, A to-do list for realizing the sequence-to-function paradigm of proteins, Current Opinion in Structural Biology, Volume 93, 2025, 103119, ISSN 0959-440X, https://doi.org/10.1016/j.sbi.2025.103119.

[7] Staffer & Palmer. Graphical Causal Modeling of Protein Structural and Dynamical Features. Volume 98, Issue 3, Supplement 1566a, January 2010

[8] Tang, Qian-Yuan, and Kunihiko Kaneko. "Dynamics-evolution correspondence in protein structures." Physical review letters 127, no. 9 (2021): 098103.

[9] Netz, Roland R., and William A. Eaton. "Estimating computational limits on theoretical descriptions of biological cells." Proceedings of the National Academy of Sciences 118, no. 6 (2021): e2022753118.

1.2. Program Description/Scope

The NODES program will focus on shifting the current paradigm of molecular modeling by employing a combination of multiscale and bioinformatics approaches and leveraging the generalizable biophysical characteristics of proteins.[10] This will be accomplished by taking advantage of the conserved structure of protein, the biophysical properties, dynamics, and responses to environmental perturbations that are conserved across all naturally existing sequences. These signatures can be exchanged between dissimilar or non-homologous sequences and used to predict currently unknown but experimentally verifiable structures. Similar techniques have previously been used to expedite next generation sequencing, wherein, instead of labeling every nucleotide, measuring their electrical current signatures significantly expedited the genome identification.[11] Likewise, MD of proteins also follows a reduced dimensional space (or landscape) of transferrable information.

The use of MD fingerprints is a new way to match information, extrapolate function, and expedite detection. For example, protein structure is constrained by the principles of biophysics (e.g., bonded and non-bonded interactions between atoms), and based on such calculations, it has been mathematically demonstrated that there are only 27 unique 5-residue movements.[12] These movements represent the grammar that reduces computational complexity to tracking only a finite number of movements (and their signatures), which can then be mapped across the entire protein universe. Tools that allow the rapid discovery of such generalizable signatures of protein movements are encouraged, irrespective of the choice of MD methods.

NODES seeks to avoid exhaustive rate-kinetic or free-energy barrier sampling approaches for probing protein dynamics. Instead, it solicits ideas on leveraging a family of multi-replica methods (including, but not limited to, Replica-Exchange, Langevin Dynamics, Entropy Maximization with Limited Structural Biology Data, Adaptive Biasing, and Conformational Flooding approaches) that focus exclusively on the ensemble of high-probability protein states, which are adequate to offer signatures of movements or MD fingerprints, without necessarily providing their precise timing. Movements are generally classified as folding, binding and allostery or cooperativity. Additionally, NODES encourages tools that can handle larger system sizes and complex membrane environments. Methods that are popularly used in literature for simpler protein sizes are potentially risky for NODES purposes, unless they show compatibility with large system sizes (i.e., 1 million atoms or more) and are parallelizable across highly parallel supercomputing capabilities (i.e., at least 100 GPUs). Coarse-graining approaches can be useful if the reverse-coarse graining is defined with correct statistics. NODES will take advantage of the fact that sets of MD fingerprints can be applied and generalized to most protein

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[10] Chan et al, "A to-do list for realizing the sequence-to-function paradigm of proteins", accepted to Current Opinion in Structural Biology 2025, July 2025

[11] Satam H, Joshi K, Mangrolia U, Waghoo S, Zaidi G, Rawool S, Thakare RP, Banday S, Mishra AK, Das G, Malonia SK. Next-Generation Sequencing Technology: Current Trends and Advancements. Biology (Basel). 2023 Jul 13;12(7):997. doi: 10.3390/biology12070997. Erratum in: Biology (Basel). 2024 Apr 24;13(5):286. doi: 10.3390/biology13050286. PMID: 37508427; PMCID: PMC10376292.

[12] Yang J, Cheng WX, Wu G, Sheng S, Zhang P. Prediction of folding patterns for intrinsic disordered protein. Sci Rep. 2023 Nov 21;13(1):20343. doi: 10.1038/s41598-023-45969-5. PMID: 37990040; PMCID: PMC10663623

families and, as identical movements are shared by diverse families, to both soluble and membrane-bound proteins. This insight into exchangeable signatures of dynamics between distinct proteins suggests that a finite training set of proteins can be adequate to learn the dynamics of all proteins.

Finally, following the creation of the library of molecular movements, deep learning methods are sought to generalize predictions and rapidly infer an ensemble of structures with correct thermodynamics, energy, and force field-based weights for a given sequence. (Note that a random collection of diverse models based on any arbitrary scoring system will NOT be deemed an ensemble.) Rather, the relative probabilities of the multiple identified intermediates should converge on thermodynamic ratios within statistical errors. These ratios will be verified using a broad range of biophysical and analytical techniques.

1.3. Government Furnished Resources

The performer codes and APIs will be tested for accuracy, speed, and generalization on national supercomputers by Government partners. Performers will be offered access to high performance computing resources from Government partners to support development. Depending upon the simulation, modeling, and learning approaches, performers may prefer to employ cloud computing resources or to bring in their own computing facilities. The Government requires justification as to why it is to the benefit of the NODES program to not use Government furnished computing resources, before alternative computing approaches may be pursued. All software applications will be tested on a unified computing environment on Government systems, notwithstanding the source development platforms. It is required that code development should be as modular as possible, and that the execution pipeline should be highly portable across multiple types of hardware (e.g. AMD or Nvidia GPU) to ensure proper transfer to these systems.

1.4. Acquisition Strategy

NODES is using a modified acquisition approach to lower the administrative burden of entry, reduce program risk, foster competition and cooperation, and accelerate start dates for performer teams. This Program Solicitation (PS) solicits independent abstract submissions for an initial 12-month Phase I effort. Proposers with successful abstracts will be invited to provide an oral presentation to describe their proposals to the DARPA NODES program team. The Government will review all oral presentations, and selected proposers may be awarded an Other Transaction (OT) for Prototype Agreement not to exceed $1.7M, which provides eligibility to participate in future Phases of the program.

This PS 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. Phase II participants will be selected from Phase I performers who demonstrated success in meeting program metrics and objectives, as described in Section 1.6. **Only Phase I activities are being sought in response to this Program Solicitation**.

1.5. Program Structure

The NODES program is a 39-month effort with three (3) concurrently researched Functional Areas (FAs):

- FA1 - Sequence-to-function through Folding: Model development for protein folding.
- FA2 - Sequence-to-function through Binding: Model development for predicting binding interactions.
- FA3 - Sequence-to-function through Allostery: Model development for predicting allosteric activity.

Performers will work on all three FAs, and should possess expertise in a range of topics, including: molecular dynamics, structural biology, bioinformatics, deep learning, large language models, diffusion maps, free energy methods, multiscale models, functional annotations, and ensemble models.

The program is a 39-month total effort structured with a 12-month Phase I (Base) (Figure 2), a 15-month Phase II (Figure 3), and a 12-month Phase III . It should be noted that Phase III will consist of Government partners only and only Phase I and Phase II will involve performer teams. Proposers must present a plan for no more than 12 months that includes a comprehensive approach to meeting all Phase I program metrics and objectives. Progression from Phase I to Phase II is dependent on demonstrated success in meeting program metrics and objectives, as described in Section 1.6. Metrics and objectives will be assessed and scored by the United States Government (USG) team. The USG team will consist of DARPA, USG stakeholders, and government test and evaluation (T&E) partners.

1.5.1. Phase I (Base, 12 months)

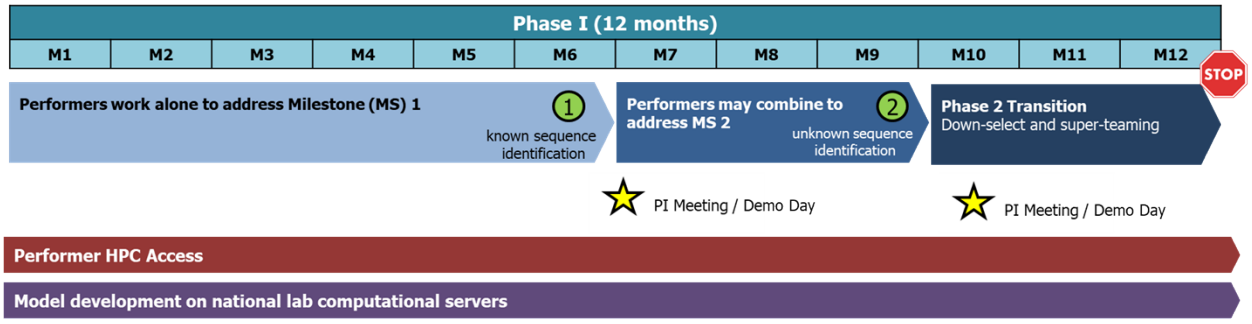

Figure 2. NODES Phase I Schedule (anticipated).

Months 1-6

During the first six months of Phase I, performer teams will develop, evaluate, and improve their models with MD approaches, initially simulating a small subset of multifunctional proteins, which will be provided by the USG team (Figure 2 above). At the end of the first six months, performers will be required to participate in capability demonstration 1 (CD1) to assess the performers' model's ability to accurately predict sequence functions for multiple, a set of twenty known protein sequences covering multiple protein families. Only well documented sequences whose predicted single or multiple molecular functions will be compared to known gene ontologies (GO) will be chosen. All examples will be picked up either from the Protein Databank or the Multifaceted Protein Database.

Performers will work with T&E partners to run simulations on USG systems for evaluation by the USG team. A consensus score will be provided based on how well a performer's model predicts the thermodynamic weights, secondary structural content, predicted local distance difference test (pLDDT) scores, and GO annotations on protein functions for the given Class, Architecture, Topology, and Homologue of the protein superfamilies. DARPA will openly share performer results with all performers in preparation for the remainder of Phase I.

Month 7-9

DARPA will hold a Principal Investigators (PI) Meeting for performers to showcase their models and test results. This will be done to facilitate collaborative relationships between performers that will be crucial for the remainder of the program. Specifically, performers are highly encouraged to collaborate into what will be termed a "Super Team" in a manner that complements their strengths, as reflected by the consensus score determined in CD1. A Super Team is defined as:

A single performer, or a team of performers, limited to no more than 3 separate performers, where no performer is a part of more than a single Super Team.

While performers will have the option to not collaborate with other performers in their Super Team, collaboration is strongly encouraged. It should be noted that the decision to work independently or collaborate with others will not impact Phase II determinations. Super Team members will continue to operate under their individual OT awards through the end of Phase I. Super Teams, whether multiple or single performer groups, will work to coordinate and integrate their models. Tasks may include, but are not limited to, creating joint datasets and libraries, creating multiscale pipelines and representations by merging MD capabilities of the different teams, marrying the MD innovations of one team with AI/ML strengths of the other, and building multi-fidelity models.

The USG team will continue working with performers to assess progress and ensure operability of models, data, and weights. Performer progress will be assessed through a final Phase I CD. DARPA will provide the performer with a set of protein sequences known to DARPA, but unknown to performers (and to the community in general). The set of sequences will be representative of each FA. Performers will work with T&E partners to run simulations on USG systems for evaluation by the USG team. Similarly to month 6, this CD will assess performers' model's ability to accurately predict sequence functions. Here, performers will begin to incorporate ML methods from the signatures uncovered through simulations to discover the 'unknown' functions of the publicly unavailable sequences. A scoring will be provided based on how well a performer's model predicts the protein function, with the cumulative scoring system based on thermodynamic weights, secondary structural content, pLDDT scores, and predicted binding constants.

Month 10-12

Performers will work with the USG team to transition technologies developed under the NODES program for further testing, evaluation, and development. Milestones, deliverables, and product transitions are listed in Table 2. Teams will be scored based on a combination of sequence-to-function prediction scores as well as compliance with the metrics listed in Section 1.6.

Phase II Proposal

Proposal instructions for Phase II of the program are anticipated to be released prior to the second CD testing. Super Teams are to submit proposals by Month 10 unless otherwise specified in the Phase II proposal instructions, with one performer acting as the prime government contractor and the rest as sub-contractors. Phase II awards are anticipated by month 12. It is incumbent upon the members of the Super Teams to choose and negotiate their own prime-sub relationships. Subject to availability of funds and assessed Phase I performance, DARPA may invite one or more Super Teams to continue to Phase II of the program.

Phase I Meetings

A list of meetings with anticipated locations is provided in the table 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	Twice Annually
Technical & Programmatic update	Teleconference/videoconference	Monthly

1.5.2. Phase II (15 months)

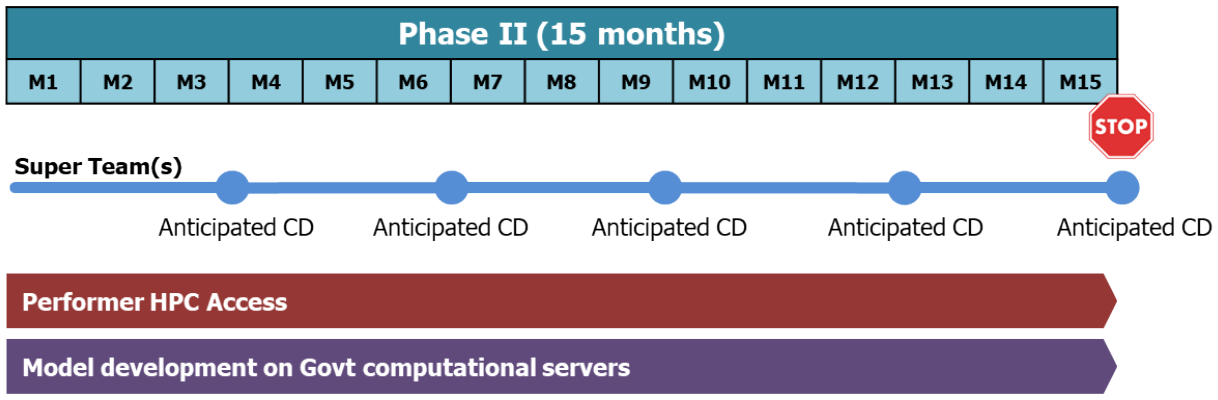

Figure 3. NODES Phase II Schedule (anticipated).

<u>This section describing NODES Phase II is provided for planning purposes only.</u>

During Phase II, Super Teams will continue to optimize their models by incorporating data from public databases, including PDB, Alphafold Data Bank, Class, Architecture, Topology, and Homologous superfamily (CATH) hierarchical classification, MultifacetedProt data bank, and Structural Classification of Proteins (SCOP) data bank. These databases contain protein sequences, structures, and fundamental folds, and binding interfaces shared across the protein universe. Progress in data incorporation will be monitored through quarterly Progress Checks to ensure adequate growth in the library of MD signatures and functions by the end of Phase II.

Once data incorporation is complete, Super Teams will perform quarterly CDs designed in collaboration with identified transition or commercial partners to ensure the developed models meet real-world needs. These demonstrations will build upon the metrics for each FA (FA1, FA2, FA3) established in Phase I, using scenarios and data driven by stakeholder requirements.

For example, DARPA and a USG biodefense partner might wish to demonstrate the models' ability to characterize specific types of protein function. Specifically, they may be interested in assessing binding functions and the ability to predict toxicity profiles of novel antibody sequences, uncovering interactions with human proteins for assessing cross-reactivity, and identifying sequence features associated with potential immunogenicity or other adverse effects. Challenge metrics will be government-defined with input from the DoD and industry stakeholders to increase engagement and support transition. The success of these demonstrations will be evaluated based on metrics jointly defined with the partner, focusing on prediction accuracy, speed, and relevance to the partner's specific use case.

1.6. Phase I Milestones and Metrics

Proposers must provide deliverables that include quantitative results, which are expected to achieve specific performance metrics. Table 2 lists each expected milestone and deliverable, as well as expected metrics for quantitative results.

Performer's models will be evaluated based on confidence scores (reflecting the model's accuracy in identifying the sequence, thermodynamic weights of known dynamics, and the correlation between function and movement) and computational performance, favoring more efficient models. Proposers should note that program metrics may serve as the basis for determining whether satisfactory progress is being made to warrant continued funding of the program.

Table 2. Milestone Schedule

Program Month	Milestone	Deliverable and Metric
0	Project kickoff meeting	Deliver briefing package to include team organization, technical approach, goals, expected results, schedule, compute infrastructure plan, and risk mitigation strategies.
4	Protein dynamics models are developed for classification of movements, and test running models in USG systems	Deliver the following: • Milestone report detailing technical approach for models developed, compute infrastructure used, preliminary tests in observing protein movements and predicting protein function, if applicable at this stage. • Models to be delivered to national laboratory Government partners, to ensure that (a) Government's partners are able to run simulations for independent testing, and (b) performers are able to conduct CD1 and CD2 on USG supercomputers infrastructure.
6	20-30% Partial completion of protein movement libraries	Deliver molecular dynamics trajectories and accompanying files corresponding to the 20-30% developed libraries. Libraries should include protein representatives in each Functional Area (FA), such as folding (FA1), binding (FA2), and allostery (FA3). Libraries are to be delivered to Government partners.
	Capability Demonstration 1 (CD1), conducted in USG systems, where performers' models are assessed for the ability to accurately predict function for a test set of protein sequences provided by DARPA,	Deliver quantitative results (graphs/data/charts) after performers test their models against the provided testing sequences **for all measurements listed below** (to include FA1, FA2, and FA3). Performers **are expected to reach 60% accuracy** (notional) of obtained results when compared to published literature, in the following tests: • *Functional Area 1 (FA1), folding:*

	composed of known proteins with published function	○ *Thermodynamic weights* ○ *Secondary structural content* ○ *Predicted local distance difference test (pLDDT) scores* ○ *GO annotations on protein function* • *Functional Area 2 (FA2), binding:* ○ *Binding constants* ○ *Interface interaction maps* ○ *Root Mean Square Deviation to known structures* • *Functional Area 3 (FA3), allostery:* ○ *Binding constants* ○ *Interface interaction maps* ○ *Root Mean Square Deviation to known structures* Additionally, deliver quantitative results (graphs/data/charts) **on the model's performance**, where performers are expected to reach (notional) <300 GPU hours per protein and total model inference time ≤ 1 week.
7	PI meeting	Deliver presentation showing results, challenges, plans, risk mitigation, computational infrastructure and performance.
	Super Team finalization.	Teams that decide to collaborate and form a Super Team are to supply NODES with a letter of intent that lists the names of performers and the computational infrastructure that they will use.
9	Super teams integrate their models, and test running models in USG systems	Deliver integrated model codes to USG supercomputer systems, to ensure that (a) Government's T&E partners are able to run simulations with integrated models for independent testing, and (b) performers are able to conduct CD2 on USG supercomputers infrastructure.
	Capability Demonstration 2 (CD2), conducted on USG systems, over test dataset provided by DARPA containing unpublished proteins for which the sequences are unknown to the performers.	Deliver quantitative results (graphs/data/charts) after performers test their models against the provided test sequences **for all measurements listed below** (to include FA1 and FA2). Performers are **expected to reach 70% accuracy** (notional) of obtained results when compared to published literature, in the following tests: • *Functional Area 1 (FA1), folding:* ○ *Thermodynamic weights* ○ *Secondary structural content* ○ *pLDDT score* • *Functional Area 2 (FA2), binding:* ○ *Binding constants* ○ *Interface interaction maps* ○ *Root Mean Square Deviation to govt-provided structures (unknown to performers)* Note that there will be no testing for Functional Area 3 (FA3). Additionally, deliver quantitative results (graphs/data/charts) on the **model's performance**, where performers are expected to reach (notional) <300 GPU hours per protein and total model inference time ≤ 1 week.
12	40-50% Partial completion of protein movement libraries	Deliver molecular dynamics trajectories and accompanying files corresponding to the 40-50% developed libraries. Libraries should include protein representatives in each Functional Area (FA), such as folding, binding, and allostery. Libraries are to be delivered to Government partners. Full

		completion of libraries is expected in the subsequent Phase II of the program.
	Final package of technical deliverables	Deliver a **technical report** that summarizes accomplishments of Phase I, to include quantitative results, challenges, and computational infrastructure used. Additionally, performers should deliver a **package containing the following computational files** and products: • Model codes and ML weights; MD codes using novel or custom MD program • Model parameter sets for input run (e.g., force field configurations) • Parameters and configuration sets (e.g., bash script runs) for cluster/parallelizable runs at the Government partner's supercomputers • Training datasets used • Simulation results (e.g., simulation trajectories or snapshots of movements, in file formats to be defined by the USG Team) • Predicated movements and functions • Tutorial and README documentation • Proposed guardrail plan for future safe usage of this tool by the community and/or the public
	Technology transfer /transition plan	Complete transfer of all models, data, etc. is required.

Success will be measured by the degree in which simulated data meets the metrics as decided by the USG team.

1.7. Independent Verification and Validation (IV&V)

There will be no IV&V during Phase I of the program, and high-level details for Phase II of the program are provided below solely for planning purposes.

In Phase II, all capability demonstrations will be developed by DARPA in collaboration with government stakeholders. As such, the performer testing will be validated by IV&V partners, who will perform activity assays and experiments on 10% of the dataset to confirm performer results. These experiments, which offer insights into protein molecular movements, may include standard Nuclear Magnetic Resonance, Circular Dichroism, Surface Plasmon Resonance, Biolayer Interferometry, and Fluorescence measurements (e.g., fluorescence resonance energy transfer).

1.8. Test and Evaluation

Performers will undergo two CDs (CD1 and CD2) in Phase I of NODES. Performers will work with DARPA-partnered Government partners when conducting CD1 and CD2. Performers' codes will need to run on Government partners supercomputers, go through test sets, and output results that will be evaluated by DARPA and the Government partner. Performers are expected to achieve goals and metrics, as listed in Section 1.6, for CD1 and CD2. Evaluations will be based on confidence scores (e.g., how well the models identified the unknown sequences and thermodynamic weights of the dynamics known and linear relationship between function and movement), and compute performance (more efficient models are favorable). The Government

partners will support DARPA in determining how each Performer (at CD1) or Super Team (at CD2) ranks.

1.9. Ethical, Legal, Societal Implications (ELSI)

Performers should consider and be aware of potential ethical, legal, and societal implications (ELSI) of their work. Phase I of NODES will not require ELSI deliverables from performers, but Phase II will require performers to propose AI guardrails, as well as deliver risk and impact assessments, conduct red-teaming, and potentially collaborate with experts from DARPA's ELSI group members. Phase II may also require that performers include an ELSI SME in their team to collaborate with DARPA ELSI group members. Such deliverables will be described at a later date.

During oral presentations for Phase I, performers should address how their proposals will follow principles from DoD Responsible AI[13] to safeguard models and outcome data, or how these guidelines affect other aspects of their proposal.

For their work in Phase I, performers are strongly encouraged to consider the potential ELSI impact of their models and outcomes when evaluating questions such as the ones below:

- *What are the potential impacts (both positive and negative) of advancing the state of the art in sequence to function determination? Can the access and use of such advancements lead to societal discrepancies?*
- *How can these simulations inform scientific discovery and manage security?*
- *Which risks could these systems have on commercial and security entities?*
- *Could the approach infringe into medical safety and considerations to civil liberties (e.g., unintended bias to input set, considerations of demographics affected by results, transparency of input set and results, explainability of methods and results)?*
- *Is there a potential for sequence-to-function features to allow for hazardous use? Consider how models in NODES could affect national security.*

1.10. Public Release of Information and Security Guidance

At this time, DARPA expects much of the work performed under Phase I of NODES to be unclassified, fundamental research subject to pre-publication review. Information generated that does not clearly identify as "CUI" (controlled unclassified) may still need to undergo review prior to public release. All publications, articles, and scientific presentations will be submitted to DARPA for review and approval 45 days in advance of required submission date, to give time to remove any sensitive information. It is anticipated that workshops and milestone reviews will be used to work towards mutually agreeable plans for review of publication, methods, data, and code prior to release, involving the NODES ELSI team, Government partners, DARPA, and performers.

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[13] "Department's Responsible Artificial Intelligence Strategy and Implementation Pathway Maps the Journey to a Trusted AI Ecosystem", available at https://www.ai.mil/Latest/Blog/Article-Display/Article/3940350/departments-responsible-artificial-intelligence-strategy-and-implementation-pat/, last accessed on July 9th, 2025.

To prevent the release of sensitive technical information, certain aspects of the proposed research may be considered CUI if they reveal DoD-specific applications or requirements and may require safeguarding or dissemination controls, pursuant to and consistent with applicable law, regulations, and government-wide policies. NODES CUI guide is in Attachment C. Performers must partition potentially sensitive tasks from nonsensitive research efforts. All performers (prime contractor and subcontractor) desiring public release of project information that may contain CUI as defined above must submit a request for public release from DARPA in accordance with their contractual requirements.

For planning purposes, it's anticipated that most of the work in Phase II of the program will primarily contain CUI information.

2. PROGRAM SOLICITATION (PS) AUTHORITY

This PS may result in the award of an OT for Prototype agreement, which can include not only commercially available technologies fueled by commercial or strategic investment but also concept demonstrations, and development activities that can significantly improve commercial technologies, existing Government-owned capabilities, and/or concepts for broad defense and/or public application(s). The Government reserves the right to award an OT for Prototype agreement under 10 U.S.C. § 4022 or make no award at all. In all cases, the Government agreements officer shall have sole discretion to select the award agreement type, regardless of agreement type proposed, and to negotiate all agreement terms and conditions with selected proposers. The OT agreement will not require cost sharing unless the proposer is a traditional defense contractor who is not working with a non-traditional defense contractor or nonprofit research institution to a significant extent. An OT template has been provided with this solicitation, see Attachment B, and is only for informational purposes.

2.1. PS Procedure

In response to this solicitation, and after verifying eligibility, proposers are required to submit an abstract as described in Section 4.1. 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 NODES 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 4.2. If DARPA finds that both of these conditions are met, it may 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 I of the program. The Government will not pay proposers responding to this PS for the costs associated with abstract submissions, OPP preparation, oral presentations, for Phase I or Phase II proposal development.

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

a. **Proposers' Day (Optional):** The Program Manager will hold an in-person Proposers' Day with a virtual option on August 1st, 2025, where he will briefly describe the program and its goals and solicit questions from the audience. Where possible, the Government will provide answers in real time, and a comprehensive list of questions and answers will

be provided afterward via a question and answer (Q&A) document. Participation in the Proposers' Day is optional and is not a requirement for proposers seeking to submit an abstract. Additional details about the Proposers' Day were provided in Special Notice DARPA-SN-25-97 separate from this PS.

b. **Program Solicitation Questions and Answers (Q&A) (Informational Only):** DARPA will host a Q&A session during the NODES Proposers Day and will post a consolidated Q&A document. The Q&A document will be available online at https://www.darpa.mil/research/programs/nodes. Following Proposers Day, questions can be sent to NODES@darpa.mil. DARPA will respond to any relevant and/or PS clarification question(s) prior to the final abstract due date and post consolidated Q&As at the NODES program page (https://www.darpa.mil/research/programs/nodes).

c. **Abstracts (Required):** Abstracts shall be submitted as specified in Section 4.1 of this PS. The Government will review all submitted abstracts for technical comprehension, technical ability and estimated cost (see Section 4.2). Selected proposers will be invited to provide an OPP and participate in an oral presentation (see Section 5) to the Government. Note that proposers must submit an abstract in response to this solicitation to be considered for participation in the NODES 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 (Required if invited):** 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, evaluation factors, 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. For Phase I, proposers must only propose an OT for Prototype with fixed payable milestones. (Note – Milestones 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.

e. **Phase I (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 Prototype under 10 U.S.C. § 4022 with fixed, payable milestones for Phase I selectees.

f. **Phase II (15 Months): The following information is for planning purposes only.** DARPA anticipates issuing proposal instructions for Phase II to all performers prior to the second CD testing with the anticipation of the Phase II awards by month 12.

3. ELIGIBILITY INFORMATION

3.1. Eligible Applicants

3.1.1. 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 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 Government partners, 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.

3.1.2. Other Applicants

Non-U.S. organizations and/or individuals are NOT eligible to submit an abstract/proposal to this solicitation. Non-US individuals employed by US organizations and working in the US are allowed to participate on the Performer teams.

3.2. Organizational Conflicts of Interest (OCI)

An organization cannot simultaneously provide scientific, engineering, technical assistance (SETA), advisory and assistance services (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 PS before time and effort are expended in preparing any submission documentation.

4. Guidelines and Guidance for Abstracts

4.1. General Guidelines

The submitted abstract must follow the "Abstract Template and Instructions" as described in Attachment A. Abstracts shall contain:

- Hypothesis corroborating, extending, or challenging the foundational principles of NODES.
- Narrative supporting the novelty and uniqueness of the proposed simulation as well as of AI/ML approaches for seeking signatures of molecular dynamics. The text shall demonstrate a thoughtful integration of simulation, learning and generation to avoid incremental advancement or duplication of current efforts.

- Benchmark for computational efficiency, preferably on national supercomputers or comparable architectures. Both hard and soft scaling are encouraged.
- Estimates of simulation time and number of simulation systems. Intent and capability for employing government furnished compute areas or request to use cloud or institution owned compute should be outlined.
- Proposed methods for correlating protein functions with dynamics, as well as methods of generalizing movement beyond single families of proteins.
- Choice of loss functions, features and representations.
- Preliminary evidence of the feasibility of the proposed innovations over the proposed period of Phase I. Publications are encouraged but not required. Demonstration of how prior research was leveraged to maximize the impact and value of the requested funding.
- The use of workflows(s) or figure(s) to depict the essence of the proposed solution.
- Specific plans, including cost, time estimates, and teaming composition to address all functional areas outlined in the program description.
- Identified risks to successful execution and fulfillment of program goals and proposed strategies for mitigating these.
- Description of plans to meet and/or exceed program metrics and milestones; these claims must be justified with literature-based explanations, data, and projections.
- Technology transfer package plan to transfer data, computational models, etc. to the USG team at the end of each phase of the program.
- Estimated cost for Phase I to include the estimated total labor cost, and estimated materials and other direct costs (ODCs; e.g., equipment, materials, travel, tuition). Total costs must not exceed $1.7M of what would be Government funding. This may be presented as a narrative or table (less than 0.5 pages) and is not included in the six (6) written page limit

Abstracts will not:

- Include elaborate brochures. Include only information relevant to the submission requirements or evaluation criteria.
- Reiterate the justifications or background information provided in the solicitation.
- Include research in humans or animals.
- Reflect cost strategies intended to artificially enhance competitiveness—such as minimizing technical risk, limiting innovation, or relying primarily on junior personnel.

Abstracts will be deemed non-conforming and not considered for further review if they:

- Are received through other mechanisms such as through Grants.gov or directly to the NODES@darpa.mil e-mail.
- Address only one or two FAs.

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 - Unclassified Submission Instructions for instructions on how to submit your abstract through DARPA's BAAT. It is important to note that the terms and conditions on the remainder of the

Proposer Instructions and General Terms and Conditions link above do not apply to this solicitation. The purpose of referencing the website is for you to obtain instructions for DARPA's BAAT. Questions regarding Proposal Abstracts can be sent to NODES@darpa.mil, by August 15, 2025.

4.2. Associate Performer Agreements (APA)

DARPA anticipates that a large amount of data will be generated under this program by each performer team. Data analysis and modeling will be strengthened by compiling and integrating information across performers as well as shared with other government partners. Data sharing plans to facilitate exchange will then be formalized in an Associate Performer Agreement (APA), to be included as an attachment to the agreement award. Performers will be encouraged to share data externally with the broader research community, after any sensitive information or capabilities are controlled per security regulations and guidance, and performers may include plans for external data sharing in the milestones, metrics, and deliverables.

4.3. Abstract Evaluation

Abstracts will be evaluated by DARPA using the evaluation criteria listed below in descending order of importance, and not against other abstracts submitted in response to this PS. As stated above, proposers are required to submit an abstract for evaluation by DARPA to be considered for any subsequent award. DARPA will respond to the 6-page abstract with a statement as to whether or not DARPA invites the submission of an Oral Proposal Package. Upon review of abstracts, the Government may elect to invite all, some, or none of the proposers to submit an OPP and participate in oral presentations. *Only abstract proposers invited by DARPA to submit an OPP and participate in oral presentations are eligible to provide one.*

- ***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.*
- ***Technical Ability:*** *The proposer's team and organization demonstrate the ability to achieve the goals of the program.*
- ***Estimated Cost:*** *The proposed estimated cost is reasonable, realistic, and affordable for the technical approach and accurately reflects the technical goals and objectives of the Program Solicitation.*

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 abstract 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.

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 PS, 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 PS, and the positive aspects do not outweigh the negative aspects*

Abstracts are to include a single page overview of Phase II plans to be included in the 6 page limit. **The Phase II overview will NOT be evaluated as part of this submission.**

5. Oral Presentation Package (OPP) Instructions & Process

If DARPA requests an oral presentation, the proposers will be asked to provide further details on their proposed solution. Specific instructions (including content submission guidelines and evaluation criteria) 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 October 2025 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 40-minute presentation time, and up to 20 minutes of questions and answers following. However, further details will be provided at the time of the OPP invitation, and presentation times may be adjusted based on the number of participants.

6. Awards

6.1. 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 Prototype 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:

- Proposers **must** have a Unique Entity Identifier (UEI) number and **must** register in the System for Award Management (SAM). Proposers are advised to begin the SAM registration as early as possible, preferably before abstract submission.
- 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 PS. For assistance with PIEE, please contact 866-618-5988 or DARPAInvoices@DARPA.mil.

- 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.

6.2. 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.

6.3. Intellectual Property Rights

NODES will produce models, protein libraries, software, and other technical data that will be furnished to stakeholders including the DoD. The Government expects unlimited rights for the technology and data developed and/or generated under the NODES program 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:

- 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 PS 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 (Table 3). If no restrictions are intended, then the proposer should state "NONE."

Table 3. List of restrictions.

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)

6.4. Data Rights

The Government shall have unlimited rights in data, including technical data, code and software, first produced and delivered in the performance of this agreement regardless of success or failure of work performed on the agreement. 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 agreement.

6.4.1. Release, publication, and use of data.

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

6.4.2. Subcontracting

The Performer shall obtain from its subcontractors all data and rights therein necessary to fulfill the Performer's obligations to DARPA under this agreement. If a subcontractor refuses to accept terms affording the DARPA those rights, the Performer shall promptly notify the Agreements Officer of the refusal and shall not proceed with the subcontract award without authorization in writing from the Agreements Officer. Non-U.S. organizations and/or individuals are NOT eligible as subcontractors for abstract submissions.

6.4.3. Copyrights

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

6.5. Procurement Integrity

All awards under this PS 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.

6.6. Human Subjects Research /Animal Subject Research Use

Proposers SHOULD NOT propose human subjects research nor the use of animals in research.

7. Fundamental Research

It is DoD policy that the publication of products of fundamental research will remain unrestricted to the maximum extent possible. National Security Decision Directive (NSDD) 189 defines fundamental research as follows: 'Fundamental research' means basic and applied research in science and engineering, the results of which ordinarily are published and shared broadly within the scientific community, as distinguished from proprietary research and from industrial development, design, production, and product utilization, the results of which ordinarily are restricted for proprietary or national security reasons.

As of the date of publication of this solicitation, the Government expects that program goals as described herein may be met by proposers intending to perform fundamental research and does not anticipate applying publication restrictions of any kind to individual awards for fundamental research that may result from this solicitation. Notwithstanding this statement of expectation, the

Government is not prohibited from considering and selecting research proposals that, while perhaps not qualifying as fundamental research under the foregoing definition, still meet the solicitation criteria for submissions. If proposals are selected for award that offer other than a fundamental research solution, the Government will either work with the proposer to modify the proposed statement of work to bring the research back into line with fundamental research or else the proposer will agree to restrictions in order to receive an award.

University or non-profit research institution performance under this solicitation will include effort categorized as fundamental research. In addition to Government support for free and open scientific exchanges and dissemination of research results in a broad and unrestricted manner, the performer or recipient, regardless of tier, acknowledges that such research may have implications that are important to U.S. national interests and must be protected against foreign influence and exploitation. As such, a performer or recipient agrees to comply with the following requirements:

1. On June 8, 2023, the Office of Undersecretary of Defense for Research and Engineering (OUSD (R&E)) released a memo entitled "Policy on Risk-Based Security Reviews on Fundamental Research" directing components to establish a risk-based security review program to identify and mitigate undue foreign influence in fundamental research consistent the requirements mandated by NSPM-33. **On May 5, 2025, OUSD(R&E) issued an updated document titled "2025 DoD Component Decision Matrix to Inform Fundamental Research Proposal Mitigation Decisions," which serves as an update to the original matrix published in 2023. The update strengthens research security by simplifying and clarifying reviews of problematic behaviors, and includes new requirements established by Congress.** In accordance with these requirements DARPA will assess all Covered Individuals proposed to support DARPA under all fundamental research proposals, selected for award, for potential undue foreign influence risk factors relating to professional and financial activities. This will be done by evaluating information provided via the OSTP Common Disclosure Forms, and any accompanying or referenced documents, in order to identify and assess any associations or affiliations the Covered Individuals may have with foreign countries of concern (FCOC) (i.e., The Peoples Republic of China, the Russian Federation, the Islamic Republic of Iran, and the Democratic People's Republic of North Korea) or FCOC connected entities.
2. The performer or recipient must establish and maintain an internal process or procedure to address malign foreign talent programs, conflicts of commitment, conflicts of interest, and research integrity consistent with USD(R&E) direction. The performer or recipient must also utilize due diligence to identify Foreign Components or participation by Covered Individuals in Foreign Government Talent Recruitment Programs and agree to share such information with the Government upon request.
3. On September 25, 2024, OUSD(R&E) published DoD Grant Information Notice 24-01 (GIN 24-01), which requires the use of Common Disclosure Forms for the submission of biographical (biosketch) information and current and pending (other) support from key personnel on proposals for assistance awards for research and development (R&D). In alignment with federal research security policy and to promote consistency across award mechanisms, these requirements are also required for Other Transactions (OTs) for R&D. Accordingly, key personnel named in OT proposals are required to submit

Common Disclosure Forms in the approved format, as well as provide a digital persistent identifier (DPI), prior to award. GIN 24-01 was issued to implement the February 14, 2024, OSTP Memorandum entitled "Policy Regarding Use of Common Disclosure Forms for the 'Biographical Sketch' and the 'Current and Pending (Other) Support' Sections of Applications by Federal Research Funding Agencies."

Effective 1 November 2024, all proposals submitted to fundamental research solicitations for R&D will use the Common Disclosure Forms to replace the SF-424, biosketch, and current/pending support forms. Forms can be found here: Common Form for Biographical Sketch (nsf.gov) and here Common Form for Current and Pending (Other) Support (nsf.gov).

Effective 1 April 2025, DoD will use Digital Persistent Identifiers (DPIs) for persistent identifiers required on the OSTP Common Disclosure Forms, and DARPA will require proposers to include the ORCID (https://orcid.org/) number for each covered person listed in a proposal for an assistance award for R&D. ORCID numbers will be used since ORCID is currently the only DPI provider that meets the requirements for DPI common or core standards in the NSTC NSPM-33 implementation guidance.

4. The above-described information will be provided to the Government as part of the proposal in response to the solicitation and will be reviewed and assessed utilizing a risk-based security review process prior to award. Generally, this information will be included in the Common Disclosure Forms
    - Instructions regarding how to fill out the Common Disclosure Forms can be found through Grants.gov.
5. DARPA's risk-based security review process takes into consideration the entirety of the Covered Individual's Common Disclosure Forms. These potential risk factors, along with any publicly available validation information, are then compared to the "DoD Risk Decision Matrix" to determine the level of mitigation that may be required to proceed, if possible.
6. The risk-based security review process will leverage publicly available lists, or reports, published by the U.S. federal government. Those lists and reports include, but are not limited to:
    - FY22 Lists Published in Response to Section 1286 of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (Public Law 115-232), as amended.
    - Executive Order 13959 "Addressing the Threat From Securities Investments That Finance Communist Chinese Military Companies"
    - The U.S. Department of Commerce, Bureau of Industry and Security, List of Parties of Concern
    - Director of National Intelligence (DNI) "Annual Threat Assessment (2025)"
    - Various Defense Counterintelligence and Security Agency (DCSA) products regarding targeting of US technologies, adversary targeting of academia, and the exploitation of academic experts: www.dcsa.mil

7. The DoD has explicitly stated in policy that there are foreign influence risks that are not able to be mitigated and thus would require denial of award. They are:
    1. **BEGINNING IN FISCAL YEAR (FY) 2024 (1 OCTOBER 2023), NO U.S. INSTITUTION OF HIGHER LEARNING THAT HOSTS A CONFUCIUS INSTITUTE* MAY RECEIVE DOD FUNDING UNLESS THE INSTITUTION OF HIGHER EDUCATION HAS BEEN ISSUED A WAIVER BY THE SECRETARY OF DEFENSE PURSUANT TO SECTION 1062 OF THE WILLIAM M. (MAC) THORNBERRY NATIONAL DEFENSE AUTHORIZATION ACT FOR FY 2021. INSTITUTIONS HOSTING A CONFUCIUS INSTITUTE ARE AUTOMATICALLY CLASSIFIED AS "PROHIBITED" UNDER OUSD(R&E) "POLICY ON RISK-BASED SECURITY REVIEWS ON FUNDAMENTAL RESEARCH"**
    2. **AS OF AUGUST 9, 2024, THE DOD IS PROHIBITED FROM FUNDING OR MAKING AN AWARD OF A FUNDAMENTAL RESEARCH PROJECT PROPOSAL IN WHICH A COVERED INDIVIDUAL IS PARTICIPATING IN A MALIGN FOREIGN TALENT RECRUITMENT PROGRAM (MFTRP) OR TO A PROPOSING INSTITUTION THAT DOES NOT HAVE A POLICY ADDRESSING MFTRP PURSUANT TO SECTION 10632 OF THE CHIPS AND SCIENCE ACT OF 2022. INDIVIDUALS PARTICIPATING IN A MFTRP, AND INSTITUTIONS WITOUT A POLICY ADDRESSING MFTRP, ARE AUTOMATICALLY CLASSIFIED AS "PROHIBITED" UNDER OUSD(R&E) "POLICY ON RISK-BASED SECURITY REVIEWS ON FUNDAMENTAL RESEARCH"**

* The term "Confucius Institute" means a cultural institute directly, or indirectly, funded by the Government of the People's Republic of China.

1. Any changes to covered individuals will require submission of the Common Disclosure Forms, a security-based risk assessment, and approval by the contracting officer and program manager.
2. Security-based risk assessments will also be conducted if changes to covered individuals reporting criteria are reflected in the Research Performance Progress Reports.
3. To the greatest extent practicable, DARPA will work with the performer to ensure that if the risk is able to be mitigated, it will make every effort to do so. If the performer refuses to, or is unable to mitigate the identified risks, it may result in a denial of award.
4. Performers who have their fundamental research proposal rejected due to the risk-based security review process, or the inability to come to an agreement concerning proposed mitigation strategies may challenge DARPA's risk-based security review decision. In that instance, DARPA shall refer the challenge to the OUSD(R&E) for mediation.
5. This process, to include negotiation of risk mitigation measures, is not to be considered as part of the time-to-award.

6. Failure of the performer or recipient to reasonably exercise due diligence to discover or ensure that neither it nor any of its Covered Individuals are involved in the subject award are participating in a Malign Foreign Government Talent Program or have a Foreign Component with FCOC or FCOC connected entity, may result in the Government exercising remedies in accordance with federal law and regulation.
    1. If, at any time, during performance of this research award, the performer or recipient should learn that it, its Covered Individuals, or applicable team members or subtier performers on this award are or are believed to be participants in a malign foreign government talent program or exhibiting behaviors/actions identified in the DoD Component Decision Matrix (i.e. funding from a FCOC or FCOC connected entity, patents resulting from U.S. government funded research that were filed with a FCOC or on behalf of a FCOC connected entity, and associations or affiliations with foreign government connected entities), the performer or recipient will notify the Government Contracting Officer or Agreements Officer within 5 business days.
        - This disclosure must include specific information as to the personnel involved and the nature of the situation and relationship. The Government will have 30 business days to review this information and conduct any necessary fact-finding or discussion with the performer or recipient.
        - Such disclosure could result in a termination of award at the government's discretion.
        - If the University receives no response from the Government to its disclosure within 30 business days, it may presume that the Government has determined the disclosure does not represent a threat.
    2. The performer or recipient must flow down this provision to any subtier contracts or agreements involving direct participation in the performance of the research.

DARPA's analysis and assessment of affiliations and associations of Covered Individuals is compliant with Title VI of the Civil Rights Act of 1964. Information regarding race, color, or national origin is not collected and does not have bearing in DARPA's assessment. Performers with proposals selected for negotiation that have been assessed as having potential undue foreign influence risk factors, as defined by the DoD Decision Matrix, will be given an opportunity during the negotiation process to mitigate the risk. DARPA reserves the right to request any follow-up information needed to assess potential risk factors or proposed risk mitigation strategies.

1. Definitions: Definitions can be found in the USD(R&E) "Policy for Risk Based Security Reviews of Fundamental Research", June 8, 2023 (or as it is amended).

Proposers should indicate in their proposal whether they believe the scope of the research included in their proposal is fundamental or not. While proposers should clearly explain the intended results of their research, the Government shall have sole discretion to determine whether the proposed research shall be considered fundamental and to select the award instrument type. Appropriate language will be included in resultant awards for non

fundamental research to prescribe publication requirements and other restrictions, as appropriate. | Read this language

For certain research projects, it may be possible that although the research to be performed by a potential awardee is non-fundamental research, its proposed sub awardee's effort may be fundamental research. It is also possible that the research performed by a potential awardee is fundamental research while its proposed sub awardee's effort may be non-fundamental research. In all cases, it is the potential awardee's responsibility to explain in its proposal which proposed efforts are fundamental research and why the proposed efforts should be considered fundamental research.

The Decision Matrix to Inform Fundamental Research Proposal Mitigation Decisions found in OUSD(R&E) Countering Unwanted Influence in Department Funded Research at Institutions of Higher Education, dated Jun 29, 2023, has been updated and replaced by the new Decision Matrix found in the Memo "Introduction to the 2025 DoD Component Decision Matrix to Inform Fundamental Research Proposal Mitigation Decisions" – Dated May 5, 2025.

Proposers must submit the two forms listed below for all covered individuals, in addition to the volumes and required attachments specified elsewhere in this solicitation.

Form 1, Common Form for Biographical Sketch, available on the NSF.gov website. This form must be completed and submitted. To evaluate compliance with Title IX of the Education Amendments of 1972 (20 U.S.C. § 1681 et.seq.), the Department of Defense (DoD) is collecting certain demographic and career information to be able to assess the success rates of women who are proposed for key roles in applications in science, technology, engineering or mathematics disciplines. In addition, the National Defense Authorization Act (NDAA) for FY 2019, Section 1286, directs the Secretary of Defense to protect intellectual property, controlled information, key personnel, and information about critical technologies relevant to national security and limit undue influence, including foreign talent programs by countries that desire to exploit United States' technology within the DoD research, science and technology, and innovation enterprise. This requirement is necessary for all research and research-related educational activities. The DoD is using the form below to collect the necessary information to satisfy these requirements. Detailed instructions for each form are available on NSF.gov.

Form 2: Common Form for Current and Pending (Other) Support Information form, available on the NSF.gov website, will be used to collect the following information for all covered individuals, including Project Director/Principal Investigator and Co-Project Director/Co-Principal Investigator, whether or not the individuals' efforts under the project are funded by the DoD and any individual designated as a "covered individual" by the funding agency. The form includes 2 parts: Proposals and Active Projects; and the In-Kind Contributions. The biographical sketch and current and pending support are to be provided as attachments:

- Biographical Sketch: Mandatory for Project Directors (PD) and Principal Investigators (PI), and designated covered individuals; optional, but desired,

for all other key personnel. The biographical sketch should include information pertaining to the researchers:

1. Identifying Information
    a. ORCID Digital Persistent Identifier (DPI)

- Position Title
- Organization and Location
- Professional Preparation (education and training)
- Appointments and Positions
- Products
- Current and Pending Support: Mandatory for all covered individuals including the PD/PI. This attachment should include the following information:
    1. Proposals and Active Projects
        a. Source of Support
        b. Primary Place of Performance
        c. Active Project Start/End Date
        d. Total Anticipated Project Amount
        e. Person-Month(s) per year devoted to Active Project
        f. Overall Objectives
        g. Statement of Potential Overlap
    2. In-Kind Contributions
        a. Status of Support
        b. Receipt Date of In-Kind Contributions
        c. Source of Support
        d. Summary of In-Kind Contributions
        e. Person-Month(s) per year devoted to the In-Kind Contribution
        f. US Dollar Value of In-Kind Contribution
        g. Overall Objectives
        h. Statement of Potential Overlap
    3. Certification

Note, if DARPA receives an application without the required information, DARPA may determine that the application is incomplete and may cause your submission to be rejected and eliminated from further review and consideration under the solicitation. DARPA reserves the right to request further details from the applicant

before making a final determination on funding the effort.

8. PS Glossary

- A&AS: advisory and assistance services
- AI/ML: Artificial Intelligence/Machine Learning
- AMD: Advanced Micro Devices, Inc.
- API: Application Program Interface
- BAAT: Broad Agency Announcement Tool
- BTO: Biological Technologies Office
- CATH: Class, Architecture, Topology, and Homologous superfamily
- CD: Capability Demonstration
- CUI: Controlled Unclassified Information
- DARPA: Defense Advanced Research Projects Agency
- DOD: Department of Defense
- ELSI: Ethical, Legal, Social Impacts
- FA: Functional Areas
- FFRDCs: Federally Funded Research and Development Centers
- GO: Gene Ontology
- GPR: Government Purpose Rights
- GPU: Graphics Processing Unit
- IP: Intellectual Property
- IV&V: Independent Validation and Verification
- MCM: Medical Countermeasure
- MD: Molecular Dynamics
- NDA: Non-Disclosure Agreement
- NODES: Network of Optimal Dynamic Energy Signatures
- OCI: Organizational Conflicts of Interest
- OT: Other Transaction
- OPP: Oral Proposal Package
- PDB: Protein Data Bank
- PI: Principal Investigator
- pLDDT: predicted Local Distance Difference Test
- POC: Point of Contact
- PPE: Personal Protective Equipment
- PS: Program Solicitation
- Q&A: Question and Answer
- RAI: Responsible Artificial Intelligence
- SAM: System for Award Management
- SCOP: Structural Classification of Proteins
- SETA: Scientific, engineering, technical assistance
- SME: Subject Matter Expert
- TBD: To Be Determined

- TCD: Technical Clarification Document
- T&E: Test and Evaluation
- TR: Technical Representatives
- UARC: University-Affiliated Research Centers
- UEI: Unique Entity Identifier
- USG: United States Government
- WAWF: Wide Area Workflow