Broad Agency Announcement

Automated Discovery for Design and Control of Turbulent Systems (AutoDIDACTS)

Defense Sciences Office

HR001126S0008

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This publication constitutes a Broad Agency Announcement (BAA) as contemplated in Federal Acquisition Regulation (FAR) 6.102(d)(2) and 35.016 and 2 CFR § 200.203. Any resultant award negotiations will follow all pertinent law and regulation, and any negotiations and/or awards for procurement contracts will use procedures under FAR 15.4, Contract Pricing, as specified in the BAA.

OVERVIEW INFORMATION:

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- **Agency contact**

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SECTION I: FUNDING OPPORTUNITY DESCRIPTION

The Defense Advanced Research Projects Agency (DARPA) is soliciting innovative proposals for the data-informed development of generalizable models and principles for aeronautical design and the optimal control of turbulent systems. Proposed research should investigate innovative approaches that enable revolutionary advances in science, devices, or systems. Specifically excluded is research that primarily results in evolutionary improvements to the existing state of practice.

A. Introduction

AutoDIDACTS seeks to demonstrate and validate new data-informed paradigms for design exploration and optimization across various regimes of aeronautics and turbulent control problems of relevance to the Department of War (DoW). The principal objective of this program is to demonstrate the use of precision ground-truth experimental data to arrive directly at macroscale design principles and surrogate models that can guide aeronautical design in various regimes of relevance to the DoW. Of particular interest to this program is the development of data-informed design principles and models that combine high predictive accuracy with generalizability across wide parameter regimes, multi-parameter design optimization, and inverse design paradigms.

To achieve its objectives, AutoDIDACTS will require teams to combine expertise in (1) compact and tunable experimental simulators of turbulent flow phenomenology to generate precision ground-truth data, (2) data-informed techniques for discovery of predictive macroscale design principles and surrogate models, and (3) design and development in relevant topic areas for demonstrations of end-of-program challenge problems as described below.

B. Background and Limitations of the Current State of the Art

Despite the long-standing need for rapid and efficient means of exploration and optimization in aeronautical design, progress in this field has been stymied by key fundamental and technical limitations.

On the one hand, computational approaches to aeronautical design require exorbitant computing resources to obtain even modest levels of accuracy. As is well known, the requirements for direct numerical simulations (DNS) of the Navier-Stokes equation scale rapidly with increasing Reynolds numbers (Re) (as $O(Re^3)$). As such, these approaches are limited to modeling flow problems at low Re, far from the regimes of turbulence that are relevant to most aeronautical design problems. Coarse-grained models such as Large Eddy Simulations (LES) and Reynolds-averaged Navier Stokes (RANS) formalisms are limited by *ad hoc* and parameter-specific approximation techniques that degrade both computational accuracy and generalizability. At a fundamental level, these coarse-grained approaches are hindered by the intractable, and often unknown, microscopic mechanisms governing dissipation at the smallest scales as well as the strongly nonlinear and scale-invariant structure of turbulent flow problems. As a result, these approximation techniques perforce require the use of empirical, quasi-equilibrium, and linearized closure models that are ill-suited to describe the wide dynamic range of length, time, and energy scales that are relevant to the system. Due to these reasons, computational aerodynamic techniques are poorly suited to design exploration or multi-objective optimization across a wide parameter range.[1]

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[1] See, for example, E. Tinoco et al, *Progress towards CFD for full flight envelope*, Aero. J. 109, 451 (2005); K. Duraiswamy et al, *Status, emerging ideas and future directions of turbulence modeling research in aeronautics*,

On the other hand, empirical measurements in wind-tunnel facilities have their own set of limitations in the context of aeronautical design exploration. State-of-the-art (SoA) wind tunnels that can reproducibly create turbulent flow conditions at high Re and high Mach numbers (M) are prohibitively expensive to construct and maintain. The transient nature of measurements at these facilities also limits the quality and volume of data that can be accrued over the duration of a single experimental run. Often, the introduction of flow, pressure, or heat sensors on the flow surfaces alters the very nature of the turbulent flows they are intended to measure. Due to these effects, the interpretation of data often requires model-dependent calibrations, scaling functions, and correction factors. Lastly, the measurements of the flow fields are limited to 1-dimensional or 2-dimensional cross sections at select locations, and the acquisition of volumetric data is a prohibitive challenge. As a result of these limitations, such facilities have limited utility for design parameter exploration, rapid design refinement, or rigorous validation of designs for most applications relevant to high Re or large M flows.

More recent AI-based approaches have sought to amalgamate computational modeling with sparse empirical measurements through physics-informed neural networks, deep learning, neural operators, and other data-informed modeling algorithms. These approaches promise to be powerful techniques for learning hitherto unknown functional mappings between infinite dimensional spaces based on sparse experimental measurements. Despite the impressive growth of such approaches for design exploration and optimization, there remain key challenges that are yet to be addressed. For instance, the "black box" nature of these algorithms often makes it challenging to interpret the outcomes of these algorithms or to trace such outcomes to established scientific principles. The quality, precision, and volume of training data that are required to achieve a specified fidelity of predictive outcomes are often difficult to quantify, and inconsistent outcomes result from even minor modifications to the training data. A vast majority of such data-informed approaches have relied on computational 'data' as feedstock for the data-informed algorithms, thereby propagating the inherent flaws of the computational algorithms to the outcomes. Further, the predictions of these algorithms can depend crucially on the choice of the constraints, objective functions, and parametrization of the system – constraining the range, fidelity, and robustness of design exploration or multi-objective optimization.

As has been observed in multiple contexts across regimes of aeronautical design – from low-Re number design of micro-air vehicles (MAVs), to predictive modeling of transonic and unsteady flight regimes, to multi-objective optimization of supersonic or hypersonic vehicles – a common underlying theme across these aforementioned approaches has been the lack of accurate, predictive, and generalizable macroscale design principles that can guide design exploration and optimization. While heuristic design principles do exist in limited regimes, these are constrained in utility to early-stage conceptual analysis due to the numerous idealizations, approximations, and assumptions inherent to these principles.

As a cumulative result of the limitations of these various approaches, aeronautical design innovation has been largely constrained to incremental modifications of established designs and optimization over narrow regimes of operating conditions. This state of the field stands in stark contrast to the occasional, and often serendipitous, discovery of novel architectures such as the toroidal propeller and bio-inspired aeronautical designs with substantially enhanced aerodynamic

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NASA/TM-2017-219682 (2017); A. A. Giunta et al, *Multidisciplinary design optimization of advanced aircraft configurations*, MAD Center Report 96-06-01 and aeroacoustic properties beyond the conventional paradigms. These latter examples offer tantalizing glimpses of a large and unexplored space of aeronautical design innovation with significant performance enhancements over the current SoA. What is currently lacking is a systematic and formal set of predictive and generalizable design principles for the efficient exploration of this design space.

C. Program Description/Scope

Building upon recent successes in the data-informed development of accurate and generalizable microscale turbulence models,[2] AutoDIDACTS will enable the data-informed discovery of macroscale design principles and emergent surrogate models that can directly inform aeronautical design exploration and optimization without the intermediary bottleneck of computing microscopic velocity flows. While seminal heuristic principles of aeronautical design do exist, such as the lifting line theory, vortex lattice models, or the area rule, these models are currently limited in generalizability due to the numerous assumptions, constraints, and approximations underlying these principles. Proposers may orient their efforts in Phase I of this program either towards

(1) the development of macroscale design principles that are far more generalizable and exhibit greater predictive capability across flow regimes and boundary conditions or
(2) the development of predictive surrogate models that are amenable to design exploration and optimization across a wide class of airfoils, flow conditions, and multi-objective constraints

The program relies on the synthesis of the following insights – (1) the existence of universal, emergent principles governing macroscale design and control of turbulent flows, (2) the development of compact, highly tunable turbulence simulators to accrue large volumes of high-resolution multiscale data across orders of magnitude in parameter space, and (3) the use of such data for the automated discovery of macroscale design principles. We elaborate upon each of these aspects below.

(1) <u>Emergence of macroscale principles in complex scale-invariant dynamical systems</u>

A diverse range of physical systems exhibit simple, universal macroscale laws that emerge from complex microscopic dynamics. While examples of such emergence have been well known in systems such as complex electronic materials and other equilibrium systems, there is growing evidence that non-equilibrium and scale-invariant dynamical systems such as turbulent systems can also exhibit similar universal macroscale behavior.[3] Empirical evidence of such universal emergent laws has been observed in a range of turbulent flow systems spanning the subsonic, transonic, and supersonic regimes – in some cases, extending all the way down to the low

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[2] See solicitation DARPA-PA-23-03-13, *Automated Prediction Aided by Quantized Simulators (APAQuS)*, and references therein.

[3] H. Branover et al, *On the universality of large-scale turbulence*, Phys. Fluids 16, 845 (2004); C. Federrath, *On the universality of supersonic turbulence*, MNRAS 436, 1245 (2013); L. J. Souverein et al, *A scaling analysis for turbulent shock-wave/boundary-layer interactions*, J. Fl. Mech. 714, 505 (2013); Z. M. Boyd et al, *On the existence of self-similar converging shocks for arbitrary equations of state*, arXiv:1707.03792 (2017); J. M. Barros et al, *Universality in the small scales of turbulent Taylor-Couette flow*, Sci. Adv. 11, 45 (2025).

temperature regimes.[4] For instance, despite the astonishing complexity of microscopic turbulent flow phenomenology as a function of flow parameters and geometry, the macroscale reactive pressures, forces, and aerodynamic coefficients are found to be comparatively smooth, and universal functions of the same parameter space.[5] Deep operator networks and surrogate models have demonstrated the use of computational data to deduce macroscale aeronautical parameters such as lift, drag, and pressure distributions around an airfoil without the intermediary step of inferring flow fields.[6] These empirical observations potentially allow for new perspectives on design and control of turbulent systems. Rather than arriving at macroscale aerodynamic parameters through computationally intensive modeling of complex microscale flow structures of a turbulent fluid surrounding a structure, these macroscale parameters can potentially be extracted directly via functional discovery of emergent macroscale laws that are parametrized by relatively few control parameters. Formally, this is equivalent to creating a "model of models" latent space (akin to concepts related to the renormalization group (RG) across various fields of physics) that encapsulates how the dynamics of aeronautical structures evolve with changing control parameters, morphing geometries, and coarse-grained flow parameters such as the Reynolds number and the Mach number. In contrast to the conventional view of the turbulent fluid as the 'system' and the aeronautical structure as a 'boundary condition', this latter perspective focuses on the macroscale structure and its dynamics in the presence of the surrounding fluid.

(2) Tunable and compact turbulence simulators for acquiring precision flow data

As mentioned earlier, a key implication of the universal nature of turbulent flow phenomenology is the potential ability to deduce design principles and macroscale aerodynamic parameters in a system of interest (e.g., shock wave-induced phenomenology near the surface of a hypersonic vehicle) by studying a different, more experimentally amenable physical systems within the same universality class (e.g., shock-wave dynamics in a low temperature atomic gas that is tuned to similar parameter regimes). Furthermore, the objectives of data-informed functional discovery and modeling will require accurate experimental data with rigorous calibration and uncertainty quantification. To achieve the ambitious goals of the AutoDIDACTS program, a key enabling capability will be the realization of compact, widely tunable turbulence simulators capable of accruing large volumes of precision ground-truth experimental data across wide parameter regimes of flow conditions.

In this context, the simulation and measurement capabilities of tabletop turbulence simulators have grown rapidly in a range of classical and quantum systems. Experimental platforms including ultracold atomic gases, superfluid Helium films, optical fluids in nonlinear and turbid media, and

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[4] Hernandez-Rajkov et al, *Connecting shear flow and vortex array instabilities in annular atomic superfluids*, Nature Phys. 20, 939 (2024); L. Dogra et al, *Universal equation of state for wave turbulence in a quantum gas*, Nature 620, 521 (2023); M. Christenhusz, A. Safavi-Naini, T. Neely, M. Reeves, *Emergent Universal Drag Law in a model of superflow*, Phys. Rev. Lett. 135, 066001 (2025); R. Dubessy et al, *Universal shock-wave propagation in one-dimensional Bose fluids*, Phys. Rev. Res. 3, 013098 (2021).

[5] See, for example, D. Durante et al, *Bifurcations and chaos transition of the flow over an airfoil at low Reynolds number varying the angle of attack*, Comm. Non. Sci. Numer. Simul. 89, 105285 (2020); L. Ding et al, *Acceleration is key to drag reduction in turbulent flow*, PNAS 121, e2403968121 (2024).

[6] X. Du et al*, Rapid airfoil design optimization via neural-networks-based parameterization and surrogate modeling*, Aerosp. Sci. Tech. 113, 106701 (2021); T. Zhao et al, *Learning mapping from iced airfoils to aerodynamic coefficients using a deep operator network*, J. Aerosp. Eng. 36, 04023035 (2023); K. Shukla et al, *Deep operator learning-based surrogate models for aerothermodynamic analysis of AEDC hypersonic waverider*, arXiv:2405.13234 (2024).

classical mesoscale turbulence simulators have been used to demonstrate turbulent phenomenology. Experimental studies on such systems have established close phenomenological similarities in scaling laws, dualities, and universality classes of turbulent behavior across a wide span of spatial and energetic scales.[7] In addition to enabling the acquisition of data at much higher volumes than would be accessible in conventional wind-tunnel facilities, such tabletop turbulence simulators also offer additional attributes including (1) a large accessible parameter space of effective Re and M by tuning interactions, dimensionality, and/or geometry of the system; (2) imposition of optical or other dynamically tunable fields to modify boundary conditions and flows; (3) accurate measurement capabilities including real-time tracking of excitations, shock waves, and other dynamical phenomenology; and (4) the ability to measure and track higher-order spatiotemporal correlations within the turbulent fluid. These attributes can enable new capabilities for data-informed discovery and model extraction for a large class of turbulent problems.

While computational techniques may be used to augment such ground truth experimental data, proposed approaches of modeling and functional discovery of design principles that rely exclusively on computational data will be compromised by the fidelity, dynamic range, and implicit limitations of the computational models. As such, modeling and data-informed approaches that rely exclusively on computational data may be deemed non-conforming and removed from consideration for award.

(3) Automated learning and functional discovery of emergent laws using experimental data

The third aspect of the AutoDIDACTS program concept relies on the use of AI-based data-informed techniques for the functional discovery of design principles and surrogate models. To date, techniques including Machine Learning (ML), Reinforcement learning, physics-informed neural networks, deep operator networks and related concepts have proved to be powerful enabling techniques for learning functional mappings between infinite dimensional spaces, even extending to highly nonlinear and scale-invariant systems. At the microscale, these techniques have been used for high-fidelity computations of sub-grid refinements to LES models, the discovery of parsimonious governing equations for chaotic few-body dynamics, the automated discovery of generalized solutions to partial differential equations such as the Navier-Stokes equation, and the use of neural networks to develop generalizable closure models for RANS transport equations.[8]

In the context of this program, key recent innovations have included the use of neural operators to learn macroscale maps between high-dimensional data spaces and lower-dimensional functional spaces, use of ML techniques to learn complex phase diagrams and stability portraits from sparse

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[7] See, for example, T. L. Ho et al, *Energy cascade in quantum gases*, arXiv:1611.00062; M. T. Reeves et al, *Identifying a superfluid Reynolds number via dynamical similarity*, Phys. Rev. Lett. 114, 155302 (2015); M. Prufer et al, *Observation of universal dynamics in a spinor Bose gas far from equilibrium*, Nature 563, 217 (2018); S. Helmrich et al, *Signatures of self-organized criticality in an ultracold atomic gas*, Nature 577, 481 (2020); L. Dogra et al, *Universal equation of state for wave turbulence in a quantum gas*, Nature 620, 521(2023); O. R. Stockdale et al, *Universal dynamics in the expansion of vortex clusters in a dissipative two-dimensional superfluid*, Phys. Rev. Res. 2, 033138 (2020); D. Hernandez-Rajkov et al, *Universality of the superfluid Kelvin-Helmholtz instability by single-vortex tracking*, arXiv:2303.12631; D. Donzis et al, *Universality and scaling in compressible turbulence*, arXiv:1907.07871 (2019).

[8] See, for example, N. Farenga, S. Fresca, A. Manzoni, *On latent dynamics learning in nonlinear reduced order modeling*, Neural Net. 185, 107146 (2025); K. Shukla et al, *Deep neural operators as accurate surrogates for shape optimization: a case study for airfoils*, Eng. Appl. Art. Int. 129, 107615 (2024); K. Champion et al, *Data-driven discovery of coordinates and governing equations*, PNAS 116, 22445 (2019).

data obtained from tabletop quantum simulators, the use of physics-informed neural networks to predict instabilities in high-speed turbulent flows, and the use of deep operator networks to develop surrogate models for rapid design optimization.[9] Intriguingly, recent results on data-informed modeling and optimization also suggest the possibility of inverse design paradigms wherein optimal airfoils or other aeronautical structures can be deduced by working backwards from the desired macroscale aerodynamic properties.[10] The rigorous demonstration and validation of such inverse design paradigms would be a transformative advance on aeronautical design. As such, a deeper understanding of the fidelity and limitations of inverse design as applied to aeronautics is an important objective of this program.

A key extant limitation of the data-informed models in most of the previous examples is the limited interpretability and traceability of model predictions to established scientific and aeronautical principles. The opaque nature of the data-informed models also makes it challenging to quantify the range of applicability of these models. However, combining such data-informed functional discovery with symbolic regression techniques offers a path to extrapolate or connect these models to analytical models in tractable regimes. As a simple illustration, a data-informed model capable of predicting and optimizing aerodynamic coefficients of an airfoil in the low-Re, unsteady regime should, in the inviscid and incompressible limit at higher-Re, converge to the predictions of the Kutta-Joukoski theorem and lifting line theory. Proposals should contain a thorough discussion of how their data-informed approaches can be amenable to similar analytic extrapolations and interpretability.

D. Program Structure

AutoDIDACTS is a 48-month program broken into two phases: a 24-month Phase I base period and a 24-month Phase II period for the demonstration of challenge problems that will be specified in a future solicitation. This BAA is soliciting proposals for Phase I only. Phase II Rough Order of Magnitude (ROM) information is being requested for planning purposes. The program is structured as follows:

Phase I (24 months) will focus on the development and accumulation of precision ground-truth data in the proposed regimes of parameter space and the use of such data to develop macroscale principles and surrogate models. During this period, performers will:

- Develop, calibrate, and demonstrate the acquisition of precision ground-truth flow data using high-throughput turbulence simulators

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[9] See, for example, N. Kovachki et al, *Neural operators: learning maps between function spaces with applications to PDEs*, J. Mach. Learn. Res. 24, 1, (2023);); C. Miles et al, *Machine learning discovery of new phases in programmable quantum simulator snapshots*, Phys. Rev. Res. 5, 013026 (2023); P. Di Leoni et al, *Neural operator prediction of linear instability waves in high-speed boundary layers*, J. Comp. Phys. 474, 111793 (2023); Q. Zhang, D. Krotov, G. E. Karniadakis, *Operator learning for reconstructing flow fields from sparse measurements: an energy transformer approach*, arXiv:2501.08339 (2025); Z. Chen et al, *Physics-informed learning of governing equations from scarce data*, Nature Comm. 12, 6136 (2021); X. Du et al, *Rapid airfoil design optimization via neural-networks-based parameterization and surrogate modeling*, Aerosp. Sci. Tech. 113, 106701 (2021); G. Catalani et al, *Neural fields for rapid aircraft aerodynamics simulations*, Sci. Rep. 14, 25496 (2024); B. Corban et al, *Discovering optimal flapping wing kinematics using active deep learning*, J. Fluid Mech. 974, A54 (2023); T. Dussauge et al, *A reinforcement learning approach to airfoil shape optimization*, Sci. Rep. 13, 9753 (2023).

[10] See, for example, P. Karnakov et al, *Solving inverse problems in physics by optimizing a discrete loss: fast and accurate learning without neural networks*, PNAS 3, 1, 2024; Zhang et al, *Effect of turbulence closure consistency on airfoil identification*, arXiv:2511.08341 (2025).

- Develop algorithms for the automated discovery of macroscale principles and surrogate models using such data
- Demonstrate the accuracy and generalizability of the developed models as per the Phase I metrics below.

The performance metrics for the data-informed design principles and surrogate models are given below. The performance of the developed principles and models will be assessed by Government independent verification and validation (IV&V) teams using a combination of computational fluid dynamics (CFD) techniques and wind-tunnel measurements. For instance, proposers who develop generalized extensions of lifting line theories to predict aerodynamic performance in unsteady flow regimes will be assessed by (1) comparisons of the predictions of these theories to CFD results on government-specified airfoils and/or (2) experimental measurements on SOA wind tunnel facilities.

Phase I metrics	
Generalizability of models and/or design principles	>100x in parameter space[11]
Model Accuracy[12]	>95%

In addition, teams should also propose an intermediate demonstration at the end of Year 1 as a preliminary validation of their approach. This intermediate demonstration can take the form of performer-defined benchmarks, a demonstration of universality that connects their data and models to operationally relevant regimes, and/or a design/performance prediction as a preliminary validation of their Phase I efforts. Performers may choose to validate this preliminary demonstration via CFD computations, empirical data, extant data from literature, or a combination thereof.

Progress under the program will be assessed against the metrics enumerated above and by the potential capability of the proposed efforts to demonstrate beyond-SoA capabilities in DoW-relevant applications. Program reviews will occur at Months 11 and 20 to assess performer progress against Phase I metrics and facilitate DARPA's Phase II selection decisions. Selection for Phase II will be contingent upon findings in Phase I and the availability of funds.

Phase II (24 months) will develop and demonstrate innovative solutions to challenge problems whose metrics will be released in a forthcoming solicitation. Brief descriptions of potential topic areas are provided in the next section for informational purposes and for aligning Phase I proposals with these topic areas. Phase I proposals should specify the topic area that will be the focus of their Phase II effort and provide a justification of their proposed Phase I approach and teaming arrangements in the context of their Phase II focus. In addition, Phase I proposals should also include a rough order of magnitude (ROM) cost for Phase II.

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[11] For the purposes of this solicitation, the range of parameter space can depend on the particular application, topic area of the challenge problems, or scope of the proposed effort. This can be interpreted to include generalizability across variations of a single parameter (e.g. Reynolds number, turbulence structure function etc.) or a combination of parameters (e.g. Mach Number x Specific Impulse etc.).

[12] For the purposes of this solicitation, the model accuracy will be determined by independent government teams via comparisons to direct numerical simulations (DNS), calibrated measurements in established wind-tunnel facilities, and a combination thereof.

Phase II Milestones and Deliverables are to be determined and will be released in a forthcoming solicitation.

Proposals responding to this announcement must address all the goals of Phase I of the AutoDIDACTS program; partial solutions will not be considered.

DARPA will evaluate the findings and results from Phase I, along with stated program objectives and mission needs, to determine the most appropriate method for identifying and selecting performers for Phase II.

Participation in Phase I neither guarantees nor precludes selection for Phase II of the AutoDIDACTS program. Phase I participation is not required for consideration for Phase II. DARPA will carefully evaluate the findings and results from Phase I, along with stated program objectives and mission needs, to determine the most appropriate method for identifying and selecting performers for Phase II. Potential approaches include, but are not limited to, issuing a forthcoming Phase II solicitation or announcement, leveraging rapid acquisition marketplaces such as ERIS or Tradewinds, or other methods deemed suitable. DARPA retains full discretion in determining the Phase II selection process and will provide additional details during Phase I.

E. Technical Areas

As stated in Section I.A the primary focus of AutoDIDACTS is the data-informed discovery of macroscale design principles and emergent surrogate models that can directly inform aeronautical design exploration and optimization. Key challenges to be addressed include:

- Rigorous uncertainty quantification and assimilation of ground-truth experimental data into AI-based training models
- Interpretability of the macroscale design principles and surrogate models in terms of established scientific principles
- Demonstration of universality (or rigorous bounds on the generalizability) of the macroscale design principles and surrogate models

Proposers must consider these programmatic objectives when justifying their proposed approach for Phase I of the program. Proposers must provide a description of their approach to include the details of their turbulence simulator and acquisition of ground truth data for training their data-informed models (as applicable),[13] the algorithms that will be employed to construct their macroscale surrogate models and design principles, the manner in which the accuracy and generalizability of these models will be evaluated, and the interpretability of these models, i.e., the manner in which the predictions of these models can be traced back to fundamental principles.

At a minimum, proposals must include:

- A description of the proposed approach, the required research and development efforts, and a description of what will be developed and demonstrated during the period of the program
- A justification of how the proposed data-informed modeling enables generalizability, interpretability, and design optimization in the proposed regimes

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[13] Ideally, teaming arrangements should incorporate expertise in tabletop turbulence simulators to obtain the requisite data for the modeling efforts. Teams that do not include such expertise should clarify how they propose to obtain such experimental ground truth data to inform their modeling efforts.

- A discussion of whether the proposed data-informed modeling is compatible with incremental and self-consistent inclusion of multi-physics models for multi-objective optimization and inverse design paradigms
- An identification of risks associated with the proposed approach (such as development and use of the turbulence simulators to accrue precision data, uncertainty quantification, assimilation of the training data into the model-development algorithms, and interpretability of the trained models). Risk mitigation strategies must be adequately described with clear statements of how the proposed research plan addresses the dominant risks early in the program.
- Proposers must identify an end-of-Year-1 demonstration as a preliminary validation of their proposed approach. This intermediate demonstration can take the form of performer-defined benchmarks, a demonstration of universality that connects their data and models to operationally relevant regimes, and/or a design/performance prediction that can be validated either via CFD computations, empirical data, extant data from literature, or a combination thereof.
- Proposers must identify a topic area for the Phase II challenge problems (see below) that is most suited to their approach and justify how their proposed approach and teaming arrangements are suitable to addressing the identified topic area. Proposals must include a ROM cost for Phase II.
- Lastly, proposers must clearly delineate approaches and justifications for meeting the program goals and metrics.

Performers who are successful in validating their design principles and surrogate models per Phase I metrics may progress to specific challenge problems whose metrics will be released in a forthcoming solicitation. For purposes of proposal development and planning, we provide a brief description of potential topic areas for these challenge problems in different flow regimes.

1. Low-Re regimes

Micro-air vehicles and other aeronautical structures that operate in the low-Re regime are currently constrained by issues including the unsteady nature of flow conditions, boundary layer separation, drag divergence, and poor aerodynamic efficiency.[14] At present, the modeling, design, and optimization of MAVs pose fundamental challenges related to the poorly understood aeronautical principles in this regime. While an extensive range of passive and active control mechanisms have been explored to address this challenge, it remains the case that the relevant performance figures of merit of MAVs are significantly inferior to their higher Re counterparts. Challenge problems in this topic area may include the demonstration of MAVs with specified hover endurance, aerodynamic efficiency, aeroacoustic optimization, and related performance enhancements.

2. Transonic and transitional flow regimes:

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[14] See, for example, P. Lissaman, *Low Reynolds number airfoils*, Ann. Rev. Fluid Mech. 15, 223 (1983); D. J. Pines et al, *Challenges facing future micro-air-vehicle development*, J. Aircraft, 43, 290 (2005); M. Ramaswamy et al, *Understanding the aerodynamic efficiency of a hovering micro-rotor*, J. Am. Heli. Soc. 53, 412 (2008); D. Florianu et al, *Science, technology and the future of small autonomous drones*, Nature, 521, 460 (2015); D. Greenblatt et al, *Flow control for unmanned air vehicles*, Ann. Rev. Fluid. Mech. 54, 383 (2021); J. Li et al, *Low-Reynolds-number airfoil design optimization using deep-learning-based tailored airfoil modes*, Aero. Sci. Tech. (2022); W. J. F. Koning et al, *On improved understanding of airfoil performance evaluation methods at low Reynolds numbers*, J. Aircraft, 60, 774 (2023).

The transonic regime is another area that is currently in need of predictive and accurate design principles. In this regime, the combination of subsonic and supersonic flows, shock wave-boundary layer interactions, dual and competing roles of inviscid and viscous flow contributions, and other factors lead to highly complex and nonlinear flow phenomenology that has remained resistant to predictive and generalizable models.[15] Challenge problems in this topic area may include the demonstration of passive, active, and/or adaptive techniques to mitigate transonic buffet, aeroelastic surrogate models with improved predictive capabilities in unstable regimes, and low-latency optimal control techniques for expanded flight envelopes.

3. Supersonic and hypersonic flow regimes:

Open questions in these extreme regimes include long-standing challenges in modeling shock wave-boundary layer interactions and associated instabilities, predictive modeling of boundary layer transitions, and accurate aero-thermo-elastic modeling.[16] Challenge problems in this topic area may include the development of predictive modeling for improved design of stable propulsion mechanisms, optimization of structures for improved aerodynamic performance, and design of active control techniques for improved aeronautical performance.

4. Optimal protocols for over-the-air optical communications and signal processing:

Over-the-air optical techniques for high bandwidth communications, imaging, and time synchronization are each limited in performance by the inability to accurately model the effects of atmospheric turbulence.[17] Challenge problems in this topic area may include the development of improved predictive models of the effects of turbulence for low-light imaging and the development of optimal protocols for high-bandwidth communication and precision time transfer in the optical and microwave domains.

It is anticipated that successful demonstrations of the AutoDIDACTS program concept can engender wide-ranging applications to a variety of aeronautical design and turbulence control problems. As such, it should be noted that the topic areas mentioned above are not an exhaustive list. Proposers are encouraged to propose additional topic areas for potential Phase II

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[15] See, for example, Gianellis et al, *A review of recent developments in the understanding of transonic shock buffet*, Prog. Aerospace. Sci. 92, 39 (2017); Y. Kojima et al, *Resolvent analysis on the origin of two-dimensional transonic buffet*, J. Fluid. Mech. 885, 1 (2020); A. Hartmann et al, *On the interaction of shock waves and sound waves in transonic buffet flow*, Phys. Fluids, 25, 026101 (2013); J. P. Eastwood et al, *Toward designing with three-dimensional bumps for lift/drag improvement and buffet alleviation*, AIAA 50, 2882 (2012); C. Gao et al, *Active control of transonic buffet flow*, J. Fluid Mech. 824, 312 (2017); E. Lagemann et al, *Towards extending the aircraft flight envelope by mitigating transonic airfoil buffet*, Nature Comm. 15, 5020 (2024).

[16] See, for example, P. Raje et al, *Recent developments and research needs in turbulence modeling of hypersonic flows*, arXiv:2412.13985 (2025) and references therein; E. T. Curran et al, *Fluid phenomena in scramjet combustion systems*, Ann. Rm. Fluid Mech. 28, 18 (1996); J. Chang et al, *Recent research progress on unstart mechanism, detection, and control of hypersonic inlet*, Prog. Aerosp. Sci. 89, 1 (2017).

[17] See, for example, S. H. Chan et al, *Computational imaging through atmospheric turbulence* (2023); T. J. Karr, *Atmospheric phase error in coherent laser radar*, IEEE Trans. Ant. Prop. 55, 1122 (2007); H. Bergeron et al, *Tight real-time synchronization of a microwave clock to an optical clock across a turbulent air path*, Optica 3, 441 (2016); C. Robert et al, *Impact of turbulence on high-precision ground-satellite frequency transfer with two-way coherent optical links*, Phys. Rev. A 93, 033860 (2016); W. Swann et al, *Measurement of the impact of turbulence anisoplanatism on precision free-space optical time transfer*, Phys. Rev. A 99, 023855 (2019); S. Chen et al, *Sub-picosecond timing fluctuation suppression in laser-based atmospheric transfer of microwave signal using electronic phase compensation*, Opt. Commun. 401, 18 (2017).

demonstrations if they believe that particularly compelling applications in DoW-relevant areas would be enabled by their proposed Phase I effort.

F. Schedule and Milestones

Proposers should specify the research and technology development schedule for the entirety of Phase I, with a ROM cost and schedule for Phase II. The Statement of Work (SoW) for Phase I must provide a detailed task breakdown, citing specific tasks and interim milestones and metrics, as applicable. Proposers must provide a technical and programmatic strategy that conforms to the Phase I schedule and present an aggressive plan to fully address the program goals, metrics, milestones, and deliverables. The task structure should be consistent across the proposed schedule, SoW, and cost volume.

A target start date of September 2026 may be assumed for planning purposes. Schedules will be synchronized across performers, as required, and monitored/revised as necessary throughout the program.

All proposals must include the following meetings and travel in the proposed schedule and costs:

- To continue integration and development across the program, foster collaboration between teams, and disseminate program developments, a two-day Principal Investigator (PI) meeting will be held approximately every six months with locations split between the east and west coasts of the United States. For budgeting purposes, plan for eight two-day meetings over the course of 48 months: four meetings in the Washington, D.C., area and four meetings in the San Francisco, California, area.
- Regular teleconference meetings will be scheduled with the Government team for progress reporting, problem identification, and mitigation. Proposers should anticipate at least one site visit per phase by the DARPA Program Manager, during which they will have the opportunity to demonstrate progress towards agreed-upon milestones.

G. Deliverables

Performers will be expected to provide, at a minimum, the following deliverables:

- Comprehensive quarterly technical reports are due within ten days of the end of the given quarter, describing progress made on the specific milestones as required in the SoW.
- A phase completion report submitted within 30 calendar days at the end of each phase, providing a comprehensive summary of the research done.
- Other negotiated deliverables specific to the objectives of the individual efforts. These may include registered reports; experimental protocols; algorithms; publications; data management plan; intermediate and final versions of software libraries, code, and APIs, including documentation and user manuals; and/or a comprehensive assemblage of design documents, models, modeling data and results, and model validation data.
- Reporting requirements for technical and financial reports as specified in the award document; and mandatory requirements for patent reports and notifications to be submitted electronically through e-Edison (https://www.nist.gov/iedison).

H. Other Program Objectives and Considerations

1. Collaboration

Throughout the course of the program, it is likely to be necessary for all performers to share relevant information regarding their research and development to support the larger program goals (see Attachment H for more information). DARPA expects all program performers to work collaboratively with each other to realize the program objectives outlined herein, so proposers should carefully review the goals for the entire program in order to fully understand the context of each program objective within the overall program structure. All proposals should describe plans for ensuring transparency of their processes to enable interactions with other program performers as well as government teams responsible for independent verification and validation (IV&V) of their results. Proposals that fail to include these plans may be deemed non-conforming and removed from consideration for award.

SECTION II: EVALUATION CRITERIA

Proposals will be evaluated using the following criteria listed in **descending order of importance**. Overall Scientific and Technical Merit; Potential Contribution and Relevance to the DARPA Mission; and Cost and Schedule Realism.

- **Overall Scientific and Technical Merit**: The proposed technical approach is innovative, feasible, achievable, and complete. Detailed technical rationale is provided delineating why the proposed approach can achieve the program goals and metrics. The proposed technical team has the expertise and experience to accomplish the proposed tasks. Task descriptions and associated technical elements provided are complete and logically sequenced, with all proposed deliverables clearly defined so the final outcome of the award's work achieves the goal. The proposal identifies major technical risks, and planned mitigation efforts are clearly defined and feasible.
- **Potential Contribution and Relevance to the DARPA Mission**: The potential contributions of the proposed effort bolster the national security technology base and support DARPA's mission to make pivotal early technology investments that create or prevent technological surprise. The proposed intellectual property restrictions (if any) will not significantly impact the Government's ability to transition the technology.
- **Cost and Schedule Realism**: The proposed costs and schedule are realistic for the technical and management approach and accurately reflect the technical goals and objectives of the solicitation. All proposed labor, material, and travel costs are necessary to achieve the program metrics, are consistent with the proposer's Statement of Work, and reflect a sufficient understanding of the costs and level of effort needed to successfully accomplish the proposed technical approach. The costs for the prime proposer and proposed subawardees are substantiated by the details provided in the proposal (e.g., the type and number of labor hours proposed per task, the types and quantities of materials, equipment and fabrication costs, travel, and any other applicable costs and the basis for the estimates). It is expected that the effort will leverage all available, relevant, prior research to obtain the maximum benefit from the available funding. For proposals containing cost share, the proposer has provided sufficient rationale regarding the appropriateness of the cost share arrangement, relative to the objectives of the proposed solution (e.g., high likelihood of commercial application, etc.). The proposed schedule aggressively pursues performance metrics in an efficient time frame that accurately accounts for the anticipated workload. The proposed schedule identifies and mitigates any potential schedule risk.

Unless otherwise specified in this announcement, for additional information on how DARPA reviews and evaluates proposals through the Scientific Review Process, please visit: Proposer Instructions: General Terms and Conditions.

SECTION III: SUBMISSION INFORMATION

- This announcement allows for multiple award instrument types to be awarded to include Procurement Contracts, Cooperative Agreements, and Other Transaction Agreements for Research. Some award instrument types have specific cost-sharing requirements. The following websites are incorporated by reference and contain additional information regarding overall proposer instructions, general terms and conditions, and each specific award instrument type.

  Proposers must review the following links:

  - **Proposer Instructions: General Terms and Conditions**: https://www.darpa.mil/about/offices/contracts-management/proposer-general-terms
  - **Procurement Contracts**: https://www.darpa.mil/about/offices/contracts-management/proposer-procurement
  - **Cooperative Agreements**: https://www.darpa.mil/about/offices/contracts-management/proposer-grants
  - **Other Transaction Agreements**: https://www.darpa.mil/about/offices/contracts-management/proposer-transactions

- All technical, contractual, and administrative questions regarding this notice must be emailed to **AutoDIDACTS**@darpa.mil. Emails sent directly to the Program Manager, or any other address, may result in a delayed or no response. DARPA will attempt to answer all questions in a timely manner and post a “Frequently Asked Questions” document on the DARPA website. This will be updated on an ongoing basis until the closing date listed above.

- This announcement contains an abstract phase. Abstracts are strongly encouraged but not required. Abstracts are due no later than the date and time stated in the Overview section. Additional instructions for abstract submission are contained within Attachments A and B.

- Full proposals are due no later than the date and time stated in the Overview section.

- **Attachments C, D, E, and F** contain specific instructions and templates and constitute a full proposal submission for proposers requesting a Procurement Contract.

- **Attachments C, D, E, F, and G** contain specific instructions and templates and constitute a full proposal submission for proposers requesting an Other Transaction for Research Agreement.

- **Attachments C, D, and F** contain specific instructions and templates and constitute a full proposal submission for proposers requesting a Cooperative Agreement. Proposers requesting a Cooperative Agreement must also complete the SF424 (R&R) Budget form through Grants.gov.

- Proposers requesting Procurement Contracts or Other Transaction Agreements must submit proposals through the Broad Agency Announcement Tool (visit Proposer Instructions: General Terms and Conditions for instructions). For proposers requesting a Cooperative Agreement, proposals must be submitted through Grants.gov (visit Proposer Instructions: Grants/Cooperative Agreements for instructions).

- **BAA Attachments**:
  - **(required if submitting an abstract) Attachment A**: Abstract Summary Slide Template
  - **(required if submitting an abstract) Attachment B**: Abstract Instructions and Template
  - **(required) Attachment C**: Proposal Summary Slides Template
  - **(required) Attachment D**: Proposal Instructions and Volume I Template (Technical and Management)
  - **(required for proposers requesting Procurement Contracts or Other Transaction Agreements) Attachment E**: Proposal Instructions and Volume II Template (Cost)
  - **(required) Attachment F**: DARPA Cost Proposal Spreadsheet
  - **(required for proposers requesting Other Transaction Agreements) Attachment G**: Model Other Transaction Agreement
  - **(reference) Attachment H**: Associate Contractor Agreement (ACA)

This table is a guide for which documents are required for the different contract types.

Attachment/Contract type	**Procurement**	**OT Research: Non-Fundamental**	**OT Research: Fundamental**	**Cooperative Agreement**
Attachment C (Slides)	X	X	X	X
Attachment D (Vol. I)	X	X	X	X
Attachment E (Vol. II)	X	X	X	
Attachment F (Excel) (for prime ***and*** all subs)	X	X	X	X
Attachment G (Model OT)		X	X	
SF424				X
Biographical Sketch (for all key personnel)			X	X
Current/Pending Support (for all key personnel)			X	X
Submission Method:	BAAT	BAAT	BAAT	Grants.gov

SECTION IV: SPECIAL CONSIDERATIONS

- This announcement, stated attachments, and websites incorporated by reference constitute the entire solicitation. In the event of a discrepancy between the announcement, attachments, or websites, the announcement takes precedence.
- All responsible sources capable of satisfying the Government's needs, including both U.S. and non-U.S. sources, may submit a proposal that shall be considered by DARPA. Historically Black Colleges and Universities, Small Businesses, Small Disadvantaged Businesses and Minority Institutions are encouraged to submit proposals and join others in submitting proposals; however, no portion of this announcement will be set aside for these organizations' participation due to the impracticality of reserving discrete or severable areas of this research for exclusive competition among these entities. Non-U.S. organizations and/or individuals may participate to the extent that such participants comply with any necessary nondisclosure agreements, security regulations, export control laws, and other governing statutes applicable under the circumstances.
- As of the time of publication of this solicitation, all proposal submissions are anticipated to be unclassified.
- This program is subject to Attachment **H**: Associate Contractor Agreement.
- University-Affiliated Research Centers (UARCs), Federally Funded Research and Development Centers (FFRDCs), Government Entities, and National Laboratories

Due to their specialized roles and longstanding regulatory relationships with the Government, Federally Funded Research and Development Centers (FFRDCs), University Affiliated Research Centers (UARCs), and Government Entities to include National Laboratories present potential conflicts and advantages that would compromise fair and open competition. These entities typically may only receive funding through existing awards they hold with their sponsoring agencies. If these entities are proposed as subawardees, their costs must be clearly segregable in cost proposals. If scientifically merited, DARPA may fund work proposed by these entities with the following caveats:

  - FFRDCs: (1) FFRDCs must clearly demonstrate that the proposed work is not otherwise available from the private sector. (2) FFRDCs must provide a letter, on official letterhead from their sponsoring organization, that (a) cites the specific authority establishing their eligibility to propose to Government solicitations and compete with industry, and (b) certifies the FFRDC's compliance with the associated FFRDC sponsor agreement's terms and conditions. DARPA, under this solicitation, will not award separate contracts to FFRDCs as prime or subawardees but will instead leverage their existing sponsors' agreements.
  - UARCs: While UARCs typically have statutory authority to compete with industry, internal DARPA policy views them as trusted advisors who are only eligible to act as performers in fields where they do not serve in an advisory role. Even in those situations, DARPA still considers UARCs as having organizational conflicts of interest (OCI) when applying for a performer role. Proposals with UARCs as prime or subawardees must include an OCI mitigation plan.

For this solicitation, DARPA will not establish new contractual agreements for their participation. Accordingly, any proposal submitted directly by these entities in a prime contractor capacity may be deemed non-conforming and not evaluated. Proposals that include a UARC, FFRDC, Government entities, or National Laboratory as a subcontractor may also be deemed non-conforming unless: (1) their role is clearly defined in the technical proposal with a point of contact, and (2) a rough order of magnitude cost is provided in the technical proposal only—cost proposals must exclude their funding, as DARPA will not fund them through the prime. It is important to note that if funded, these organizations will be required to share their work and findings with other performers also supporting the same program. Additionally, DARPA may contact these entities directly to discuss proposed activities.

- 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. For additional information on fundamental research, please visit Proposer Instructions: General Terms and Conditions.

- 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. This language can be found at Proposer Instructions: General Terms and Conditions.

  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.

- DARPA's Fundamental Research Risk-Based Security Review Process (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 fundamental research awards (to include cooperative agreements and Other Transactions). The DARPA risk assessment process will be conducted separately from the DARPA scientific review process for all fundamental research effort/proposal and adjudicated prior to final award. For additional information on this process, please visit Proposer Instructions: Grants/Cooperative Agreements and Proposer Instructions: Other Transactions. All submissions proposing to this solicitation must complete the Common Disclosure Forms, biosketch, and current/pending support forms. Forms can be found here and included in your submission:

  - Common Form for Biographical Sketch (nsf.gov)
  - Common Form for Current and Pending (Other) Support (nsf.gov)

- The APEX Accelerators program, formerly known as the Procurement Technical Assistance Program (PTAP), focuses on building strong, sustainable, and resilient U.S. supply chains by assisting a wide range of businesses that pursue and perform under contracts with the DoD, other federal agencies, state and local governments, and government prime contractors. See www.apexaccelerators.us/ for more information.

  APEX Accelerators helps businesses:
  - Complete registration with a wide range of databases necessary for them to participate in the government marketplace (e.g., SAM).
  - Identify which agencies and offices may need their products or services and how to connect with buying agencies and offices.
  - Determine whether they are ready for government opportunities and how to position themselves to succeed.
  - Navigate solicitations and potential funding opportunities.
  - Receive notifications of government contract opportunities on a regular basis.
  - Network with buying officers, prime contractors, and other businesses.
  - Resolve performance issues and prepare for audit, only if the service is needed, after receiving an award.

- Project Spectrum is a nonprofit effort funded by the DoD Office of Small Business Programs to help educate the Defense Industrial Base (DIB) on compliance. Project Spectrum is vendor-neutral and available to assist businesses with their cybersecurity and compliance needs. Their mission is to improve cybersecurity readiness, resilience, and compliance for small/medium-sized businesses and the federal manufacturing supply chain. Project Spectrum events and programs will enhance awareness of cybersecurity threats within the manufacturing, research and development, and knowledge-based services sectors of the industrial base. Project Spectrum will leverage strategic partnerships within and outside of the DoD to accelerate the overall cybersecurity compliance of the DIB.

  www.projectspectrum.io is a web portal that will provide resources such as individualized dashboards, a marketplace, and Pilot Program to help accelerate cybersecurity compliance.

- DARPAConnect offers free resources to potential performers to help them navigate DARPA, including “Understanding DARPA Award Vehicles and Solicitations”, “Making the Most of Proposers Days”, and “Tips for DARPA Proposal Success”. Join DARPAConnect at www.DARPAConnect.us to leverage on-demand learning and networking resources.

- DSO has been using new solicitation formats to speed award timelines. These include Disruption Opportunities (DOs, also known as "Disruptioneering"), Advanced Research Concepts (ARC), and the accelerated award option for the Office-wide BAA. These are focused, milestone-based contracts designed to reduce negotiations and emphasize the quality of the idea and its potential for disruption over the proposer's ability to write a proposal. The milestone structure, where payment is tied to research execution rather than meeting aggressive metrics, is intended to incentivize ideas with high potential for disruption even if they are riskier. We are seeking feedback regarding these mechanisms from our proposer community. Please consider completing the survey at this link: https://events.sa-meetings.com/esurvey/126974

- **Cybersecurity Maturity Model Certification (CMMC) Requirements**

  Applicable to awards under this Broad Agency Announcement that will result in procurement contracts.

  1. General Applicability
     a. Awards resulting from this Broad Agency Announcement (BAA) that take the form of procurement contracts are subject to the Cybersecurity Maturity Model Certification (CMMC) requirements prescribed in 32 CFR Part 170 and DFARS 252.204-7021, Cybersecurity Maturity Model Certification Requirements.
     b. The Government will designate the required CMMC level (1, 2, or 3) in each resulting contract based on the sensitivity of the information involved—Federal Contract Information (FCI) or Controlled Unclassified Information (CUI).
     c. Offerors must demonstrate compliance with the applicable CMMC level at the time of contract award and maintain that level for the duration of contract performance.
     d. CMMC requirements must be flowed down to all subcontractors whose performance involves processing, storing, or transmitting FCI or CUI.

  It is anticipated that Procurement Contracts resulting from this BAA will require CMMC Level 1 compliance.

     a) Applicability:
     Applies when the contractor will handle Federal Contract Information (FCI) only.
     b) Requirement:
     Contractors shall implement the 17 basic safeguarding requirements in FAR 52.204-21, Basic Safeguarding of Covered Contractor Information Systems, and maintain practices equivalent to CMMC Level 1.
     c) Assessment:
     Prior to award, the Offeror shall have a current CMMC Level 1 Self-Assessment recorded in the Supplier Performance Risk System (SPRS) in accordance with DFARS 252.204-7021.
     d) Certification Status:
     A valid and current Level 1 certification is a condition of award. Offerors that do not possess the required certification at the time of award shall be ineligible for contract award.

e) Flow-Down:
   The Contractor shall ensure that any subcontractor processing, storing, or transmitting FCI also maintains a current Level 1 Self-Assessment in SPRS.

f) Verification:
   The Contractor shall maintain its Level 1 certification for the full contract period. The Government will verify certification status in SPRS and may request access to assessment results or supporting evidence at any time.