STRATEGIC & SPECTRUM MISSIONS ADVANCED RESILIENT TRUSTED SYSTEMS
(S^2MARTS)
REQUEST FOR SOLUTIONS (RFS)

in support of the

Hypersonics Advanced Manufacturing Test Capability (HAMTC)

PROTOTYPE PROJECT

Project No. 21-13

All prospective respondents must be members of the NSTXL consortium.

1. **Project Title:** Hypersonics Advanced Manufacturing Test Capability (HAMTC)

2. **Prototype Project Sponsor/Requiring Activity:** Office of Secretary of Defense (OSD) ManTech; Naval Surface Warfare Center (NSWC), Crane Division

3. **Contracting Activity:** Naval Surface Warfare Center (NSWC) Crane Division

4. **Project Background & Current Capability:**

The Department of the Navy (DoN) has entered into the hypersonic missile domain to execute the Warfighter's mission requirements. As threats and mission requirements continue to evolve, the Department of Defense (DoD) is constantly looking to improve and upgrade its domestic manufacturing capabilities and industrial base. Partnership with academia and industry will help develop and demonstrate capabilities in key focus areas, supporting transition to military Service programs of record, consistent with the FY 2020 National Defense Authorization Act (NDAA).

The purpose of this effort is to advance the domestic manufacturing readiness in support of hypersonic missile development. This would include high-temperature technology (including additive manufacturing (AM)) and scramjet/glide body improvements, with specific improvements to reduce defects/ variability and increase yield/ performance, while driving down the cost per unit. Most hypersonic weapons require specialized lightweight composite materials capable of withstanding extreme temperatures and flight environments. Currently, there are limitations to the size and manufacturing capacity of large carbon composite structures as well as high cost and minimal classified machining capacity to support production of high temperature refractory carbon composites. An emerging capability the Warfighter needs to improve hypersonic missile mission is an automated weaving and densification process, to include the automation and capability advancement of inspection capabilities for these materials. A related emerging capability to pursue is automated weaving capability to produce 3D polar woven preforms. Automating these capabilities would provide significant cost savings to key DoD programs.

Design and integration of components; additive manufacturing of components; bonding, joining, and sealing of sub-assemblies; and thermo-mechanical and wind tunnel testing of hypersonic sub-systems in a cooperative environment would allow for more timely and efficient development of the hypersonic capability desired by the Warfighter. Specifically, a collaborative environment with industrial supply chain during engineering manufacturing development will aid in the transition of comprehensive solutions for hypersonic platforms and DoD acquisition programs. The development of novel high temperature materials, processing routes, associated predictive software tools, and manufacture of one-of-a-kind designs to enable hypersonic advancements would greatly expedite domestic hypersonic manufacturing abilities.

High temperature refractory composites utilizing carbon require long lead times/low throughputs and high cost. Current methods of manufacturing high temperature composites parts require large amounts of touch labor and unusable waste material, further driving up costs and reducing potential yield. To decrease cost and increase yield, it is necessary to develop the next generation of materials for hypersonic applications by combining the expertise of heritage 3D carbon/carbon suppliers with advances in automation and material technologies. The improvements resulting from this effort can be designed into future systems, thus eliminating requirements for more complex and less capable approaches.

Adversaries of the US have developed hypersonic weapons capable of traveling five to six times the speed of sound, which reduces response time for defense. The DoD has taken a deterrence approach, with the intent to field hundreds of hypersonic weapons within the Future Years Defense Program (FYDP). With an urgent need to develop and field new hypersonic weapon systems has come a demand for test and development capabilities.

The DoD has identified advanced manufacturing of specialty high temperature materials as critical to hypersonic weapon systems. Hypersonic vehicles are subjected to extreme environments, necessitating robust materials and processing techniques to ensure successful operation. Specialized materials manufacturing and production processes are being developed to manage temperature requirements while maintaining a lightweight and shock absorbent design. AM enables construction of complex thin-walled and multi-channeled structures with heat-resistant materials, resulting in cooling passages to reduce engine heat buildup caused by atmospheric friction when flying at high speeds. However, adoption of metal AM in Defense supply chains is limited for hypersonics. Furthering the development of AM, and exploring its application to hypersonic development programs, would enable shorter lead times, mass customization, energy reduction, complex shapes, and production of parts on demand for legacy and new acquisition hypersonic weapon systems.

To overcome these challenges, DoD has invested in developing new digital computational tools to accelerate the certification of metal AM-built parts. This approach uses machine learning, materials engineering, simulation, and controls to enhance part designs, eliminate defects, and optimize workflows.

High-temperature materials are currently being developed that can withstand extreme temperatures that hypersonic vehicles must endure. These materials remain difficult to construct by conventional means due to limited ductility or high degrees of porosity; furthermore, many developers lack digital tools necessary to optimize design and ensure AM repeatability based on the behavior of these materials. There are currently limited proven methods in production for forming Ultra-High Temperature Ceramics (UHTC) into complex geometries that can withstand extreme conditions for hypersonic flight regimes. Introducing alternate manufacturing capabilities will provide the DoD customer with alternate solutions for UHTC components.

Advanced manufacturing methods for quality and production are critical to hypersonic vehicles. Advancing techniques such as in-situ sensing and non-destructive inspection (NDI) can inform rapid and dynamic process control through data-driven understanding of defect mechanisms and end-to-end inefficiencies. Many of the current approaches to inspection are limited, challenging, expensive, and time consuming, thus limiting throughput of critical parts and delaying warfighter access to needed capabilities. As applied to hypersonics, in-situ sensing, NDI, and analytics can enable rapid qualification of AM parts and overall optimization of high temperature material processing (e.g., composite densification cycle optimization) to ensure reliable and repeatable manufacturing of hypersonic components.

Assembly of components with dissimilar material compositions poses additional quality and production challenges to hypersonics manufacturing. The junctions between dissimilar materials contribute to multiple issues in system design ranging from joining difficulties to increased corrosion susceptibility and property variances which can contribute to undesirable stress, degradation, optical path changes during use. Improved manufacturing approaches should mitigate such risks and address joining of material sets that are relevant to hypersonic applications (or otherwise offer transitionable knowledge for manufacture of hypersonic components). Of particular interest are bonds between refractory metals/ceramics (refractory and optical) and fiber-reinforced composite materials as well as bonds between thermal protection systems and internal support structures. Example approaches may include gradient material additive manufacturing via Directed Energy Deposition (DED), Chemical Vapor Infiltration (CVI), or other methods.

While both government and industry researchers have explored different aspects of a digital workflow that could contribute to a hypersonic vehicle production, little has been done to establish a singular fluid architecture necessary for accelerating weapon system development. As a result, nearly a decade of disjointed AM and hypersonic technology research has still not led to qualified process for repeatable AM-produced hypersonic systems. The lack of reliable domestic manufacturing technology maturity creates challenges for technology adoption and transition to DoD programs and drives up production costs. Manufacturing affordable hypersonic systems will require reliable domestic manufacturing capability and capacity, with greater uniformity and reproducibility to deliver cost-effective high yield substrates.

The establishment of domestic manufacturing capability of materials for a wide range of DoD hypersonic applications requires domestic manufacturing improvements to increase production throughput, with accompanying ability to test the efficacy of the materials. Key to the ability to configure projectiles to withstand unprecedented temperatures and air-flow is the ability to test in high speed wind tunnels and in high thermal conditions.

Accurately measuring heat-flux distribution over the aircraft surface is a primary basis for designing the Thermal Protection System (TPS) structure and ensuring the materials used in TPS manufacturing will withstand extreme hypersonic conditions during flight.

Most of the existing hypersonic tunnels in the U.S. were designed and built 50-70 years ago when America invested heavily in missile development and the Space program. The integration of one or more hypersonic wind tunnel facilities capable of performing wind speed and thermal testing with a domestic hypersonic material manufacturing capability is paramount to creating a collaborative domestic hypersonic development capability. The development of hypersonic technology requires more advanced thermodynamic test facilities capable of duplicating hypersonic flight conditions for various Mach numbers at different altitudes to accurately reproduce high thermal flows for reliable ground testing.

Vertical supply chain integration proof-of-concept for multiple unique material systems and manufacturing bonding, joining, and sealing processes into hypersonic sub-assemblies would address key issues with hypersonic DoD production and testing. Wind tunnel and thermal testing to expedite verification and validation of design, manufacturing, and production would ensure timely and robust method implementation.

A key technology in enabling strategic hypersonic weapons is high temperature capable carbon fiber reinforced carbon (C/C) and carbon fiber reinforced silicon carbide composites (C-SiC) to deliver differentiated missile and reentry body performance. This is especially true for multidirectional reinforced composites such as 3D and 4D reinforced composites. Currently there is high demand for polar woven 3D composites to support key hypersonic and strategic missile programs in propulsion and thermal protection system applications. The current process is very labor intensive, particularly in the densification and weaving processes used to produce these unique materials, as 3D polar woven preforms are only produced by manual weaving.

Currently, there are limitations on the size and manufacturing throughput capacity of large C/C shapes for hypersonic missile nosetip applications. Specifically, the C/C parts are densified using multiple cycles to arrive at the optimal density required to meet missile re-entry stability performance requirements. There are also maximum size manufacturing capability challenges for these specialized parts. Increasing demand for larger hypersonic vehicle nosetip and other ablative material end items necessitates new business processes and associated C/C material manufacturing technologies that enable faster processing times and increased throughput capability. Resolution of the processing time increases reentry vehicle nosetip production throughput and achieves affordable solutions.

Part of the challenge is the time required for manufacturing parts and machining the parts into their final, classified configuration as many of the DoD programs are requiring classified facilities for multiple phases of production. The capability to machine large carbon/carbon parts in a classified setting rests with a very limited set of vendors and requires shipping classified parts between densification location and machining location. This often results in multiple trips. It is not uncommon for parts to log more than 5000 miles between the material fabricator and machine shop locations. Having the capability of machining these parts residing with a vendor who also fabricates the parts will save time, cost, and reduce risk of damage/spillage of sensitive parts while in transit.

Currently available 3D woven C/C material, bolstered by a risk-averse environment sustained by a small number of strategic defense programs, are of high quality and extremely high cost. Automation and processing technologies developed for commercial aerospace offer significant potential cost reductions to these advanced materials.

5. Desired End-State Objective(s) & Success Criteria:

Task Area One:

The desired end state is a refined advanced materials manufacturing proof-of-concept for hypersonic vehicle applications for vertical supply chain integration. State-of-the-art manufacturing for hypersonic technologies that will include increased utilization of digital engineering tools, advanced AM processes, and bonding, joining, and sealing of dissimilar materials will increase the domestic defense industrial base. Decisions made early in the design lifecycle must include manufacturing processes as part of the solution set to reduce schedule and cost risk, accelerate technology development, and increase performance for hypersonic systems. This process should reduce defects and variation in material properties within individual substrates and from batch to batch.

Technologies/processes of interest include:
1. Advanced in-situ sensing, control, and data analytics for unique high temperature materials, such as refractory ceramics, etc.
2. Domestic integration of processes/manufacturing into manufacturing operations.
3. Advanced bonding, joining, and sealing of dissimilar materials (metals and/or composite) for hypersonic applications.
4. Testing processes, to include wind and thermal testing, to validate the efficacy of the materials produced.
5. Prototyping of materials using equipment used in additive manufacturing/processing

A goal of this effort is to establish a domestic supplier for growth processes of sufficient quality to meet the projected needs of DoD for hypersonics applications.

The objective of this effort is for the performer to deliver prototype items using new technical processes, demonstrating cost savings and yield increases. Specifically, the Objectives/Success Criteria are:

1. DESIGN: Flow and design optimization of multi-material systems for hypersonics, such as those required for air-breathing and glide-body system hypersonic vehicles

   a. Develop workflow for parallel computational fluid dynamics, structural analysis, and geometric design
   b. Establish integration of model-based definitions and deploy model-based systems engineering approaches, including the application of integrated computational materials engineering (ICME) to a system of materials and components
   c. Optimize representative design workflow for hypersonic performance

d. Manufacturability analysis
e. Integrate materials processing, structure, properties, performance into workflow with the goal to optimize materials and processes for increased efficiency of production

2. BUILD: Advanced manufacturing of hypersonic support systems
   a. Additive Manufacturing
      i. Develop ICME, design & data analytic software and in situ process monitoring, real time feedback loop to understand/control part defects
      ii. Hardware optimization, including laser sources, scan strategies, and autocalibration
   b. High Temperature Composites, including Silicon Carbide/Silicon Carbide (SiC/SiC) ceramic matrix composites (CMC) materials, Carbon/Carbon (C/C) composites, and Carbon/SiC (C/SiC) composites
   c. Coating systems, including coatings for C/C systems and tailorable, high emissivity coatings. Potential improvements in UHTC TPS development for C/C aero-shells, nose-tips, and leading edges include composition and microstructure optimization, surface and interface refinement, structure integration, multi-step processing, and service life-based coating topology design. A possible solution to explore would be printing geometrically complex parts composed of disparate high temperature materials applicable in a conventional prompt strike glide environment.
      i. Full integration of C/C manufacturing process with custom TPS fabrication: Currently, the fabrication of C/C, C/SiC, and the TPS application are generally isolated steps. Full-scale integration of these steps can greatly reduce the production cycle and enable custom designs of coating microstructure and coating topology.
      ii. Evaluation of emerging processing technologies: Emerging technologies include chemical vapor infiltration (CVI), melt infiltration (MI), precursor infiltration pyrolysis (PIP), supersonic atmospheric plasma spraying (SAPS), and slurry coating (SC), and often times in a multi-step manner. Compared to Pack Cementation (PC) and Chemical Vapor Deposition (CVD), these techniques are more scalable with enhanced flexibility for composition and micro-structure design.
      iii. Improvement of aero-thermal-chemical-mechanical robustness: Develop new TPS systems with improved overall aero-thermal-chemical-mechanical robustness through optimization of chemical composition and microstructure design. Specific coating designs must be tailored toward flight profile parameters and vehicle life cycle conditions. System should show survivability during hypersonic conditions and time frames (thermal environments from 2500-4000°F); characterize survivability by analyzing oxidation and degradation of the physical/ mechanical properties and the stability of interfaces of bonded materials.

d. Higher efficiency hypersonic systems: Substantial part count reductions using novel digital tools and testing methodology. Reduced lead times with domestically-produced materials that meet system requirements.
e. For manufacturing process, characterize and test products:
   i. Perform microstructure and defect characterization, in tandem with exploring post processing routes and developing new rapid characterization techniques
   ii. Test coupons and qualify high temperature strength and oxidation performance (testing at up to 90% of melting temperature, in inert and open air environments, including possibility of plasma flows with ionized air)

3. JOIN: Joining of multi-material systems and components
   a. Define design constraints and requirements for mating of dissimilar material components, to include thermal protection system materials and a novel ceramic inlet/ metallic combustor scramjet system
   b. Joining experiments on coupons of dissimilar material systems, including thermo-mechanical testing of strength and stability
   c. Print representative components, including monolithic and gradient structures based on design requirements (for example, hot structure and thermal protection system substrates and interface geometries to bond/join to larger system components/subsystems)
   d. Join and coat large and/or complex shapes for structures, propulsion, and thermal protection systems
      i. Mechanical fasteners and mechanical fastening methods and design, including fastening CMC to metal
      ii. Brazing dissimilar materials including SiC-based CMC, C/C composites, and/or metals
      iii. Demonstration of joining for leading edges, including mating of CMC, C-C composites, and metal alloys
      iv. Co-bonding/co-joining of similar and dissimilar materials to make unitized, lightweight, high performance structures and thermal protection systems
   e. Incorporate the material and process modeling into model-based systems engineering approaches to support the digital twin

4. TEST: Sub-assembly performance testing
   a. Perform feature based testing in instrumented thermo-mechanical environments for time dependent failure properties
   b. Test sub-assemblies in hypersonic Mach flows and environment
   c. Perform quantitative diagnostics of the flow paths of components in hypersonic environments
   d. Evaluate the performance results and consider opportunities for part reductions to enhance flow paths for increased performance (including part consolidation toolkit)

The technical objectives are to use a three phase approach. The three phases are:

1. Manufacturing Equipment Planning and Execution Phase
2. Growth and Manufacturing Process Refinement Phase
3. Prototype Acceptance Testing Phase.

Task Area Two:
An additional desired end state is a capability to produce and machine 3D C/C materials to enhance and optimize missile performance per Navy requirements. The automation of this process will deliver significant cost savings in preform weaving while also providing capacity to support key DoD programs. Additionally, the skills, knowledge, capabilities, and facilities (or facilities access) for the specialized high-pressure pitch resin impregnation C/C densification process and/or development of the required localized ceramic regions within SSNT billets is required. The resulting 3D C/C materials must hold/exhibit strength in 3 directions (X,Y,Z axis) using 3D C/C with high pressure densification, or equivalent processes.

The objective of this additional effort is for the performer to deliver:

• Significant cost reductions anticipated in densification processes, weaving processes, and polar woven preforming.
• Capability advancement, cost savings, and capacity improvements in inspection capabilities
• Mature manufacturing methods for long-lead carbon composites components for hypersonic programs (to include classified programs)
• Expansion of the supply base to provide alternate options for a more robust supply base, increased performance, and increased production capacity with reduced lead time
• Next generation 3D C/C materials for hypersonic applications with advances in automation and material technologies, which may include:
• Graphite fiber yarn management/pre-treatments.
• Automatic 3D weaving of large graphite fiber preforms.
• Tailored pitch resin densification of these preforms into C/C billets.
• Localized ceramic regions within Shape Stable Nose tips (SSNT) billets

All capabilities should be proven through testing and prototyping.

6. Project Deliverables:

#	Deliverable(s)	Description	Due Date/Frequency	Delivery Method
1	Execution Plan	Lay out the schedule, milestone and projected hours required for completion by phase.	One month after award (Task Area 1, Phase 1; Task Area 2)	Written document
2	Technical Reports	Identify preliminary design, material selection, and team members/ collaborative environment partners.	Two months after award (Task Area 1, Phase 1; Task Area 2)	Written document
3	Feasibility Assessment and Strategy	To meet end-user needs, to include framework to support digital twin architecture.	Three months after award (Task Area 1, Phase 1)	Written document
4	Prototype multi-physics software suite	Suite to perform integrated design, manufacture, and analysis of hypersonic sub-assemblies.	As software is developed (every 6 months) (Task Area 1, Phase 2)	Software suite
5	Prototype manufacturing equipment	Any manufacturing equipment developed and/or acquired for this effort (For example, a prototype 3D printer, etc.)	As equipment is developed (every 12 months) (Task Area, Phase 2; Task Area 2)	Equipment
6	Validated ICME models	Models to assess variability and system risk, and control part defects.	As models are developed (every 6 months) (Task Area 1, Phase 2)	Models
7	Closed-loop advanced manufacturing platform	Platform to build and join hypersonic components and sub-assemblies.	Final deliverable, before PoP (30 months from award) (Task Area 1, Phase 3)	Platform
8	Test specimens and prototypes, as well as performance data and processing parameter suite	Demonstration that requirements have been met and capabilities have been developed	As each capability is developed (outlined above) (Task Area 1, Phase 3; Task Area 2)	Prototypes, Data, Software suite

9	Technical Data Package	Data to demonstrate that deliverables (software suite, models, equipment, platform) meet requirements.	As each capability is developed (every 6 months) (Task Area 1, Phases 1-3; Task Area 2)	Written summary of data, Data package
10	Financial Reports	Report of expenditures against spend plan, estimates to completion, etc.	Monthly (Task Area 1, Phases 1-3; Task Area 2)	Powerpoint and/or Excel
11	Schedule Reports	Report of project completion percentage for each requested capability with detailed schedule	Monthly (Task Area 1, Phases 1-3; Task Area 2)	Powerpoint and/or Project
12	Program Management Reviews	Financial and Schedule data, compiled for management review	Quarterly (Task Area 1, Phases 1-3; Task Area 2)	Powerpoint, Excel, and Project
13	Automated machining capability	Demonstration of ability to produce C/C materials in an automated process	Final deliverable, before PoP ends (NLT 30 months from award) (Task Area 2)	Process/ Machine
14	Next generation 3D C/C material prototypes	Demonstration of 3D polar woven C/C preform prototypes	Final deliverable, before PoP ends (NLT 30 months from award) (Task Area 2)	Prototype

7. **Current Project Budget:** $ 29.237M

Current budget for Task 1 is estimated to be $18.674M. Current budget for Task 2 is estimated to be $10.914M. Each Task is anticipated to take 30 months (3 months for Phase 1, 21 months for Phase 2, and 6 months for Phase 3.

This value represents what is currently available for the subject project at the time of the RFS release. This value is subject to change but is being provided for planning purposes. Respondents are encouraged to clearly explain how much of their solution can be developed for the advertised amount. Capabilities or project phases that will require additional funding beyond the project budget must be identified as such.

8. **Security Classification, Respondent Restrictions, and other required compliances:**

This RFS has been released under the following—

☒ Distribution Statement A: Approved for public release

This project encompasses the following restrictions:

a. Security Classification: Secret, At Award

b. Is ITAR Compliance required? Yes

c. Respondent Restrictions (e.g., domestic companies only): Domestic Companies Only

d. Hazardous Material: No Hazardous Material

e. Any additional restrictions applicable to this project:

9. **Level of Data Rights Requested by the Government**:

☒ Government Purpose Rights: The right to use, modify, reproduce, release, perform, display, or disclose technical data within the Government without restriction. This also includes the rights to release or disclose technical data outside the Government and authorize persons to whom release or disclosure has been made to use, modify, reproduce, release, perform, display, or disclose technical data for United States government purposes. This level of restriction is set at five-years but may be negotiated & tailored to a specific project. The five-year period, or such other period that may be negotiated, would commence upon execution of the agreement that required development of the items, components, or processes or creation of the data. The performer will have the exclusive right, including the right to license others, to use technical data in which the Government has obtained government purpose rights under this agreement for any commercial purpose during the five-year period. Upon expiration of the five-year period (or other negotiated length of time), the Government will receive unlimited rights in the technical data and computer software.

10. **RFS and Response Process**:

a. The following is requested from all respondents:

	Technical Response	Price Response
Page Maximum	**20**	**5**

For written submissions, the following formatting guidelines shall be followed by respondents:

- 10-point font (or larger) for all response narratives; smaller type may be used in figures and tables but must be clearly legible.
- Single-spaced, single-sided (8.5 by 11 inches).
- Margins on all sides (top, bottom, left, and right) should be at least 1 inch.
- Page limitations shall not be circumvented by including inserted text boxes/pop-ups or internet links to additional information. Such inclusions are not acceptable and will not be considered as part of the response
- Files must be submitted in PDF and/or Microsoft Word formats only. Price volumes may be submitted in an editable, unlocked Excel file

b. Each submittal **must include** (i) a Cover Page, (ii) a Technical Response, and (iii) a Price Response that each align to the instructions below:

i. Cover Page: (Not included within page count) The cover page shall include the company's name, Commercial and Government Entity (CAGE) Code (if available), level of facility clearance (if available), address, primary point of contact, business size, and status of U.S. ownership, location where work will be performed, and security office responsible for processing security clearance.

Respondents shall also identify the applicable 10 U.S.C. § 2371b eligibility criteria related to the response (*please identify only one*):

- There is at least one nontraditional defense contractor (*defined below*) or nonprofit research institution participating to a significant extent in the project**; OR**

- All significant participants in the transaction other than the Federal Government are small businesses (including small businesses participating in a program described under section 9 of the Small Business Act (15 U.S.C. § 638)) or nontraditional defense contractors**; OR**

- At least one third of the total cost of the project is to be provided by sources other than the Federal Government.

  Note: A *Nontraditional Defense Contractor* is defined as an entity that is not currently performing and has not performed, for at least the one-year period preceding the solicitation of sources by the Department of Defense (DOD) for the procurement of transaction, any contract or subcontract for the DOD that is subject to full coverage under the cost accounting standards prescribed pursuant to 41 U.S. Code §1502 and the regulations implementing such section.

ii. Technical Response:

Responses should be constructed to align with the order of the instructions below (1 - 8).

1. Solution Narrative: Respondents shall describe the approach used to design/deliver a unique prototype solution for the prototype technology objectives defined in RFS Section 5, Desired End-State Objective(s), to include any attachments. While these focus areas are of significant importance, responses will be considered as a whole. No pricing shall be included in the technical response.
   The Solution Narrative must also include a discussion on schedule and the timing of all deliverable(s) to include those outlined within RFS Section 6, Project Deliverables.

2. Explanation Supporting Eligibility for Award of a Prototype OTA: Respondents shall provide rationale to support the specific condition that permits award of an OTA to the proposed prime contractor/performer. The onus of proof to support *nontraditional participation to a significant extent; small business or nontraditional defense contractor status;* or any *cost sharing arrangement* lies with the respondent and has a direct correlation to award eligibility.

3. Foreign Owned, Controlled, or Influenced (FOCI) Documentation (if applicable): Documentation may include, but is not limited to: Standard Form 328 (Certificate Pertaining to Foreign Interest); Listing of Key Management Personnel; an Organizational Chart; Security Control Agreements: Special Security Agreements; and Proxy Agreements or Voting Trust Agreements. It is recommended that companies who fall within the FOCI category visit https://www.dss.mil for additional guidance and instruction.

4. Government Furnished Property or Information: Respondents must clearly identify if its proposed solution depends on Government Furnished Information (GFI) / Government Furnished Property (GFP) or other forms of Government support (i.e. laboratory or facility access), etc.

   If so, the response must specify the GFI/GFP required. Respondents must clearly identify if its proposed solution depends on GFI/GFP or other forms of Government support be provided, the impact to the solution if the requested information/property/asset is not available, and will confirm the details with the respondent prior to any proposal revisions or selection, if applicable.

5. Mandatory Compliance with Restrictions: Respondents must address the restrictions identified within RFS Section 8, Security Classification, Respondent Restrictions, and other Required Compliance, and explain how each regulation or standard is currently, or will be met.

6. Task Description Document (Not Included Within Page Count): Respondents must provide a Task Description Document (TDD) outlining the project tasks to be performed along with schedule milestones and delivery dates required for successful completion. It is anticipated that, if selected, the proposed TDD will be incorporated into the resultant OTA. Respondents are encouraged to be concise but thorough when outlining their work statements. The TDD may be submitted as an appendix or a separate file as part of the proposal.

7. Summary of Subcontractor Participation (if applicable): Respondents must identify all subcontractors involved and their role within the performance of the proposed concept. The information must include the following:

    a. Subcontractor company name, Commercial and Government Entity (CAGE) Code (if available), level of facility clearance (if available), address, primary point of contact, business size, and status of U.S. ownership.

    b. If the subcontracted company's involvement is considered significant, rationale supporting the significance must be present within the narrative. The onus of proof to support participation to a significant extent or any cost sharing arrangement lies with the respondent and has a direct correlation to award eligibility.

    c. If applicable, Foreign Owned, Controlled, or Influenced (FOCI) Mitigation Documentation shall be provided for subcontractors and will not count towards the page count.

8. Data Rights Assertions and Level of Rights Proposed:

    a. The rights offered should be displayed in a manner that allows for ease of discussion in determining trade-offs and potential options for long-term sustainability of the deliverables of this effort.

    b. If rights are being asserted at a level less than the Government's desired level of allocation (see RFS Section 9, Level of Data Rights Requested by the Government), respondents must provide detail explaining the specific rationale for the assertion. Please also review below section for additional requirements related to data rights pricing.

    c. Any items previously developed with federal funding (and used for the proposed solution) should clearly identify all individual components funded by the Government and the recipient of the deliverables.

    d. If commercial software is proposed as part of the prototype solution, all applicable software licenses must be identified and included with the response. Note that any software license term or condition inconsistent with federal law will be negotiated out of the license.

iii. Price Response:

The price response shall be submitted as a separate file from the technical response. No pricing details shall be included in the technical response. This project will employ the following pricing structure:

☒ Fixed Price with Payable Milestones
☐ Expenditure Basis (cost reimbursable)

1. The overall total price should be divided among severable increments that align to a proposed milestone payment schedule. Milestones are not required to match actual expenditures but should realistically align to the effort expended or products delivered.

2. In order to support the Government's evaluation of fair and reasonable pricing, the respondent shall delineate the key pricing components, and show clear traceability to the phases and/or milestones of the Technical Response. At a minimum, key pricing components include Labor Total(s), Other Direct Costs/Material Total(s), License prices and Subcontractor price(s). Data should be segregated by each key objective, milestone, and/or phase proposed.

3. Include a brief narrative that explains your pricing structure and maps the proposed prices to the solution's technical approach.

4. Including a Basis of Estimate to support your pricing may substantially expedite evaluation of your response.

5. If limited or restricted rights are being asserted within the response, a table that includes prices for both Government Purpose Rights and Unlimited Rights for any limited or restricted item must be included.

6. Any additional features or capabilities that extend beyond the currently requested core technical objectives shall be separately priced for the Government's consideration. Pending funding availability and need, the Government may fund these advanced features at a later date.

11. Evaluation Process and Methodology:

a. Individual responses will be evaluated with consideration given to:

i. Demonstrated expertise and overall technical merit of the response;

ii. Feasibility of implementation; and

iii. Total project risk as it relates to the technical focus areas, price and schedule

b. The Government will evaluate the degree to which the proposed solution provides a thorough, flexible, and sound approach in response to the prototype technical objectives as stated in RFS Section 5, Desired End-State Objectives, as well as the ability to fulfill the objectives in this RFS.

c. The Government will award this project, via S^2MARTS (Agreement No. N00164-19-9-0001), to the respondent(s) whose solution is assessed to be the most advantageous to the Government, when price, schedule, technical risks, the level of data rights, and other factors are considered. The Government reserves the right to award to a respondent that does not meet all the requirements of the RFS.

d. The proposed project price, schedule, and intellectual property/data rights assertions will be considered as aspects of the entire response when weighing risk and reward. The assessment of risks is subjective and will consider all aspects of the proposed solution. Respondents are responsible for identifying risks within their submissions, as well as providing specific mitigating solutions.

e. The Government reserves the right to reject a submission and deem it ineligible for consideration if the response is incomplete and/or does not clearly provide the requested information. Debriefings will not be provided.

12. Follow-On Activity:

a. Upon successful completion of this prototype effort, the Government anticipates that a follow-on production effort may be awarded via either contract or transaction, without the use of competitive procedures if the participants in this transaction successfully complete the prototype project as competitively awarded from this document. The prototype effort will be considered successfully complete upon demonstration of the aforementioned technology objectives.

b. Successful completion for a specific capability may occur prior to the conclusion of the project to allow the Government to transition that aspect of the prototype project into production while other aspects of the prototype project have yet to be completed.

c. Requirements of other potential follow-on activities could involve, though not limited to, continued development and baseline management, fielding, sustainment, training, further scaling of the solution, integration of future capabilities, or integration of the solution with other capabilities.

13. Attachments

a. Section 889 Verification and Representation

b. DD254

14. Important Dates

a. Questions related to this RFS shall be submitted no later than 12 PM EST Tuesday, August 3, 2021

   To submit any questions, visit the opportunities page at www.nstxl.org/opportunities, select the “Current” tab, locate the respective project, and select “Submit a Question”.

b. Proposals submitted in response to this RFS are due no later than 12 PM EST Monday, August 23, 2021.

c. To submit your proposal, visit the opportunities page at www.nstxl.org/opportunities, select the “Current” tab, locate the respective project, and select the “Submit Proposal” link. You must have an active account and be logged-in to submit your response.

d. RFS Respondents must be active members of the consortium at the time of proposal submission.

15. Additional Project Information

a. The Government intends to award one Other Transaction Agreement as a result of this RFS; however, more than one award may be made if determined to be in the Government’s best interest. The Government also reserves the right to not select any of the solutions proposed.

b. Acceptable responses not selected for the immediate award will be retained by NSTXL & the Government for possible future execution and funding. The non-selected proposals will be considered as viable alternatives for up to 36 months. If a proposal (that was not previously selected) is determined to be a suitable alternative, the company will be contacted to discuss any proposal updates and details of a subsequent project award.

   Respondents whose proposals are not selected for the initial award shall not contact the Government or NSTXL to inquire about the status of any ongoing effort as it relates to the likelihood of their company being selected as a future alternative.

c. The United States Navy, specifically Naval Surface Warfare Center, Crane Division, has release authority on any publications related to this prototype project.

d. Unsuccessful respondents will be notified, however, debriefings for this project are not required nor planned at this time.

e. If resource-sharing is proposed in accordance with 10 U.S. Code § 2371b(d)(1)(C), then the non-Federal amounts counted as provided, or to be provided, by parties other than the Federal Government may not include costs that were incurred before the date on which the OT agreement becomes effective. Costs offered as a resource-share that were incurred for a project after the beginning of negotiations, but prior to the date the OT agreement becomes effective, may be counted as non-Federal amounts if and to the extent that the Agreements Officer determines in writing that: (1) the party other than the Federal Government incurred the costs in anticipation of the OT agreement; and (2) it was appropriate for the entity to incur the costs before the OT agreement became effective in order to ensure the successful implementation of the OT agreement.

f. Certain types of information submitted to the Department during the RFS and award process of an OT are exempt from disclosure requirements of 5 U.S.C. §552 (the Freedom of Information Act or FOIA) for a period of five years from the date the Department receives the information. It is recommended that respondents mark business plans and technical information that are to be protected for five years from FOIA disclosure with a legend identifying the documents as being submitted on a business confidential basis.

g. No classified data shall be submitted within the proposal. To the extent that the project involves DoD controlled unclassified information, respondents must comply with DoDI 8582.01 and DoDM 5200.01 Volume 4. Respondents must implement the security requirements in NIST SP 800-171 for safeguarding the unclassified internal information system; and must report any cyber incidents that affect the controlled unclassified information directly to DoD at https://dibnet.dod.mil.

h. Export controls (if applicable): Research findings and technology developments arising from the resulting proposed solution may constitute a significant enhancement to the national defense and to the economic vitality of the United States. As such, in the conduct of all work related to this effort, the selected performer must comply strictly with the International Traffic in Arms Regulation (22 C.F.R. §§ 120-130), the National Industrial Security Program Operating Manual (DoD 5220.22-M) and the Department of Commerce Export Regulation (15 C.F.R. §§ 730-774).