

**STRATEGIC & SPECTRUM MISSIONS ADVANCED RESILIENT TRUSTED SYSTEMS
(S²MARTS)
REQUEST FOR SOLUTIONS (RFS)**

*in support of the
**Spectral Calibration and Noise Characterization Hardware, Methods, and
Fixtures***

Project No. 21-02A

All prospective respondents must be members of the NSTXL consortium.

- 1. Project Title:** Spectral Calibration and Noise Characterization Hardware, Methods, and Fixtures
- 2. Prototype Project Sponsor/Requiring Activity:** Naval Surface Warfare Center (NSWC) Crane, Code WGRP
- 3. Contracting Activity:** (NSWC) Crane, Code 024
- 4. Project Background & Current Capability:**

The Naval Surface Warfare Center Crane Division, Infrared (IR) / Radar Frequency (RF) Systems Technology Division, Pyrotechnics Operations is seeking prototype support to address spectral calibration and associated noise characterization of detection devices with an emphasis on spectral cameras. As the threat increases in complexity, so must the countermeasures and associated quality control / developmental measurement techniques. Changes to the measured, key performance parameters require development and validation of new testing methods, fixtures, and hardware. In order to assure accuracy of new types of measurements, strict calibration and noise characterization methods must be developed and employed. An additional complication of this task is that the developed methods and prototype fixtures may eventually need to transition to manufacturer environments to begin the creation of standards within the countermeasures industry. This work is part of the first attempt at standardization within the field of countermeasure measurement.

Cavity blackbody sources are currently used to calibrate pyroelectric detectors for infrared measurements. The current calibration procedure must be completed before every lot acceptance test event (as per current countermeasure contracts). The need for constant calibration eliminates the possibility of an outside entity performing regular calibrations. There is currently a push to move from single element pyroelectric detectors to spectral cameras. The move towards spectral cameras is necessitated by a need to perform measurements on the full visual scene during countermeasure function. Desired measurements, that are only capable with spectral cameras, include counting the number of objects in the field, determining the size/shape of objects, and

tracking/trajectory of all objects within the field of view. These capabilities do not currently exist beyond non-quantitative, subjective measurement.

NSWC Crane currently owns several spectral cameras. This new technology is currently being investigated for use in the countermeasures community. Over the past few years, spectral cameras have demonstrated excellent potential for countermeasure use during flight-testing. They are able to visually record the event and provide details as to qualitative countermeasure function. Unfortunately, the limited attempt at gathering quantitative data has struggled with verifying accuracy and correlation with ground-based, quality control measurements. These issues may be resolvable with side-by-side testing of spectral cameras along with traditional pyroelectric detectors during ground testing. Pyroelectric detectors are not sensitive enough for use during flight-testing so this scenario is not an option.

In terms of quantification of spectral camera data, inherent issues including lens irregularity, array non-uniformity, and field of view effects prevent the cameras from being accurately calibrated using current equipment and methods. Without accurate calibration, the cameras are unable to be used for quantitative measurements. As part of the calibration process, methods also need to be developed to accurately characterize the spectral response and noise characteristics. Prototype fixtures will need to be developed to align and maintain known distances between the source and camera due to the mathematics of measurement.

In addition to intensity measurements, methods to accurately measure sizes and shapes of targets in the resultant image are needed. Current pyroelectric detectors provide a single value, intensity output whereas cameras provide an entire array of per pixel intensities in addition to a visual scene of the event. This leads to a desire to perform measurements on the visual scene as well. Potential measurements include the number of objects in the field, size/shape of objects, and object tracking/trajectory. This capability does not currently exist beyond “human interpretation” (non-quantitative, subjective measurement).

As part of spectral calibration, system noise must also be characterized to fully understand and validate the resulting data. System noise has contributions from the measurement equipment, weather, scene backgrounds, cabling, connections, impedance matching, and electrical disturbances. Isolating, understanding, and minimizing this noise will allow for better calibrations that are more accurate: leading to higher quality final data. There is currently no established method to characterize noise beyond “human interpretation” of final data. Data deemed too high in noise is rejected; decreasing the sample size of testing and occasionally leading to the loss of an entire test event.

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

The government requires a complete spectral calibration and noise characterization solution. The solution needs to be fully documented including any drawings used to produce prototype hardware and fixtures. The method should have easy user setup, fixed positioning of instrumentation, and robust hardware. Solutions should be field portable and not limited to laboratory environments. The calibration method will be verified and validated by NSWC

Crane. Any software required to acquire data should be provided as both an executable file and editable code (LabVIEW is preferred).

Due to the potential large scale and long-term nature of this potential projects, (potentially ranging from 3-24 months), a collaborative partnership with NSWC Crane is key. The project will be tackled in increments that will be dictated by available project funding and technical urgency. Spectral regions of interest include but are not limited to infrared, ultraviolet, visible, and radar frequency. A generalized objective that could apply to any spectral region is provided below.

- Develop prototype instrumentation package including necessary hardware, procedures, and software (if needed) to accurately measure/calibrate spectral response as a function of wavelength. Output should be a file containing a raw data numerical table and any associated graphs.
- Design and build fixtures to hold all required hardware in alignment and at known distances.
- Develop prototype system package including hardware, procedures, and software (if needed) to accurately characterize system noise.
- Determine and implement methods for improvement of background noise such as improved fixtures, absorbing foam, background blocking devices, improved cabling, etc.

Initial funding is likely allocated for the infrared region of the spectrum with radio frequency expected to follow. Respondents are encouraged to offer a full solution. However, partial solutions are acceptable and will be evaluated by the technical assessment team. If offering a partial solution, please indicate in your response. Proposed solutions that show potential merit will be held for up to 3 years. Even if not funded in the initial effort, companies will be notified when/if new funding becomes available to begin their proposed solution. If funded later than the initial RFS release, time will be allowed to revise the proposed solution for technology changes and collaborative discussions with NSWC Crane.

6. Project Deliverables:

#	Deliverable(s)	Description	Frequency	Delivery Method
1	Monthly Status Report	Provide summary of events/actions completed during the previous month	1/Month	Electronic submission
2	Fixture Schematics	Schematic drawings of any and all prototype fixtures produced	As delivered	Electronic submission
3	Hardware Prototypes	Instrumentation or fixtures prototyped for verification/validation at NSWC Crane	As made	In-person delivery
4	System Software	Software designed for data acquisition (if needed)	As developed	In-person delivery

5	Procedures	Documentation outlining procedures for equipment operation and calibration protocols	With hardware delivery	Electronic submission
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7. Current Project Budget: \$50,000

This value represents what is currently available for the subject project at the time of the RFS release. Respondents should propose a cost that reflects the respondent’s approach and not use the budgetary estimate only. 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 Distribution Statement A, Approved for public release.

This project encompasses the following restrictions:

- a. Security Classification: A SECRET (Personnel) may be required during performance. Respondents will be asked to submit a plan on how and when they will be capable of obtaining a Secret Clearance. If the respondent already has the appropriate clearance level, they should state it in their proposal.
- b. ITAR Compliance may be required during performance. Respondents will be asked to submit a plan on how and when they will be capable of obtaining ITAR Compliance. If the respondent already has the appropriate ITAR compliance, they should state it in their proposal.
- c. Respondent Restrictions are limited to domestic companies based in the United States Only. Subcontractors/ teaming partners may not include foreign entities.
- d. Any additional restrictions applicable to this project: Any hardware and software solutions must be fully compatible with LabVIEW (current version 2019). Hardware must be Ethernet controlled (no Wi-Fi or Bluetooth).
- e. Respondents must be compliant with DODI 8582.01. “Security of Unclassified DoD Information and Non-DoD Information Systems” and DoDM 5200.01 Volume 4, “DoD Information Security Program; Controlled Unclassified Information”. Respondents must implement the security requirements in NIST SP 800-171, “Protecting Controlled Unclassified Information in Non-Federal Information Systems and Organizations”
- f. Respondents shall complete the Section 889(a)(1)(B) Prohibition on Contracting with Entities Using Certain Telecommunications and Video Surveillance Services or Equipment representation attached to this RFS (Attachment #1), and return the signed

representation with the submitted proposal.

9. Level of Data Rights Requested by the Government:

Unlimited rights: The right to use, modify, reproduce, perform, display, release, or disclose technical data in whole or in part, in any manner, and for any purpose whatsoever, and to have or authorize others to do so.

10. RFS and Response Process:

a. The following is requested from all respondents:

Proposal Volumes	Page Limitation
Technical Report	20 pages (max)
Price Response	5 pages (max)

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.

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 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.

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 9(b)(iii)(3) below 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 a Fixed Price with Payable Milestones pricing structure:

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.
 - a. The proposed milestone payment schedule shall be provided in columnar/table format with the following column headers: Task/Milestone; Timeline/date; and Payment Value. Milestone payments shall align with a meaningful project event.
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 S²MARTS (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

1. FY 2019 NDAA Section 889 (a)(1)(B) Section 889 Verification - Representation
2. FY 2019 NDAA Section 889 (a)(1)(B) Section 889 Clause
3. DD 254

14. Important Dates

- a. Questions related to this RFS shall be submitted no later than 5 February 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 Monday, March 8, 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).