



Statement of Objectives (SOO)
for
Eastern Range (ER) Agile Launch Pad Lightning
Warning System (LPLWS) Capability
Development (Upgrade)

September 2022

1 PURPOSE

- 1.1 During launch operations, the 45th Weather Squadron (45 WS) is responsible for evaluating Lightning Launch Commit Criteria (LLCC) using LPLWS measurements of ground-level electric field intensity to ensure launch vehicles are not at risk for damage by triggered lightning during the first few minutes of flight.
- 1.2 Triggered lightning is a giant spark of electricity that does not form naturally in the atmosphere. Launch vehicle-triggered lightning only occurs when a large rocket flies through a strong enough atmospheric electric field. The electric field needed to induce this is lower than natural lightning, and a cloud that is not producing natural lightning could still cause rocket-triggered lightning.

2 BACKGROUND

- 2.1 Current LPLWS capabilities burden 45 WS Launch Weather Officers (LWOs) with limitations prohibiting simultaneous launch missions and workarounds that cause launch support inefficiencies.

3 SCOPE

- 3.1 This project will include (but not be limited to) all design, material, procurement, and development (upgrade) needed to provide a complete and usable product to the Government as specified in Table 1-1 Product Backlog. The contractor must provide all labor, materials, equipment, and transportation required for the integration contractor to install new equipment and software.

4 AGILE MANAGEMENT

- 4.1 Using an agile software development approach, the contractor shall establish an iterative process to develop and demonstrate the suitability of the software builds.
- 4.2 The contractor shall improve the software by using designated timeframes in which the contractor shall develop capabilities. Metrics shall be provided per sprint and tailored to the agile development process.
- 4.3 The Government (Product Owner) and user/stakeholder community will prioritize product backlog candidates. Changes/updates to the prioritized list in Table 1-1 Product Backlog will be provided to the contractor as necessary.
- 4.4 The contractor shall provide sprint review demonstrations to prove capability improvement or discuss upgrade status. Elicit Government feedback at each sprint review to help realign upgrade and analysis efforts. Sprint reviews will be done via teleconference.

- 4.4.1 In collaboration with the contractor and end-users, the Government (Product Owner) will determine each software candidate's acceptable level of "doneness," also known as the Minimally Viable Capabilities Release (MVCR). When MVCR is reached, the contractor shall hold a sprint review to demonstrate whether the software candidate meets or exceeds the requirements and constraints outlined in this document.
- 4.5 The Government and the contractor shall collaborate on removing product backlog candidates if the candidates are determined not to be feasible or practical for implementation.

5 PERFORMANCE OBJECTIVES

- 5.1 The contractor shall support continued upgrade activities in an agile software development approach via sprints of the LPLWS to collect, process, and display data and alert users to the near real-time surface electric field and contour overlays. This will be done on a geographical background map of the Kennedy Space Center (KSC) and Cape Canaveral Space Force Station (CCSFS) areas and provide multiple simultaneous instances of all data.
- 5.2 The Government and the contractor will jointly prioritize and develop sprint backlog candidates to improve design, development, test, and delivery to the integration contractor.
- 5.3 The contractor shall procure the necessary hardware (two Host Computer servers) to upgrade and deliver the final product (all delivered sprints/capabilities).
 - 5.3.1 The two host computer servers must have the necessary specifications below at a minimum:
 - 5.3.1.1 (1) host computer will consist of: HP Proliant DL360 Gen9, 8B SFF, (2) E5-2670 V3 Twelve Core 2.3Ghz Processors, (4) 32GB RAM (128GB total), Smart Array P840ar 2GB FBWC 12Gb / 6Gb RAID, Embedded 1Gb Ethernet 4-port 331i Adapter, 2x HPE 361T 652497-B21, DVD, (8) HP 600GB 12G SAS 10K 781516-B21, Riser 2 Included, iLO Standard, TPM hardware security chip (745823-B21), (2) 800W HotPlug RPS, Sliding Rail Kit, HPE system cabinet bezel kit 664918-B21, 3 Year TekBoost NBD Part Replacement Warranty
 - 5.3.1.2 (1) host computer will consist of: HP Proliant DL360 Gen9, 8B SFF, (2) E5-2670 V3 Twelve Core 2.3Ghz Processors, (4) 16GB RAM (64GB total), Smart Array P840ar 2GB FBWC 12Gb / 6Gb RAID, Embedded 1Gb Ethernet 4-port 331i Adapter, 2x HPE 361T 652497-B21, DVD, (8) HP 600GB 12G SAS 10K 781516-B21, Riser 2 Included, iLO Standard, TPM hardware security chip (745823-B21), (2) 800W HotPlug RPS, Sliding Rail Kit, HPE system cabinet bezel kit 664918-B21, 3 Year TekBoost NBD Part

Replacement Warranty

- 5.4 The contractor shall procure Red Hat Enterprise Linux (RHEL) 7.4 operating system or higher for the Host Computer servers
- 5.5 The contractor shall apply Security Technical Implementation Guide (STIG) configuration standards to the Host Computer servers.
- 5.6 System Integration, Test, and Demonstration
 - 5.6.1 The contractor shall use an agile methodology with testable, potentially releasable deliveries (by disk or FTP file drop) to the integration contractor and Government every two weeks.
 - 5.6.2 The contractor shall provide a sprint review demonstration of how the system meets all technical requirements listed in the user stories. Note: The integration contractor will test/use each capability delivered in a sprint and provide feedback. The capability will be accepted or reevaluated for further development.
- 5.7 The contractor shall deliver a software version description (SVD) document in accordance with Data Item Description (DID) DI-IPSC-81442A.
- 5.8 The contractor will develop a sprint backlog using the product backlog in Table 1-1 and give an estimate of the quantity (number of sprints) and cost (unit price) for each group of capabilities assigned to a sprint or series of sprints. Reference the example below.
 - 5.8.1 A sprint includes analysis, design, development, internal testing, quality assurance, documentation, and demonstration of releasable code in a 2-week iteration.

Example:

| Item No. | Supplies/Services | Quantity | Unit | Unit Price | Amount |
|----------|-------------------|----------|--------|------------|--------|
| 0001 | Sprint | 1 | Sprint | \$ | \$ |

Table 1-1. Product Backlog

| Item # | User Story | Comments |
|--------|------------|----------|
|--------|------------|----------|

ER Agile LPLWS
Statement of Objectives

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|-----|---|--|
| 1 | <p>Extreme positive and negative electric Field Mill (FM) spikes (thousands of volts per meter) are observed during periods of standard measurements. FMs 2, 4, 7, 9, 15, 17, 19, 22, 29, 30 & 32 have shown a 1/50th of a second spike in electric FM readings with a coincident 1-second spike in precipitation data. Analyze the data to determine the root cause(s) and provide solution(s). Confirm whether other FMs (1, 5-6, 8, 10-14, 16, 18, 20-21, 24-28, 31 & 34) are manifesting same issue(s).</p> | <p>Consult with field mill subject matter experts (Thunderstorm Technology) as necessary to find the root cause.</p> |
| 2 | <p>The LPLWS workstations will allow individual users to configure and display mission parameters independent of other workstations.</p> | |
| 2.1 | <p>Protect critical site data from being lost or overwritten whenever users add or modify critical site data on an individual workstation.</p> | |
| 2.2 | <p>Recall user stored configuration data at login and restore last used user configuration data during a warm or cold restart of workstations.</p> | |
| 3 | <p>The LPLWS shall highlight all field mills within a user-selectable radius from a critical site center point when a threshold is met/exceeded.</p> | |
| 4 | <p>An improved graphical display of the Kennedy Space Center (KSC) and Cape Canaveral Space Force Station (CCSFS) regional field mill sites using green for landmass and blue for water, depicting accurate landmass coastlines and using contrasting colors between text and map.</p> | <p>Map from the legacy system can be used.</p> |
| 4.1 | <p>Represent accurate field mill locations on the geographical display.</p> | |

| | | |
|---|---|--|
| 5 | Displays update once per second. | Data occasionally does not update until the keyboard or mouse is moved. Launch Weather Team (LWT) experienced occasions when the display appeared frozen, and values did not update until the LWT moved the mouse or pressed a keyboard key. |
| 6 | Provide the capability to select an FM averaging rate from 1 second to 10 minutes at 1-second intervals. Display the averaged values at the selected update/refresh rate. Lightning Launch Commit Criteria (LLCC) requires that a 1-minute average be selected. | Does not interfere with the real time data flow described in item #5. |
| 7 | The ability to configure and simultaneously monitor and display up to ten (10) rules per critical site. Tabular display of all field mills with user-defined field mill groupings for each Launch scenario, workstation, and launch site. | |
| 8 | Monitor rainfall in 1-min, 1-hr, 3-hr, 6-hr, 12-hr & 24-hr increments. The ability to specify any time increment between 1-min and 24-hrs would be ideal. Data older than 24-hrs would be best viewed on the archive site. | |

6 Cybersecurity

- 6.1 The contractor shall distribute software releases via officially released packages containing, at a minimum, modified software baselines, updated software version descriptions, installation procedures, operator checklists, system/training documentation, and results of developmental tests.
- 6.2 The contractor shall maintain physical and logical source lines of code counts for all developed software.

- 6.3 The contractor shall establish a monitoring procedure to track the status of reported deficiencies discovered in vendor products.

7 DELIVERY AND PERIOD OF PERFORMANCE

- 7.1 Delivery of a complete functional Display System, conforming to the requirements herein, is required within 12 months of contract award. The Government is planning for the LTRS Integrated Support Contract (LISC) contractor to conduct the integration of the capabilities to the existing operationally accepted system. The current schedule for the LISC contractor requires contract award NLT 7 November 2022.

8 ADMINISTRATIVE AND PROGRAM SUPPORT

- 8.1 The contractor shall be available for program reviews and project meetings.
- 8.2 The contractor shall schedule and facilitate a technical development team/Government kickoff meeting within seven (7) calendar days after beginning performance to review and clarify, as required, candidates in Table 1-1 listed in section 5. This meeting must also identify the development team and Government contact points, including names, email addresses, and phone numbers. Meeting may be conducted via teleconference/video conference or in-person at government facilities.
- 8.3 The contractor shall provide "hands-on" user training to SLD 45 personnel at CCSFS or via video conference once the final capability has been delivered but before the end of contract performance.
- 8.4 Contract Data
- 8.4.1 Data Rights. The contractor shall deliver technical data in accordance with Defense Acquisition Regulation Supplement (DFARS) 252.227-7017. The Government will be offered options of data rights/licensing for any modifications made to the commercial data provided to and paid for by the Government resulting from capabilities specified in Table 1-1 of this SOO.
- 8.4.2 Data Deliverable Requirements. All deliverables generated in support of SLD 45's program shall be submitted to the Government in accordance with requirements specified in the DD Form 1423s, Contract Data Requirements Lists.
- 8.4.3 Data Preparation. Data preparation instructions are identified on individual DD Form 1664s authorized by the Department of Defense Acquisition Management System and the Data Requirements Control List (DoD 5000.19L, Vol II).

9 TASK DELIVERY

- 9.1 Solution agnostic, but the speed of delivery of performance is the bottom line.

10 PROJECT MANAGEMENT

10.1 Program management support should aid the delivery process of the development cycle.

11 SYSTEMS ENGINEERING

11.1 The contractor will determine whether the existing system's performance baseline and the modification design concept will enable current operational capabilities to be met or exceeded.

11.2 In the event of any changes, the contractor will update and maintain the technical data package information including, but not limited to:

11.2.1 Software Maintenance Manuals

11.2.2 Users Manuals

11.2.3 Products (Software and Firmware)

11.2.4 Interface Control Documentation (ICDs)

11.2.5 Technical Orders (TOs)

12 Demonstration

12.1 Per the agile management section 4, a demonstration can be completed via video teleconference (VTC).

13 LOCATIONS

13.1 Government facilities at Patrick Space Force Base (PSFB) and/or CCSFS, Florida

13.1.1 LTRS Sustainment System (LSS)

13.1.2 CCSFS MOC Rooms 146.1 and 140

13.1.3 CCSFS Hangar T Operations and Maintenance

13.2 Contractor location(s)

14 DELIVERABLES

14.1 Contract Data Requirements List (CDRL)

14.1.1 Sprint Backlog

14.1.2 Test procedures and results

14.1.3 SVD updates

14.1.4 Release notes (describes changes made to satisfy a user story)

14.1.5 Sprint Demonstration

14.1.6 Final Product (including data, etc.) by disk or FTP file drop

14.2 Non-CDRLs

14.2.1 The contractor will identify non-CDRLs commensurate with their proposal's project scope and technical solution.

15 LIMITATIONS/DEPENDENCIES

15.1 Delivered capabilities will not use an operating system version beyond Red Hat Enterprise Linux 7.4 (RHEL 7.4) – supported by Windows OS.

15.2 Deliver all test documentation related to the upgrade of the desired capabilities described in this SOO, including, but not limited to, Factory Acceptance Test (FAT), level 2 test report (with test descriptions and test results), and capabilities' test solutions (with test descriptions and test results) to the LISC contractor.

15.3 The ER Launch Schedule takes precedence over contractor schedules.

15.4 Funding will be incremental due to options within the contract.

16 ACRONYM AND ABBREVIATION LIST

| Acronym | Acronym Expansion |
|----------------|---|
| 45 WS | 45 th Weather Squadron |
| CCSFS | Cape Canaveral Space Force Station |
| CDRL | Contract Data Requirements List |
| CONS | 45 th Contracting Squadron |
| DD | Department of Defense |
| DFARS | Defense Acquisition Regulation Supplement |
| DID | Data Item Description |
| DT&E | Developmental Test and Evaluation |

ER Agile LPLWS
Statement of Objectives

| | |
|--------|---------------------------------------|
| ER | Eastern Range |
| FAT | Factory Acceptance Test |
| FL | Florida |
| FM | Field Mill |
| ICD | Interface Control Document |
| KSC | Kennedy Space Center |
| LISC | LTRS Integrated Support Contract |
| LLCC | Lightning Launch Commit Criteria |
| LPLWS | Launch Pad Lightning Warning System |
| LSS | LTRS Sustainment System |
| LTRS | Launch and Test Range System |
| LWO | Launch Weather Officer |
| LWT | Launch Weather Team |
| MOC | Murrell Operations Center |
| MVCR | Minimally Viable Capabilities Release |
| PCO | Procurement Contracting Officer |
| PSFB | Patrick Space Force Base |
| RHEL | Red Hat Enterprise Linux |
| RM | Range Management |
| SE&I | Systems Engineering and Integration |
| SFB | Space Force Base |
| SLD 45 | Space Launch Delta 45 |

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| | |
|-----|------------------------------|
| SOO | Statement of Objectives |
| SVD | Software Version Description |
| TO | Technical Order |
| VTC | Video teleconference |