

Space Debris Information System (SDIS) Redesign
Request for Proposal

1. BACKGROUND

Institute for Orbital Resources (IOR) is a United States Space Monitoring Agency (USSMA) Field Operating Activity (FOA) located within the Washington, D.C. National Capital Region (NCR), in Alexandria, VA, with satellite centers in Davis, CA, and Golden, CO. IOR was created in 2018 to analyze and anticipate changing orbital resources management conditions and to develop planning methods and analytical tools to address economic, social, institutional, and environmental needs in orbital resources planning and policy. IOR is currently responsible for several orbital resources activities or programs, including evaluation of strategic plans, policies and programs, investment and financial analysis, performance measurements and evaluations, infrastructure analysis, and other orbital related activities.

IOR seeks services and support to maintain and enhance one of its orbital debris database systems through iterative agile development with multiple working interim releases. These services are requested for the Space Debris Information System, which utilizes an Oracle database and is hosted on Solaris or Linux servers (internal to USSMA) and utilizes and RDS and Linux application server in the AWS GovCloud (the target for this development work).

Space Debris Information System (SDIS): The SDIS is used to keep track of information relating to USSMA debris control jobs, to include both USSMA and industry executed jobs. The data includes all phases of debris control jobs from the planning process through the completion of the job. SDIS is only accessible by USSMA employees on the internal network who are responsible for inputting and updating the data relevant to the debris control job. The site is managed by a USERID/Password system. Data extracts from the SDIS are available either through a database application hosted on the DMZ, and/or through static files available on the IOR public website.

In 2022 SDIS was identified as a system that could be enhanced to increase data availability, completeness, and timeliness while reducing user input burdens. Some work has been done to move forward along this path, but the intent of this PWS is to create a new, fully functional, and deployed version of SDIS that incorporates these required changes and a need for open data exchange.

2. SCOPE

Using Agile development practices, this PWS will deliver multiple incremental, but usable, updates to the Space Debris Information System. These will be referred to as

sprints. The goals of these sprints will be determined and prioritized by the needs identified by a USSMA PDT, e.g., through user stories, and tracked for execution and the fulfillment for requirements by a third-party Agile PM/Scrum master.

As technology has progressed, USSMA has adopted additional systems that capture similar or identical data to SDIS. For contract tracking, the Vital Contracting Enterprise (VCE) system houses all data related to contract content and competition. For contract execution tracking, the Reliable Management System (RMS) houses all data for contracted debris related work, including costs and work performed. For spatial tracking, the Debris Quality Management (DQM) program tracks debris orbital position and containment state, as well as an estimate of cubic yards actively being removed through specific gravity estimates. USSF financial and project management systems (SFFMS and P1) can be used to track internal and contractual spending for orbital debris projects. This PWS aims to use as much of this external data as possible to change the purpose of the SDIS from strictly data input to an enterprise orbital debris data warehouse and data dissemination tool.

The contractor is expected to create a data model that integrates these existing capabilities into a data entry/data warehouse concept that requires as little additional data entry as possible for comprehensive reports/extracts. For those data elements that still require input, the contractor is expected to create new streamlined data entry methods. Existing data systems include, but are not limited to Space Monitoring Financial Management System (SMFMS), Space Works Integrated Funding Database (SWIFD), P1, Reliable Management System (RMS), Space Monitoring Business Intelligence (SMBI), and Debris Quality Management (DQM).

The contractor is expected to meet with IOR personnel frequently to obtain requirements, translate those requirements into mockups, seek approval of the mockups, and provide working prototypes of functionality. This process will be followed multiple times throughout the Period of Performance.

The contractor is expected to take place in meetings with the responsible parties of other Government systems, primarily those mentioned in this document, to create a comprehensive dredging data model and data warehouse.

The overall final deliverable of this PWS is a new version of the SDIS software, inclusive of the front-end interface and back-end database, which combines data from multiple Government systems to deliver a one-stop-shop for orbital debris data. This new software will need to create and utilize an application programming interface (API) for data entry and data outputs (both via reports and ingestion by other systems).

The contractor shall provide technical support to redesign the SDIS. Any implemented changes should be made 508 compliant and be updated in accordance with SMIT/Cloud system changes, mandatory USSMA software updates, and other equipment issues.

The contractor team shall provide code that is accurate, understandable, and contains inline source comments for documentation. The code should be in accordance with and acceptable to the Defense of Department (DoD) code repository Defense Intelligence Information Enterprise (DI2E) or an equivalent, which will be used as the main code repository and task tracking tool. The contracting team shall provide all documentation, diagrams, and artifacts necessary as part of the Risk Management Framework (RMF) process to maintain the SDIS Authority to Operation (ATO) as a part of SMBI. The deliverables and any recommendations should recognize and adhere to current Space Monitoring Agency IT policy.

These systems are currently hosted at the Redstone Processing Center inside the SMA Network, but active development should target the SMBI Cloud (AWS). All proposed changes should be developed with the idea that information with need to be quickly and easily passed between Amazon Web Services (AWS), Azure, and USSMA infrastructure.

The contracting team is expected to work with the Contracting Officer Representative (COR), the Technical Point of Contact (TPOC) and the IOR Project Delivery Team (PDT) to ensure technical accuracy, clarity and appropriateness of key software and documentations while balancing project tasks, deadlines, and deliverables. All code and deliverables developed are the property of USSMA.

This contract is seeking Agile and DevOps development support for the creation and deployment of software. Continuous Operations & Maintenance of this software is not being sought under this contract.

The contracting team should be familiar with the USSMA Civilian Work-Partner Program, specifically the orbital mechanic's mission. The contracting team should have a basic understanding of orbital debris tracking operations. The contractor team should understand the basics of USSMA project management as it pertains to the planning, award, and execution of a dredging activity. The contractor shall have extensive technical knowledge of programming in Oracle databases, Oracle APEX, and Oracle Rest Data Services (ORDS) to make the necessary revisions to the relevant systems. In addition to these general skills and experience, the contracting team should also possess the following:

- Knowledge and experience in developing and maintaining a relational database operated from a data center or the Amazon Web Services (AWS cloud).
- Knowledge and experience of data entry and options to increase automation and efficiency.
- Knowledge and experience of data transfers between multiple clouds/networks.
- Knowledge and experience with the development of applications for smart phones and tablets.
- Knowledge and experience in optimizing the performance of existing Oracle based applications, including procedures, functions, etc.

- Knowledge and experience with creating data services, for example Representational State Transfer (REST) services, utilizing common data dissemination formats.
- Knowledge and experience with making websites 508 compliant.

While this PWS assumes an Oracle database and Oracle APEX UI solution, the Government is open to other equivalent possibilities that are in alignment with SFBI and/or USSF practices.

3. GENERAL REQUIREMENTS

The following sub-sections provide details of various general requirements for this effort.

3.1. Non-Personal Services

The contractor shall provide strictly non-personal services; contractor employees are not subject to direct supervision and control by the government. The contractor shall advise and support the government but shall not make final decisions or certifications on behalf of the government nor perform any inherently governmental functions. The contractor and its employees shall not represent the government nor appear to represent the government in performance of these contract services. Contractor personnel shall clearly identify themselves as contractor employees in all interactions during contract performance.

3.2. Place of Performance

All work will be performed at the contractor's physical site.

3.3. Period of Performance

The period of performance is 12 months from award.

3.4. Materials

All materials, minus expendable supplies, purchased by the contractor with funds from this task order and used under this task order, become, and remain the property of the government. This is to include all created or altered source code.

3.5. Travel

The contractor shall provide services necessary to plan and schedule travel and travel shall be reimbursed in accordance with Federal Acquisition Regulation (FAR) 31.205-46. The contractor shall be reimbursed for actual allowable costs

and not to exceed the amount allowed in the Joint Travel Regulations (JTR). No fee is allowable on travel costs. No travel is expected.

4. PERFORMANCE REQUIREMENTS (TASK AREAS)

4.1. Technical Documentation

The contractor shall provide required documentation to comply with IOR, SMIT, Space Monitoring Agency, DoD, etc. requirements. Documentation includes, but is not limited to, documented source code, OV-1 DoDAF diagrams, database entity relationship diagrams (ERDs), schema diagrams, networking models, business process diagrams, and environment model/catalogues detailing components related to these systems (host names, IP addresses, open ports, services used, etc.). Documentation must meet the needs of a continued ATO through the RMF Process.

The Contractor shall provide easily understandable metadata dictionaries describing the new database and data services, such that other groups within USSMA can easily understand and digest information.

4.2. System Design and Planning

The contractor shall coordinate with IOR's Agile coach and practitioner to rapidly plan, communicate, develop, and deploy the deliverables required in this PWS. The contractor coordinate with IOR's Agile coach and practitioner to develop project management documentation (schedule, quality management plan, implementation plan, etc.), which is to be agreed upon by USSMA before being finalized.

The contractor shall coordinate with technical representation of other Government systems to identify ways to link those systems with SDIS.

The contractor shall consult with USSMA to understand existing business processes and propose new consolidated and streamline processes to USSF for evaluation.

4.3. Redesigned Space Debris Information System

The contractor shall create and deploy a new SDIS, to include a new database design, front end interface, business process, and design for data to flow to and from disparate network segments. Attached appendices A – D are to be used as references for this design, but the design should be a new start. It is expected

that the contractor will need to develop the design with inputs from technical representation of other Government systems.

The new user interface for SDIS shall be designed with ease of use and ease of data access in mind. The new interface shall be demonstrated as wireframes to USSMA before design begins.

The contractor shall be responsible for creating the requirements of the new system (e.g., database and virtual server specifications) which is to be agreed upon by USSMA before being finalized. The contractor shall be responsible for overseeing the creation of this new environment (e.g., through the creation of tickets for and coordination with those performing the work). It is expected that this system will fit within current standards for development practices (e.g., having a Development, Testing, and Production environment). The contractor shall be responsible for code deployments between environments. The contractor shall automate builds and deployments between environments where possible, and explicitly document how migrations are to be done where automation is not possible.

The contractor shall SMCAC enable the redesigned SDIS.

The contractor shall provide data services and APIs to the redesigned SDIS to allow data consumption without direct database connections.

The contractor shall execute the overall redesign through tri-weekly design sprints. These sprints, based off user stories/USSMA requirements will deliver iterative working software once every three weeks. **This amounts to an estimated 18 sprints.**

4.4. Transform Data into SDIS 2.0 Format

This task is to develop methods to transform existing data into the same format such that it can be seamlessly imported into the new database model. This code should be written such that IOR team members can run this code from the existing Oracle 12c database utilizing SQL and/or PL/SQL.

The contractor shall develop and execute code to transform SDIS 1.0 data into a SDIS 2.0 database. The contractor shall provide an Excel or CSV export of the data transformation into the SDIS 2.0 format for the Fiscal Year 2021, this example transformation will be used for testing the fitness of the code which provides the transformations. Once the example has been verified, the contractor shall deliver the code to IOR to perform extract-transform-load (ETL) procedures themselves.