

JUSTIFICATION For OTHER THAN FULL AND OPEN COMPETITION (JOFOC)
(In accordance with Federal Acquisition Regulation (FAR) 6.3 – Other than Full and Open Competition)
Systems Engineering Support for Two GSFC International Space Station Payloads

1. This document is a justification for other than full and open competition prepared by NASA's Goddard Space Flight Center (NASA's GSFC):

The procuring agency is NASA and the contracting entity is NASA's Goddard Space Flight Center (NASA's GSFC). This document justifies the determination for using other-than-full-and-open competition.

2. The nature and/or description of the action being approved:

NASA's GSFC proposes to contract with Lockheed Martin Space Systems Company (LMSSC) for approximately 18-months to provide systems and discipline engineering support for the development and execution of 2 International Space Station (ISS) Infrastructure Demonstrations designed to be launched on either a space shuttle or a Government provided expendable launch vehicle. The contract also includes the continuation of research in the cutting edge of in-space servicing technology.

The proposed cost plus fixed fee contract will include the following efforts related to the ISS demonstrations: requirements definition and verification, hardware design, support of flight hardware fabrication, development of avionics, assembly of ground support equipment (GSE) and harnesses, software development support, interface control planning and documentation, mission planning, support of mission execution, and mission analysis.

Infrastructures Demonstrations

NASA Headquarters has directed GSFC to develop and implement 2 Station Development Technical Objectives (SDTOs). The ISS Infrastructure Demonstrations described below, which are intended to show the feasibility of on-orbit refueling and precision pointing capabilities, will increase NASA's technical capability to conduct in-space servicing. These demonstrations are designed to operate on the ISS as SDTOs. The development of the Infrastructure Demonstrations is being managed by NASA's GSFC, Space Servicing Capabilities Office, Code 442.

The Contractor will design flight hardware and GSE as well as support the fabrication effort done through the NASA's GSFC Building 5 manufacturing shop or through other contracts. Nearly all the flight hardware will be provided by the Government with the exception of the GSE, avionics and harnesses, which are to be fabricated and assembled by the Contractor. The Contractor will provide the integration and testing support as well as the necessary program management and quality assurance to support the contract activities. The Contractor will coordinate the interfaces and required documentation with the Johnson and Kennedy Space Centers. The ISS Infrastructure Demonstrations will be the prime focus and will make up the majority of the effort of the GSFC's Space Servicing Capabilities Office.

Robotic Refueling Demonstration - In preparation for the potential refueling of an orbiting spacecraft, the Robotic Refueling Demonstration will perform representative tasks required to refuel a spacecraft using its ground fuel fill-and-drain valve. The demonstration will use the 2 armed ISS robot, Dextre. Dextre, which is the short name for the Special Purpose Dexterous Manipulator, is part of Canada's contribution to the ISS, and was added to the ISS in March 2008. In this demonstration, Dextre must locate and access the fuel valve, uncap the valve, open the manual valve, and transfer the liquid fuel simulant through the tool interface into the fill-and-drain valve. Once the flow of liquid is stopped, Dextre then closes the valve and disconnects the tool from the simulated spacecraft interface. In addition, Dextre will perform a variety of general robotic operations using a "busy board" to demonstrate potential servicing scenarios. Dextre will execute the refueling demonstration and the general robotic operations over a 6-month period during the 2-year operational life of the mission.

Dextre Pointing Package (DPP) - To expedite the development of new sensors, detectors, and instruments, which require accurate pointing, the contractor will support the development of a package to enhance the Dextre robot's precision pointing capabilities. Sensors or other payloads will be mounted onto the DPP, which will be attached to one of Dextre's arms. The DPP will control the Dextre robot to keep it pointed at a designated target as the ISS orbits Earth. Using the Dextre robot to perform the positioning and pointing eliminates the need for an expensive pan and tilt system. The DPP will have an operational life of 2-years and demonstrate precision pointing control and stability, track fixed targets, and perform payload change outs.

The Contractor shall also be responsible for incidental related efforts regarding the development of servicing technologies, such as navigation sensors, servicing tools, robot end-effectors, and simulations, as well as potential support for integration of other science experiments on the ISS, which may be designated by NASA Headquarters.

3. Description of the supplies or services required, including an estimated value:

The Contractor will provide Systems Engineering services valued at an estimated "[text redacted]". The Contractor's effort will include requirements definition and verification, hardware design, support of flight hardware fabrication, development of avionics, assembly of GSE and harnesses, software development support, interface control planning and documentation, mission planning, support of mission execution, and mission analysis. The Contractor will provide integration and testing support as well as the necessary program management and quality assurance to support the contract activities. The Contractor will coordinate the interfaces with the Johnson and Kennedy Space Centers and develop the required documentation.

4. Statutory authority permitting other than full and open competition:

The statutory authority permitting other-than-full-and-open competition is 10 U.S.C. 2304(c) (1), as implemented by FAR 6.302-1 - only one responsible source.

5. A demonstration that the proposed Contractor's unique qualifications or the nature of the acquisition requires use of the authority cited:

NASA Headquarters has directed GSFC to have the first of the two SDTOs, the Robotic Refueling Demonstration, ready for launch and shipped to the Kennedy Space Center in October 2010, for launch on STS-133. To ensure the SDTOs can be launched at the earliest possible date, NASA Headquarters is requiring both SDTOs to be able to be launched on either a Government-provided expendable launch vehicle or the space shuttle.

The body of knowledge and experience accumulated by LMSSC and its subcontractor team during nearly 20-years of on-orbit servicing activities makes it the only responsible source capable of meeting the technical and schedule requirements. The LMSSC team has unique knowledge and experience in several specific areas required for this effort: in-space servicing, flying a payload on a man-rated vehicle, working with the Dextre robot, developing in-space servicing tools, interfacing with the ISS infrastructure, and performing systems engineering support for the above in accordance with an aggressive schedule requirement.

The Agency has identified the ISS Infrastructure Demonstrations as critical actions necessary to assess the feasibility of technologies related to in-space servicing. These demonstrations are required to be designed to operate safely in the astronaut EVA environment of the ISS. LMSSC's involvement with the HST servicing missions not only has given them experience in the critical systems engineering skills required for planning, developing and executing in-space servicing, but also has resulted in them developing an in-depth knowledge and unique experience designing hardware to fly on a man-rated launch vehicle and operate in the man-rated environment of the ISS. The LMSSC team has been working with NASA Space Safety Standards and Procedures for Human Rating Requirements (NSTS 07700) for over 20-years. Expert knowledge of the volumes of documentation necessary to fly this hardware in an astronaut-rated environment is critical, especially given the near-term to meet the planned launch date.

In addition to having experience with designing for an astronaut-rated environment, LMSSC is also experienced with the Dextre robot aboard the ISS. LMSSC competitively won the prime contract for spacecraft development and systems engineering on the HST Robotic Servicing and De-orbit Module (HRSDM) Project, and took the Project through a fully successful PDR only 6-months after contract award. During that effort the Project took delivery of a Dextre robot that had been built for the ISS. The LMSSC team did extensive work with Dextre, learning how to program it to do numerous robotic tasks using Dextre, including removing and reinstalling a full-scale mock-up of the Wide-Field Camera into the HST High-Fidelity Mechanical Simulator as well as disconnecting and reconnecting the battery connectors on a mock-up of the new batteries. The LMSSC team continued to gain a more intimate working knowledge of the Dextre robot as the development of robotics capability continued at a low level after the HRSDM mission was cancelled. The extensive knowledge of robotic servicing gained by LMSSC and its understanding of the workings of Dextre has produced engineering results critical to the successful performance of this SDTO, especially within the timeframe needed to meet the accelerated schedule of this mission.

LMSSC team members have extensive experience developing hardware for the ISS, including the Cargo Transport Container, ExPRESS Logistics Carriers (ELC), the External Stowage Platform, Materials International Space Station Equipment 7, and Commercial Orbital Transportation Services. The hardware developed by the LMSSC team has interfaced with many of the ISS standard interfaces including the Common Attachment System, Flight Releasable Attachment Mechanism (FRAM), and Common Berthing Mechanism. This knowledge and experience is critical for both the Refueling Demonstration and the DPP which will both be mounted on the ISS structure. This knowledge will also be used in assisting other GSFC experimenters in integrating their experiments to the ISS and assisting them in understanding the JSC required documentation for attaching to the ISS.

A critical aspect of both manned and robotic in-space servicing is developing the tools to be used in the space environment. In addition to being adapted for the space environment, the tools need to compensate for the limited dexterity of an astronaut wearing gloves, or a robotic arm. The LMSSC team has unique and extensive experience in space-rated tool development required for five previous HST servicing missions and has been working with NASA on developing robotic tools since the HRSDM mission. They are familiar with servicing tool development and the characteristics of the Dextre robot. Tool development is a critical aspect of in-space servicing. An experienced team is essential to keeping cost down and the mission on schedule.

No other contractor possesses the combination of the in-space servicing expertise, in conjunction with the familiarity with the hardware interfaces, of LMSSC and its subcontractors. No other contractor can prepare, develop, and implement the flight demonstrations on the ISS with a similar level of safety and efficiency in the time required. The Government would incur significant additional costs and delays should this effort be competed. Another contractor would expend substantial additional time and effort and still not acquire the level of knowledge and experience of servicing systems, man-rated payloads, tool development, and the ISS infrastructure that LMSSC's team already possesses.

LMSSC is the only company that has managed a contract for in-space satellite servicing for nearly 20-years. LMSSC became the prime contractor for servicing the Hubble Space Telescope soon after the Observatory's launch in 1990. Since that time, LMSSC has been responsible for servicing preparation, including development and delivery of spacecraft servicing hardware and planning servicing mission executions. LMSSC was also the prime contractor for the HRSDM where they worked with the Dextre robot. The full breadth and depth of LMSSC's spacecraft servicing knowledge and expertise make LMSSC the only potential offeror capable of providing the planning, systems engineering, and development required for this mission, particularly in light of the aggressive schedule for shipping the required flight hardware to the KSC by October 2010, for launch.

6. Description of the efforts made to ensure that offers are solicited from as many potential sources as practicable, including whether a notice was or will be publicized as required by Federal Acquisition Regulation (FAR) 5.202:

Based on the required expertise and program constraints described above, efforts to solicit more than one source for this procurement were not considered as a viable alternative. The

procurement was synopsisized on the NASA Acquisition Internet Service (NAIS) to ensure that any other potential offerors have the opportunity to express their interest in proposing to meet the requirements. (See item 10 for results.)

7. A determination by the contracting officer that the anticipated cost to the Government will be fair and reasonable:

A cost analysis will be performed as described in FAR 15.4. LMSSC will be required to submit a proposal that will be evaluated and negotiated by the Government. The Contracting Officer will utilize all sources such as the Defense Contract Audit Agency and Government technical and financial representatives in determining a fair and reasonable cost.

8. Description of the market research conducted, and the results, or a statement of the reasons market research was not conducted:

No formal market survey was conducted for the proposed acquisition. GSFC technical personnel are familiar with the aerospace industry's experience with in-space servicing and in-space robotics as well as experience with regulations required to fly on the space shuttle and to operate on the International Space Station. Given the technical, operational, and safety constraints described above, LMSSC is the only company capable of performing this effort.

9. Other facts supporting the use of other than full and open competition:

Although the technical data requirements are nearly defined and the Statement of Work is prepared, there is not sufficient time for a formal competitive acquisitions process to take place, since flight hardware must be shipped to Cape Canaveral in less than 7 months. It is necessary to use a highly successful and integrated team familiar with the space shuttle and the ISS programs, including their documentation and safety requirements. The LMSSC team is familiar with robotics and servicing issues and has extensive experience with preparing flight hardware to interface with the space shuttle and the ISS structure and services. With LMSSC being the only company that has managed a similar effort, the additional time for the learning curve of another company would add significant cost and unacceptable schedule risk to the effort, in effect duplicating the learning process LMSSC has undertaken over the past 20-years.

The Government's estimate of the time needed to complete the above-described development activities requires using the highly experienced team, familiar with Dextre and experienced with the previous successful in-space servicing implementations that required similar highly condensed schedules. LMSSC's previous servicing activities are well matched to the highly aggressive schedule and the specific types of systems and discipline engineering required to meet the schedule requirements of NASA headquarters. No other contractor will be able to achieve a similar total output at the same cost and within the same timeframe.

The LMSSC team is the only known source with the capability to provide robust flight demonstrations with the fast turnaround required while working with the personnel at JSC and KSC to streamline the normal pre-launch process to make these two STDOs possible in the required timeframe.

10. Sources, if any, that expressed an interest, in writing, in the acquisition:

The synopsis was posted to the Federal Business Opportunities (FedBizOps) webpage on March 19, 2010, with a closing date of April 3, 2010. No other company submitted a valid expression of interest and/or the capability to perform this work. One company did, through the automated FedBizOps website, request to be notified of future announcements related to this procurement. However, they did not contact the Contracting Officer nor describe their qualifications or capabilities to perform the described work, which was required by the synopsis. Therefore, no information was received in response to the synopsis to alter the Government's intent to proceed on a sole source basis with the LMSSC team.

11. The actions the Agency may take to remove or overcome any barriers to competition before any subsequent acquisition for the supplies or services required:

Future servicing demonstrations are not anticipated to fly on the space shuttle, and will be varied in nature increasing the potential for competition. Therefore, it is our intention to compete future on-orbit servicing efforts.