



- ◆ **Welcome and Opening Remarks** **Mr. Robert Lightfoot, Director of Marshall Space Flight Center**

- ◆ **NASA Human Exploration and Operations Mission Directorate (HEOMD) Perspective** **Mr. Dan Dumbacher, NASA Deputy Associate Administrator for HEOMD**

- ◆ **Introduction of U.S. Air Force** **Ms. Jody Singer
Deputy Program Manager
Marshall Space Flight Center**

- ◆ **SLS Program Overview** **Ms. Jody Singer**

- ◆ **NRA Overview** **Ms. Mindy Niedermeyer, Chairperson
Marshall Space Flight Center**

- ◆ **NRA Model Contract** **Ms. Monica Heidelberg, Contracting Officer
Marshall Space Flight Center**

- ◆ **Questions**

- ◆ **Networking**





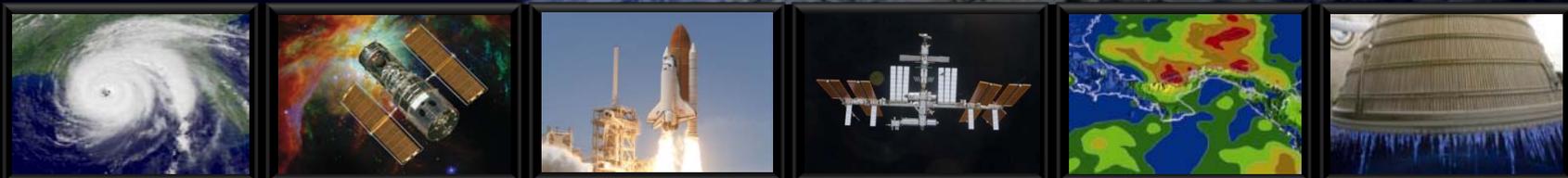


Space Launch System (SLS) Program Overview

Advanced Development
NASA Research Announcement (NRA)
Industry and Academia Day

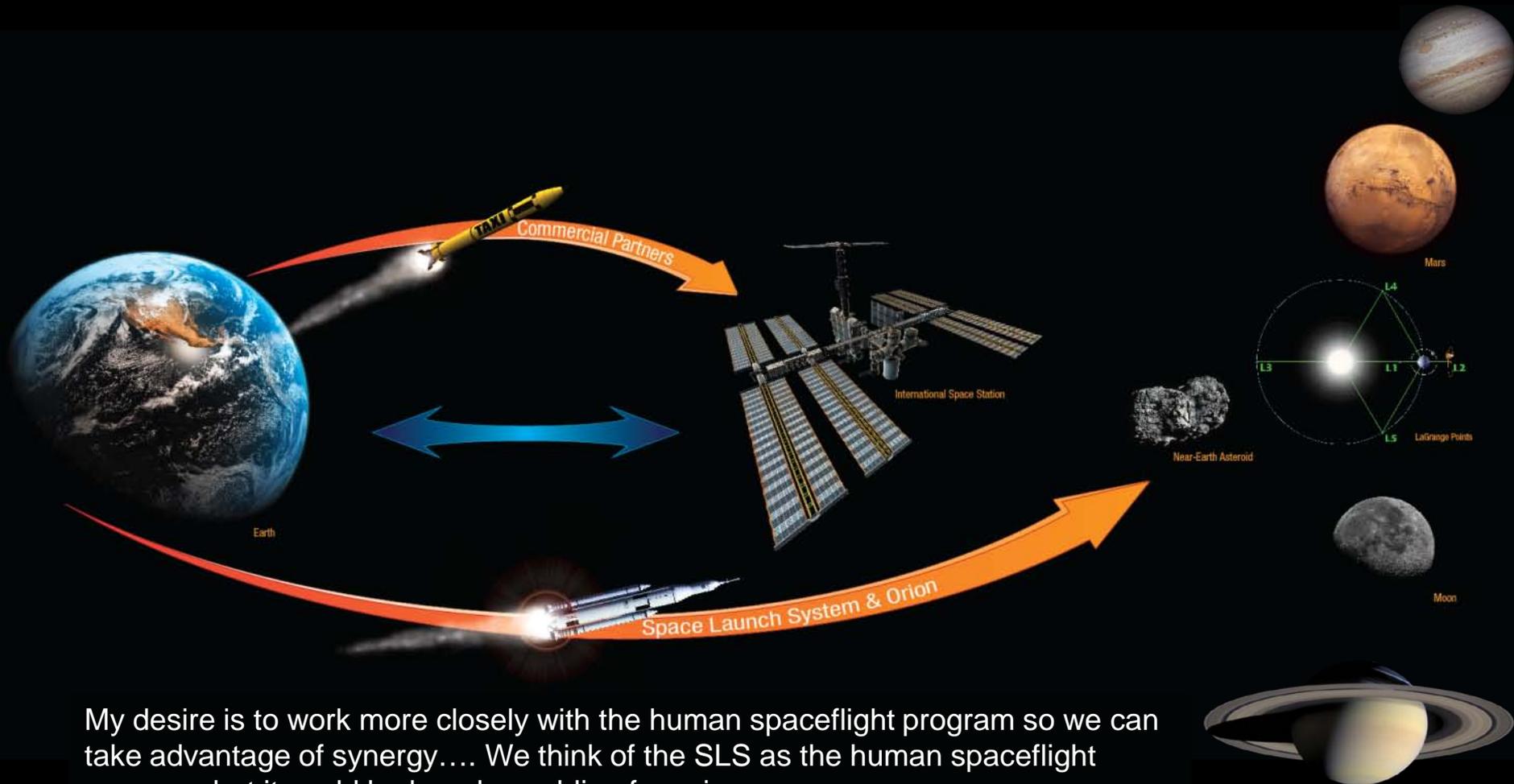


Space Launch System



Jody Singer, SLS Deputy Program Manager
NASA Marshall Space Flight Center
February 14, 2012

The Future of Exploration



My desire is to work more closely with the human spaceflight program so we can take advantage of synergy.... We think of the SLS as the human spaceflight program, but it could be hugely enabling for science.

— John Grunsfeld, Associate Administrator
NASA Science Mission Directorate
Nature, Jan 19, 2012

- ◆ **The Congress approved and the President signed the National Aeronautics and Space Administration Authorization Act of 2010.**
 - Bipartisan support for human exploration beyond low-Earth orbit (LEO)
- ◆ **The Law authorizes:**
 - Extension of the International Space Station (ISS) until at least 2020
 - Strong support for a commercial space transportation industry
 - **Development of Orion Multi-Purpose Crew Vehicle (MPCV) and heavy lift launch capabilities**
 - A “flexible path” approach to space exploration, opening up vast opportunities including near-Earth asteroids and Mars
 - New space technology investments **to increase the capabilities beyond Earth orbit (BEO)**



This rocket is key to implementing the plan laid out by President Obama and Congress in the bipartisan 2010 NASA Authorization Act.

*— NASA Administrator Charles Bolden
September 14, 2011*



Delivering on the Laws of the Land ... and Obeying the Laws of Physics

◆ Safe: Human-Rated

◆ Affordable

- Constrained budget environment
- Maximum use of common elements and existing assets, infrastructure, and workforce
- Competitive opportunities for affordability on-ramps

◆ Sustainable

- Initial capability: 70 metric tons (t), 2017–2021
 - Serves as primary transportation for Orion and exploration missions
 - Provides back-up capability for crew/cargo to ISS
- Evolved capability: 105 t and 130 t, post–2021
 - Offers large volume for science missions and payloads
 - Modular and flexible, right-sized for mission requirements



SLS First Flight in 2017



- ◆ **Utilize an evolutionary development strategy that allows for incremental progress within constrained budgets.**
- ◆ **Incorporate mature technical solutions into SLS program-phased block upgrades.**
- ◆ **Optimize use of common elements and existing assets for a flexible/modular design.**

Improve Affordability, Reliability, and/or Performance

SLS Sustainability Begins with Affordability



◆ Evolvable Development Approach

- Manage requirements within constrained, flat budgets
- Leverage existing National capabilities, including LOX/LH₂ propulsion infrastructure, manufacturing facilities, and launch sites
- Infuse new design solutions for affordability

◆ Robust Designs and Margins

- Trade performance for cost and schedule
- Use heritage hardware and manufacturing solutions
- Maintain adequate management reserves controlled at lower levels

◆ Risk-Informed Government Insight/Oversight Model

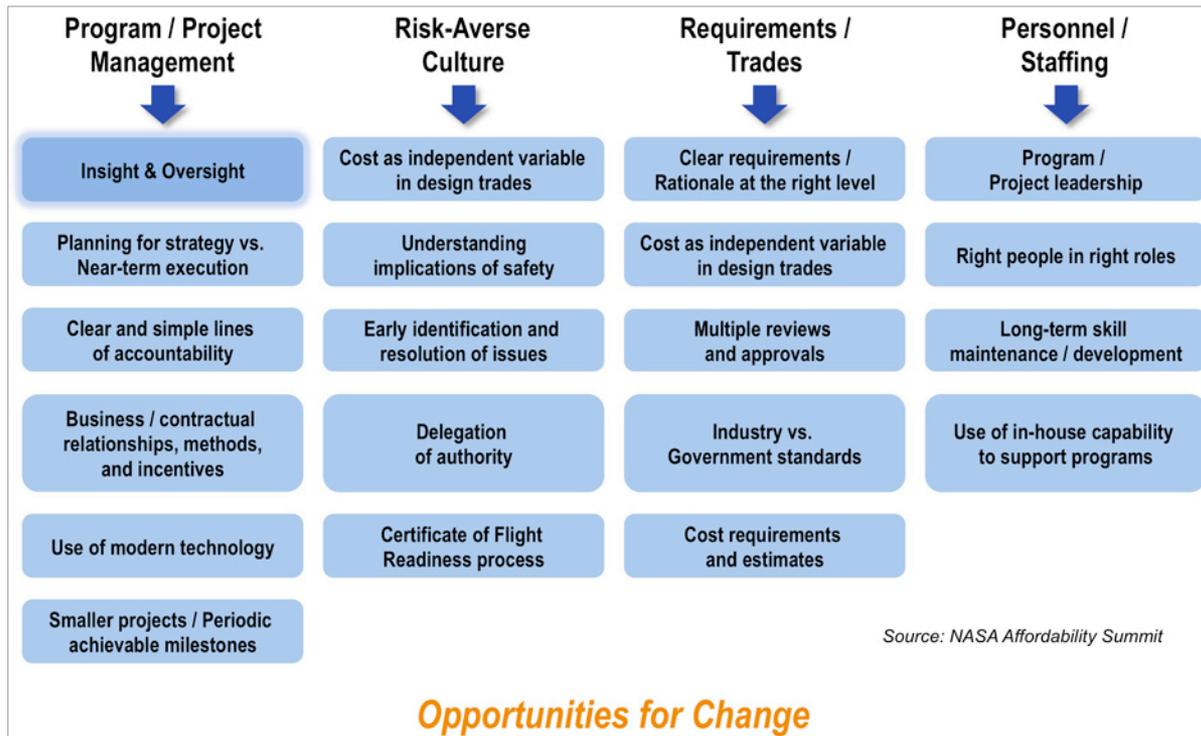
- Insight based on:
 - Historic failures
 - Industry partner past performance and gaps
 - Complexity and design challenges
- Judicious oversight:
 - Discrete vs. near-continuous oversight
 - Timely and effective decisions

◆ Right-Sized Documentation and Standards

- Up to 80% reduction in the number of Data Requirement (DR) and Program documents from the Ares Projects
- Industry practices and tailored NASA standards

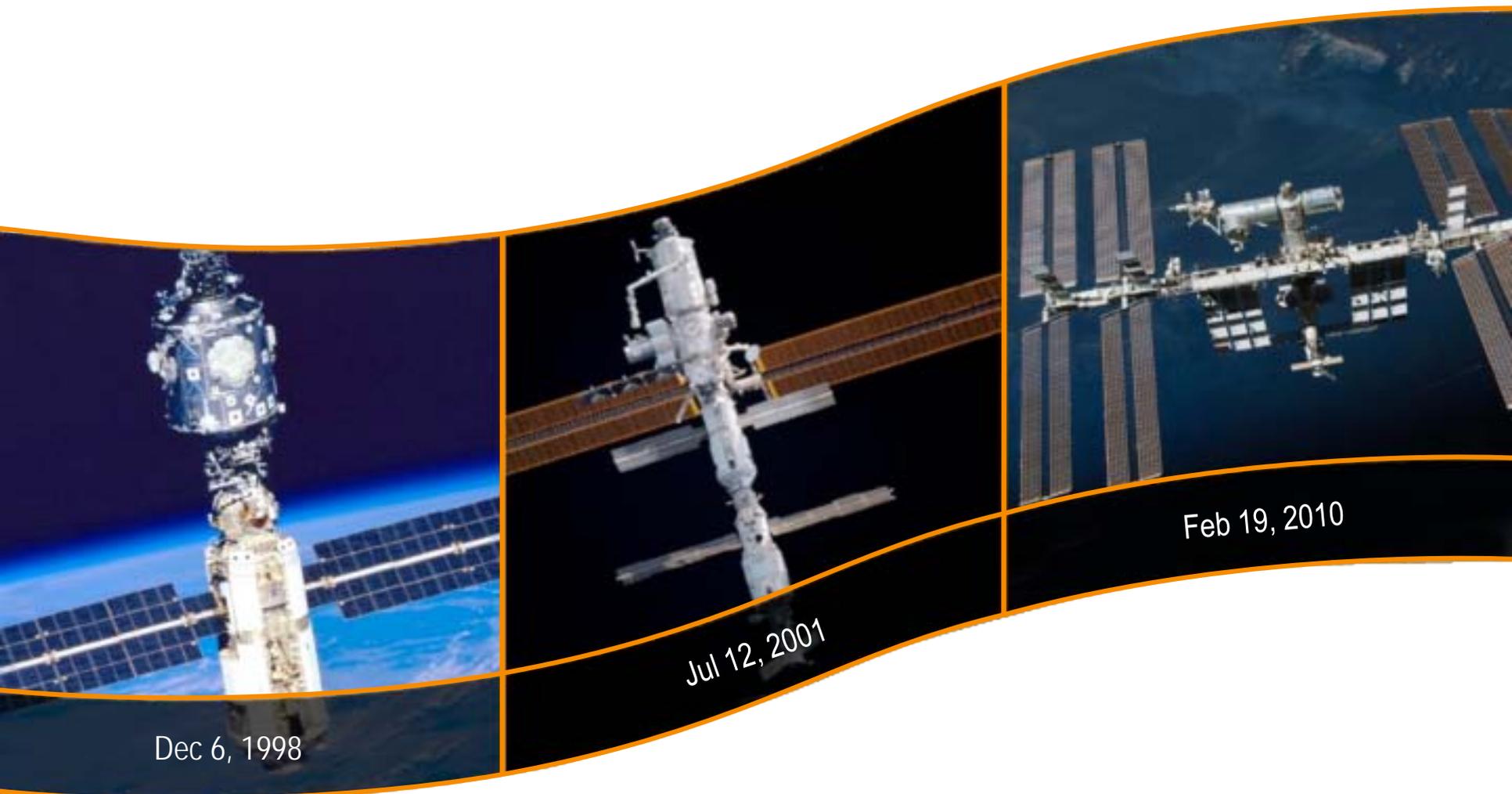
◆ Lean, Integrated Teams with Accelerated Decision Making

- Simple, clear technical interfaces with contractors
- Integrated Systems Engineering & Integration (SE&I) organization
- Empowered decision makers at all levels
- Fewer Control Boards and streamlined change process



Affordability: The ability to develop and operate the SLS within the National means, to sustain funding for the Program.

Planning Programmatic Content to Deliver Incremental Capability



Dec 6, 1998

Jul 12, 2001

Feb 19, 2010

*Like International Space Station,
the SLS is a long-term commitment to America's future in space.*

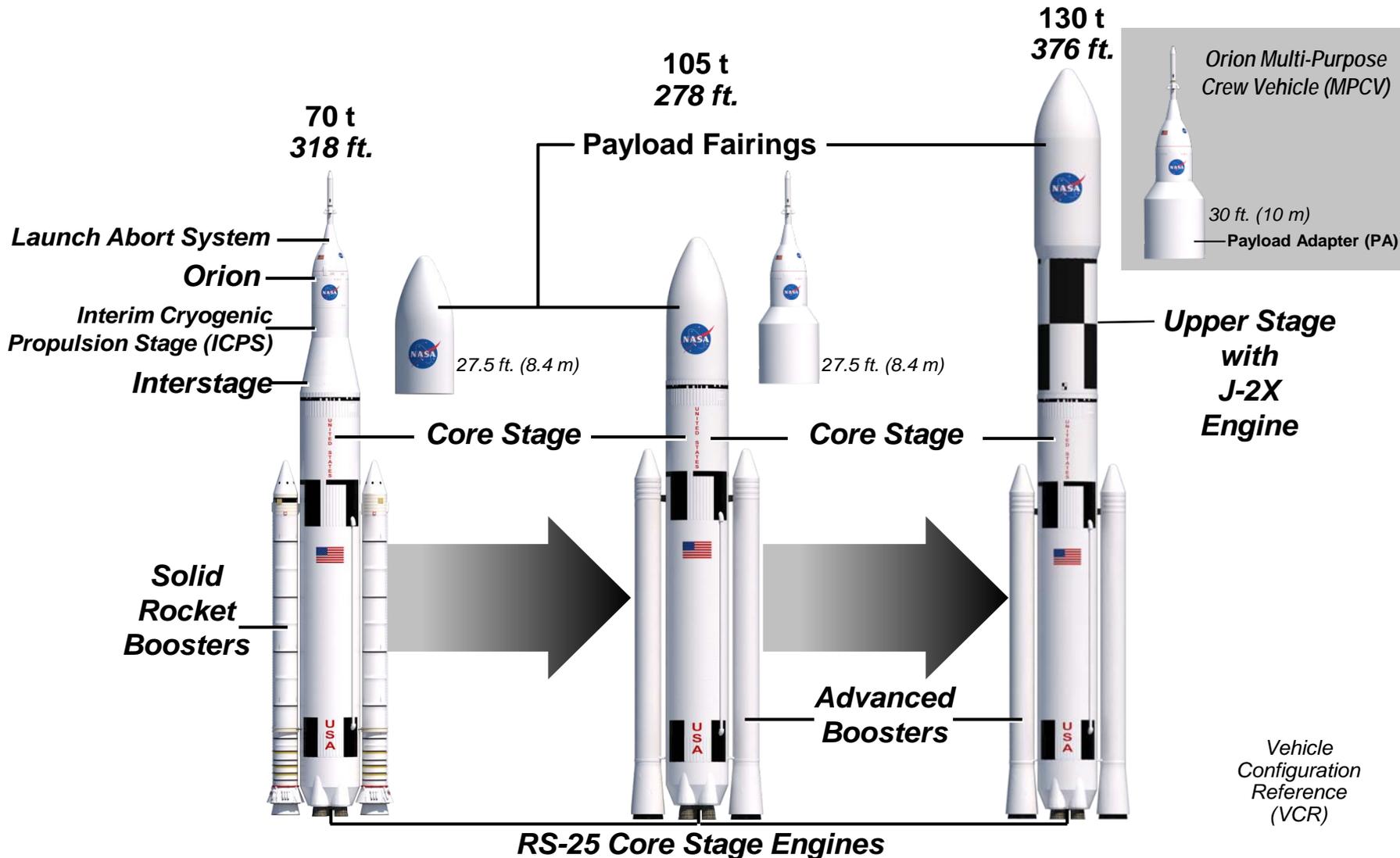
SLS Architecture Block Upgrades



VCR 10000

VCR 11000/12000

VCR 21000/22000



Flexible Capability for Human Exploration and Science Missions

Advanced Development Summary



**Full and Open
Competition**

Advanced Development NRA

- Concept Development (Trade Studies and Analyses)
- Propulsion
- Manufacturing, Structures, and Materials
- Avionics and Software

Goals

Advanced Development

- Support SLS Safety, Affordability, and Sustainability
- Seek out innovative and creative solutions
- Reduce the risk of evolving SLS through block upgrades
- Engage small businesses, academia, and other partners



Initial Capability 2017 – 21

- Builds on current capabilities
- Engages U.S. workforce and aerospace facilities
- Provides a firm foundation for the human and scientific exploration of space



Moving Forward from Initial to Evolved Capability

- ◆ **SLS is a national capability that empowers entirely new human exploration and science missions beyond Earth orbit.**
- ◆ **SLS builds on a solid foundation of experience and current capacities to enable a timely initial capability and evolve to a flexible heavy-lift capability through competitive opportunities.**
- ◆ **The SLS Advanced Development NRA provides opportunities for innovative approaches to improving safety, affordability, reliability, and performance, as well as overall sustainability.**
- ◆ **SLS is partnering with businesses, academia, and other government agencies to make wise choices that yield the best value for the American taxpayers' investment.**

For more information: www.nasa.gov/sls



Advancing the U.S. Legacy of Exploration



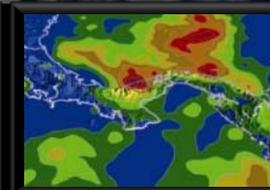


National Aeronautics and Space Administration

Space Launch System NASA Research Announcement Advanced Development Office



Space Launch System



Mindy Niedermeyer, Chairperson
Monica Heidelberg, Contracting Officer

February 14, 2012



- ◆ **The SLS Advanced Development Office is responsible for all aspects of advanced development planning and upgrades for the SLS vehicle.**

- ◆ **Mature technical solutions will be provided for an affordable avenue to continue America's journey of discovery by:**
 - Using an evolutionary development strategy, maturing upgrades in parallel with the program until the product reaches acceptable maturity and can be integrated into the vehicle

 - Maturing technologies to be effectively integrated into the SLS Program

 - Working proactively with the Office of Chief Technologist, such that resources are not wasted on duplicative efforts



- ◆ **NASA welcomes the U.S. Air Force (USAF) Space and Missile Systems Center's Launch Systems Directorate as partner on this NRA.**

- ◆ **The NASA/USAF partnership strengthens mutual goals, which include:**
 - Collaborating across agencies for rocket propulsion system development
 - Reducing development and sustainment costs for rocket systems
 - Supporting competitiveness and resilience of the national industrial base



Key Tenets

- ◆ **Utilize an evolutionary development strategy that allows for incremental progress within constrained budgets.**
- ◆ **Incorporate mature technical solutions into SLS program-phased block upgrades.**
- ◆ **Optimize use of common elements and existing assets for a flexible/modular design.**

Improve Affordability, Reliability, and/or Performance

- ◆ **An NRA is used to announce research interests in support of NASA's programs.**
- ◆ **Offeror submits own Statement of Work (SOW).**
 - More flexibility than a Request for Proposal (RFP), allowing multiple awards for various types of work
 - Not prescriptive in defining the work effort to be proposed
- ◆ **An NRA provides for submission of competitive project ideas.**



◆ Offeror should monitor the following locations for this NRA and any amendments issued against it:

- Federal Business Opportunities (FBO)
(<http://www.fedbizopps.gov>)
- NASA Acquisition Internet Service (NAIS)
(<http://prod.nais.nasa.gov>)
- NASA Solicitation and Proposal Integrated Review and Evaluation System (NSPIRES)
(<http://nspires.nasaprs.com>)

Advanced Development NRA Procurement Schedule



Activity	Approximate Dates
Request for Information (RFI) Issued	Oct 7, 2011
Synopsise Draft NRA and Industry Day	Jan 25, 2012
Issue Draft NRA	Feb 1, 2012
Industry Day	Feb 14, 2012
Offeror Comments/ Questions Due	Mar 1, 2012
Issue NRA	Mar 20, 2012
Proposals Due	May 14, 2012
Award Notice for Provisional Selectees	Aug 13, 2012
Negotiations Complete	Sep 21, 2012
Contract Effectivity/Award	Sep/Oct 2012

Completed Activity





- **NRA Body**

- Executive Summary**

- 1.0 – Funding Opportunity Description

- 2.0 – Award Information

- 3.0 – Eligibility Information

- 4.0 – Proposal and Submission Information

- 5.0 – Proposal Review Information

- 6.0 – Award Administration Information

- 7.0 – NASA Contact

- 8.0 – Other Information

- 9.0 – Concluding Statement

- Appendix A – SLS Advanced Development Technical Information

- Appendix B – SLS Program Launch Vehicle Specification

- Appendix C – SLS Program Concept of Operations (CON OPS) Document

- Appendix D – Acronym List

- Appendix E – Subcontractor Information

- Appendix F – Element of Price Detail for Contracts

- Appendix G – Budget Summary for Grants

- **Model Contract**

- Sections A-I

- Attachment J-2, Data Procurement Document (DPD)

- **Model Grant**

- ◆ **SLS is seeking proposals that improve affordability, reliability, or performance in the following key technology areas:**
 - Concept development, trades, and analyses
 - Propulsion
 - Manufacturing, structures, and materials
 - Avionics and software

- ◆ **SLS seeks proposals in these areas from both Industry and Academia.**

◆ Benefits of including Academia:

- Enable undergraduate and graduate students to directly contribute to agency missions through research and technology development projects.
- Allow NASA and SLS to influence the path of the future workforce.
- Establish synergy with National Institute of Rocket Propulsion Systems (NIRPS).



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Executive Summary

1.0 – Funding Opportunity Description

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Appendix C – SLS Program CON OPS Document

Appendix D – Acronym List

Appendix E – Subcontractor Information

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- **Model Contract**

Sections A-I

Attachment J-2, DPD

- **Model Grant**

1.0 – Funding Opportunity Description



- ◆ **Funding is not currently available; award is contingent upon the availability of appropriated funds.**
- ◆ **Construction of facilities is not an allowed activity.**
- ◆ **Participation by non-U.S. organizations and Foreign Governments:**
 - Is limited to the direct purchase of supplies and/or services that do not constitute research
 - Allows foreign nationals to receive payment through a NASA award for the conduct of research while employed by a U.S. organization
- ◆ **All information needed to respond to this solicitation is contained in this NRA, *the NASA Guidebook for Proposers, January 2011* and the *NASA Grant and Cooperative Agreement Handbook*.**



- ◆ **Total anticipated funding available is \$40 million (M)**
 - Anticipated Funding split:
 - FY2013 Industry \$18.5M, Academia \$1.5M
 - FY2014 Industry \$ 8.5M, Academia \$1.5M
 - FY2015 Industry \$ 8.5M, Academia \$1.5M
 - Each academic award capped at approximately \$250k per year
- ◆ **Period of performance is a 12-month base period, with two 1-year options.**
- ◆ **Multiple awards are anticipated.**
- ◆ **Proposals shall be valid for 12 months to allow for a later award, should the opportunity become available, unless withdrawn by the Offeror prior to award.**

3.0 – Eligibility Information



- ◆ **Other Government agencies, Federally Funded Research and Development Centers (FFRDCs), and NASA Centers or their employees may be a supplier, consultant, or subcontractor via separate agreement.**
- ◆ **NASA employees are not permitted to be key personnel or a prime contractor.**
- ◆ **Each Offeror is encouraged to submit only one proposal, which shall describe only one standalone work effort.**



- **NRA Body**

- Executive Summary

- 1.0 – Funding Opportunity Description

- 2.0 – Award Information

- 3.0 – Eligibility Information

- 4.0 – Proposal and Submission Information**

- 5.0 – Proposal Review Information

- 6.0 – Award Administration Information

- 7.0 – NASA Contact

- 8.0 – Other Information

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- Appendix C – SLS Program CON OPS Document

- Appendix D – Acronym List

- Appendix E – Subcontractor Information

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- **Model Contract**

- Sections A-I

- Attachment J-2, DPD

- **Model Grant**

4.0 – Proposal and Submission Information



- ◆ **This part provides overall guidance for Offerors regarding the SLS Advanced Development NRA.**
 - Purpose and Scope
 - Section 1 – Relevance to NASA’s Objectives
 - Section 2 – Intrinsic Merit
 - Section 3 – Price
 - Section 4 – Model Contract (or Model Grant)
 - Additional Proposal Guidance

4.0 – Proposal and Submission Information



- ◆ **The technical scope of this NRA is defined by the SLS description provided in Appendix A. To be considered within the technical scope of this NRA, proposed work efforts should also be at a maturity level capable of supporting timely implementation into the Block 1A vehicle configuration.**
- ◆ **This NRA solicits work efforts within the technical scope (described above) that are either:**
 - Upgrades to the vehicle
 - Studies, analytical tools, or databases that support development of the vehicle



Section 1 – Relevance to NASA’s Objectives

- ◆ Offeror shall describe the relevance and significance of the proposed work effort to the objectives of SLS by:
 - Describing how the work effort is within the technical scope of this NRA
 - Describing how the work effort improves or influences affordability, reliability, and performance



Section 2 – Intrinsic Merit

◆ Management Approach

- Distribution and management of responsibilities and work
- Teaming, partnering, and subcontracting arrangements
- Key capabilities, facilities, and equipment
- Ground rules and assumptions
- Deviations and exceptions

◆ Technical Approach

- Technical objectives, methodology, and innovation
- Upgrade implementation approach
- Related work experience
- Current and pending support
- Bibliography (not evaluated)



Section 3 – Price

- ◆ **All cost and workforce summary information shall be complete and be consistent with, and traceable to, lower levels of cost and labor hour detail contained within the proposal.**
- ◆ **Offeror's proposal shall contain a summary of labor hours and other information supporting the proposed price in accordance with Element of Price Detail for Contracts (Appendix F) and Budget Summary for Grants (Appendix G).**
- ◆ **Deviations from Price Section Requirements shall be fully explained and supported.**

4.0 – Proposal and Submission Information



Proposal Page Limits and Formatting:

REQUIRED CONSTITUENT PARTS OF PROPOSAL (in order of assembly)	WORD COUNT OR PAGE LIMIT	PAGE NUMBERING FORMAT
Cover Page	1 page	None
Abstract	200 – 300 words	None
Table of Contents	1 page	Contractor Format
Relevance to NASA’s Objectives and Intrinsic Merit Sections	15 pages	1 – 15
Price Section	As needed	P1 – P#
Model Contract/Model Grant: Statement of Work (SOW)	5 pages	S1 – S5
Model Contract: Data Procurement Document (DPD)	As needed	Contractor Format
Model Contract: Work Breakdown Structure (WBS)	1 page	W1

4.0 – Proposal and Submission Information



Additional Guidance:

- ◆ Each Offeror is encouraged to submit only one proposal, which shall describe only one standalone work effort.
- ◆ Proposed programmatic or business (i.e.: non-technical) work efforts to support the SLS are not within the technical scope for this NRA.
- ◆ Industry Offerors should use topics in the Broad Advanced Development area presented in Appendix A, Section 5.0 as guidance for focusing the proposed work into areas of interest that have been identified by the Advanced Development Office.
- ◆ Academic Offerors should use topics in the Focused Advanced Development area presented in Appendix A, Section 5.0 as guidance for focusing the proposed work into areas of interest that have been identified by the Advanced Development Office.



- **NRA Body**

- Executive Summary

- 1.0 – Funding Opportunity Description

- 2.0 – Award Information

- 3.0 – Eligibility Information

- 4.0 – Proposal and Submission Information

- 5.0 – Proposal Review Information**

- 6.0 – Award Administration Information

- 7.0 – NASA Contact

- 8.0 – Other Information

- 9.0 – Concluding Statement

- Appendix A – SLS Advanced Development Technical Information

- Appendix B – SLS Program Launch Vehicle Specification

- Appendix C – SLS Program CON OPS Document

- Appendix D – Acronym List

- Appendix E – Subcontractor Information

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- **Model Contract**

- Sections A-I

- Attachment J-2, DPD

- **Model Grant**

5.0 – Proposal Review Information



◆ Evaluation Factors (approximately equal importance)

- Relevance to NASA's Objectives
- Intrinsic Merit
- Price

◆ Basis for Award

- Based upon the evaluation of the Offeror's proposal and the Selection Official's decision

5.0 – Proposal Review Information



Factor 1: Relevance To NASA's Objectives

- ◆ Does the proposal meet the technical scope of this NRA?
- ◆ How does proposed work effort improve or influence the SLS objectives of affordability, reliability, and performance?

**One Adjectival Rating for Factor 1 (Ex/VG/G/F/P)
Based on Consolidated List of Strengths and Weaknesses**

5.0 – Proposal Review Information



Factor 2: Intrinsic Merit

◆ Management Approach

- Distribution and management of responsibilities and work
- Teaming, partnering, and subcontracting arrangements
- Key capabilities, facilities, and equipment
- Past performance
- Ground rules and assumptions
- Deviations and exceptions
- Clauses B.3 and H.16, SOW, WBS, technical schedule, and detailed description of deliverables

◆ Technical Approach

- Technical objectives, methodology, and innovation
- Upgraded implementation approach, if applicable
- Relationship to past work experience
- Relationship to current and pending support

**One Adjectival Rating for Factor 2 (Ex/VG/G/F/P)
Based on Consolidated List of Strengths and Weaknesses**



Factor 2: Intrinsic Merit – Past Performance

◆ Past Performance will be evaluated by:

- Government evaluation of Past Performance Information Retrieval System (PPIRS), 5-year history
- Prime contractor and subcontractors
- Relevant work includes advanced development of aerospace systems, launch systems, or their subsystems

Lack of relevant past performance will not be evaluated favorably or unfavorably.



Factor 2: Intrinsic Merit – Model Contract/Grant Components

◆ The Government will evaluate:

- Deviations or exceptions to this NRA and the Model Contract/Model Grant, including the DPD
- Model Contract Clause B.3 – Consideration and Payment and H.16 – Advanced Agreements in Rights in Data
- Quality and thoroughness of the SOW and WBS as attached to the Model Contract
- Work effort schedule with technical milestones and the description of deliverables as attached to the Model Contract/Model Grant

5.0 – Proposal Review Information



Factor 3: Price

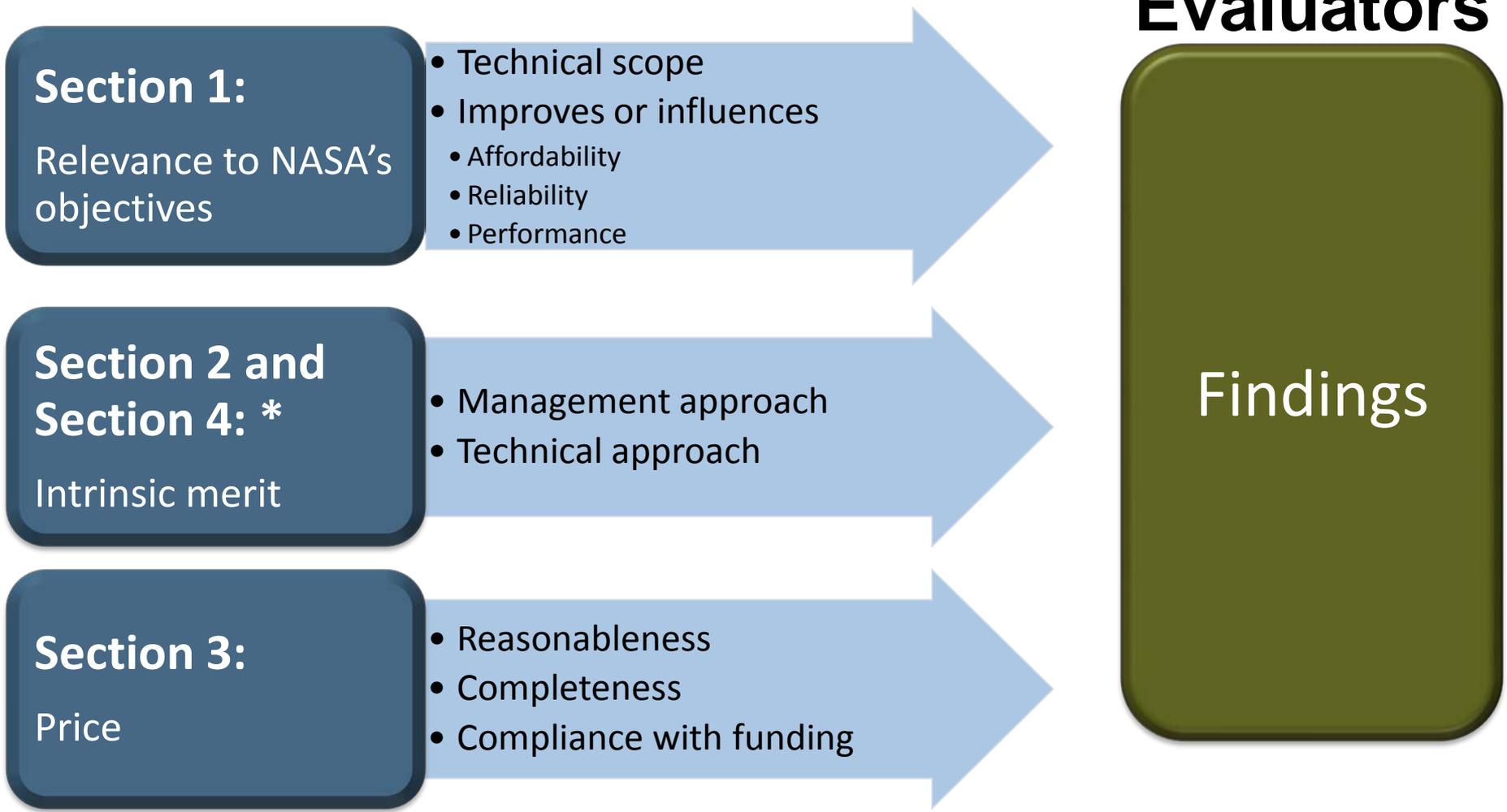
◆ Total Price Proposed will be evaluated for:

- Reasonableness
- Completeness
- Extent to which the Offeror complied with the expected funding allocations in NRA

◆ Contribution of corporate resources will be a consideration in determining reasonableness.

Adjectival Rating, in Terms of Cost Confidence
for the Price Factor (High/Medium/Low)

5.0 – Proposal Review Information



*** Only selected portions—Consideration and payment, rights in data, WBS, SOW, and schedule**

Voting Board Responsibilities

Findings

1. Assign significance to findings.
2. Assign adjectives to factors.

E	Excellent
VG	Very Good
G	Good
F	Fair
P	Poor

H	High
M	Medium
L	Low

Factor 1 and 2:

Relevance to
NASA objectives
and intrinsic merit
E, VG, G, F, P

Factor 3:

Price and
price confidence
H, M, L

5.0 – Proposal Review Information



Voting Board Responsibilities

**Factors
assigned
ratings**

**Separate
proposals**

**Industry
proposals**

**Academic
proposals**

5.0 – Proposal Review Information (Definitions)



Types of Findings

Significant Strength	An aspect of the proposal that greatly enhances the potential for successful contract performance
Strength	An aspect of the proposal that will have some positive impact on successful contract performance
Weakness	A flaw in the proposal that increases the risk of unsuccessful contract performance
Significant Weakness	A flaw that appreciably increases the risk of unsuccessful contract performance

Adjectival Ratings based on Findings

Excellent	A thorough and compelling proposal of exceptional merit that fully responds to the objectives of the NRA as documented by numerous or significant strengths and no significant weaknesses
Very Good	A competent proposal of high merit that fully responds to the objectives of the NRA, whose strengths fully out-balance any weaknesses and none of those weaknesses constitute fatal flaws
Good	A competent proposal that represents a credible response to the NRA, whose strengths and weaknesses essentially balance each other
Fair	A proposal that provides a nominal response to the NRA, but whose weaknesses outweigh any strengths
Poor	A seriously flawed proposal, having one or more major weaknesses that constitute fatal flaws

Confidence Levels for Price Proposal

High	Indicates that the Government has a very high level of confidence that the Offeror can perform successfully at or below the proposed price
Medium	Indicates that the Government has a reasonable level of confidence that the Offeror can perform successfully at or below the proposed price
Low	Indicates that the Government has a marginal level of confidence that the Offeror can perform successfully at or below the proposed price



Partial Awards and Participation with Others

◆ NASA may:

- Elect to offer selection of only a portion of a proposed work effort.
- Ask Offerors to team in a joint proposal.
- Decide to award an effort for less than the full period of the proposal.
 - If accepted, a revised budget and SOW may be required.
 - If declined, the offer of selection may be withdrawn in its entirety.

◆ Selection Announcement and Award Dates

- No selection announcements are made until funds are approved through the Federal budget process.
- Offeror may contact, in writing, the Contracting Officer (CO) after 150 days past the proposal submission due date.
- Offerors *not* selected will be notified and offered a debriefing.
- NASA reserves the right to subsequently negotiate and make award to Offeror(s) not initially selected.
 - Proposals shall be valid for 12 months to allow for later award.



- **NRA Body**

- Executive Summary

- 1.0 – Funding Opportunity Description

- 2.0 – Award Information

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- 6.0 – Award Administration Information**

- 7.0 – NASA Contact**

- 8.0 – Other Information**

- 9.0 – Concluding Statement**

- Appendix A – SLS Advanced Development Technical Information

- Appendix B – SLS Program Launch Vehicle Specification

- Appendix C – SLS Program CON OPS Document

- Appendix D – Acronym List

- Appendix E – Subcontractor Information

- Appendix F – Element of Price Detail for Contracts

- Appendix G – Budget Summary for Grants

- **Model Contract**

- Sections A-I

- Attachment J-2, DPD

- **Model Grant**

6.0 – Award Administration Information



- ◆ Anticipate ***firm fixed price contracts and grants.***
- ◆ Contract awards will be subject to the provisions of the Federal Acquisition Regulations (FAR) and the NASA FAR Supplement (NFS).
- ◆ Grants will be subject to the provision of the NASA Grant and Cooperative Agreement Handbook.

7.0 – NASA Contact



All questions shall be submitted in writing within 30 days of the issue date of this draft NRA to the Procurement point of contact:

Monica Heidelberg
monica.d.heidelberg@nasa.gov

Please include solicitation number with questions.

***Questions regarding this Draft NRA
will not be answered individually but will be addressed
within the issuance of the Final NRA.***

8.0 – Other Information



- ◆ **Announcement of updates/amendments to solicitation will be added as a formal amendment to this NRA.**
- ◆ **It is the responsibility of the prospective proposer to check for updates concerning the program(s) of interest.**
- ◆ **NASA Partnership Office contacts at each Center are listed in the NRA to coordinate with Industry for negotiating Space Act Agreements (SAAs).**

9.0 – Concluding Statement



- ◆ **NASA encourages the participation of Industry and Academia in this SLS Advanced Development NRA.**



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- 5.0 – Proposal Review Information

- 6.0 – Award Administration Information

- 7.0 – NASA Contact

- 8.0 – Other Information

- 9.0 – Concluding Statement

- Appendix A – SLS Advanced Development Technical Information**

- Appendix B – SLS Program Launch Vehicle Specification**

- Appendix C – SLS Program CON OPS Document**

- Appendix D – Acronym List**

- Appendix E – Subcontractor Information**

- Appendix F – Element of Price Detail for Contracts**

- Appendix G – Budget Summary for Grants**

- **Model Contract**

- Sections A-I

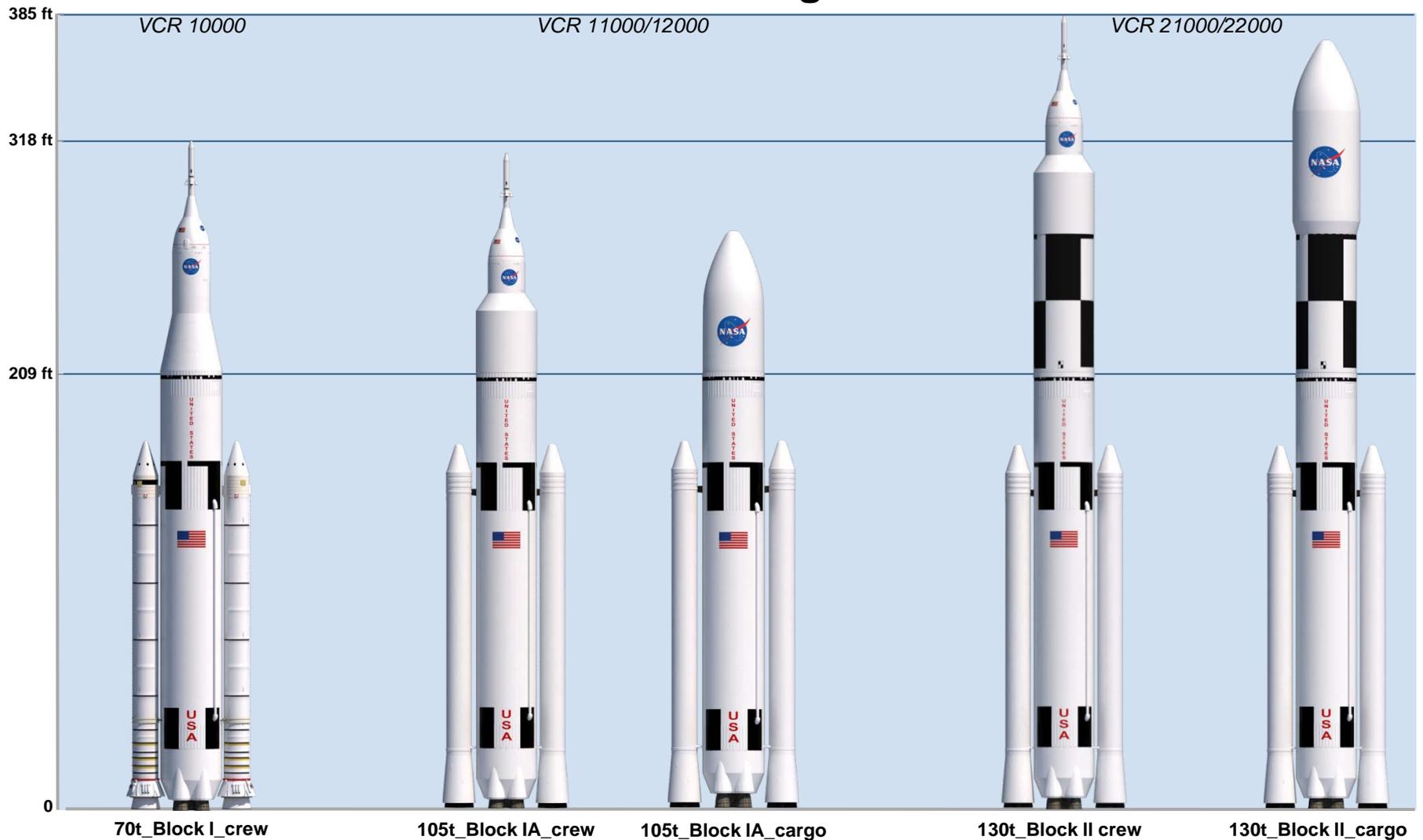
- Attachment J-2, DPD

- **Model Grant**

Appendix A – SLS Technical Information



SLS Vehicle Configurations





Core Stage

- ◆ Block 1 core stage uses four RS-25 Space Shuttle Main Engines (SSMEs) and Space Transportation System (STS) Solid Rocket Booster (SRB) Thrust Vector Control (TVC).
- ◆ Core stage is designed for thrust takeout of the boosters and structural load path for the upper stage and payload.
- ◆ Core stage will be common across Blocks 1, 1A, and 2.

Boosters

- ◆ Block 1 booster is a metallic 5-segment solid rocket booster (SRBv).
- ◆ Blocks 1A and 2 (evolved) will use either SRB or liquid rocket boosters (LRB).
- ◆ **The Advanced Booster Engineering Demonstration and Risk Reduction (ABEDRR) NRA (NNM12ZPS001N) – which is currently soliciting proposals – is outside the scope of this NRA solicitation.**



Non-Propulsive Payload Element (NPE)

- ◆ Includes a 27.6 ft- or 33 ft-diameter fairing and a payload carrier

Other Elements (SLS Block 1A)

- ◆ May use one or more Affordable Upper Stage Engines (AUSE)

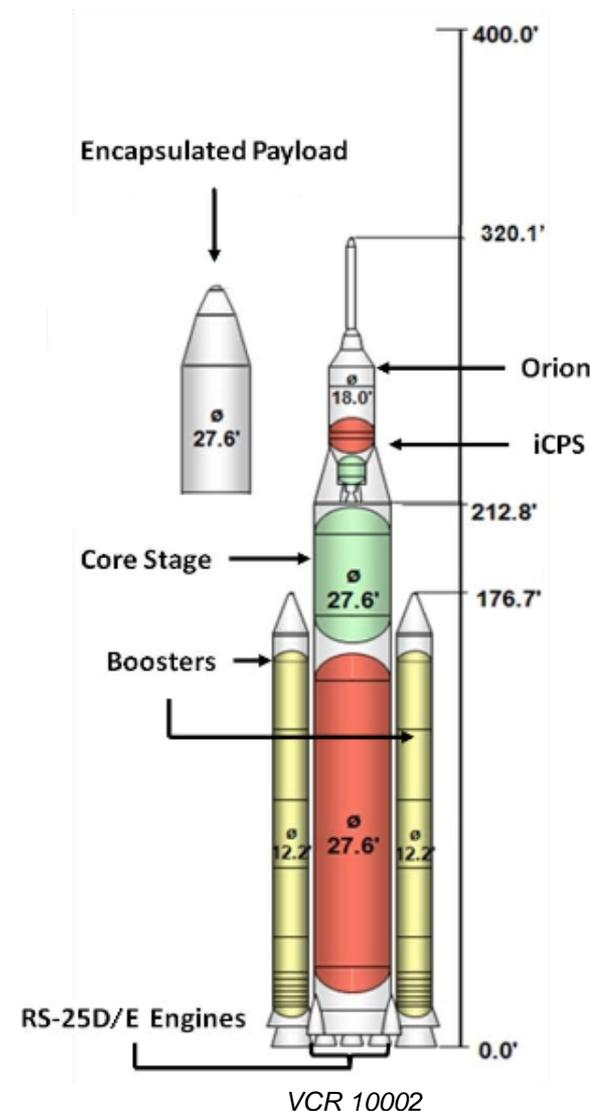
Upper Stage (SLS Block 2)

- ◆ Adds an LH₂/LOX upper stage with one to three J-2X engines

NOTE: This NRA does not solicit Block 2 upgrades to the vehicle.

Block 1 Configuration

- Block 1 uses two 5-segment expendable SRBv boosters.
- The SRBv solid rocket fuel is polybutadiene acrylonitrile (PBAN).
- Core stage will contain four RS-25D engines.
- Core stage will be common across subsequent blocks.
- Booster TVC uses STS SRB heritage hardware.
- Block 1 is capable of carrying an Orion - MPCV, Orion-MPCV + Interim Cryogenic Propulsion Stage (ICPS), or cargo payload.
- Cargo payloads will be responsible for orbit stabilization.

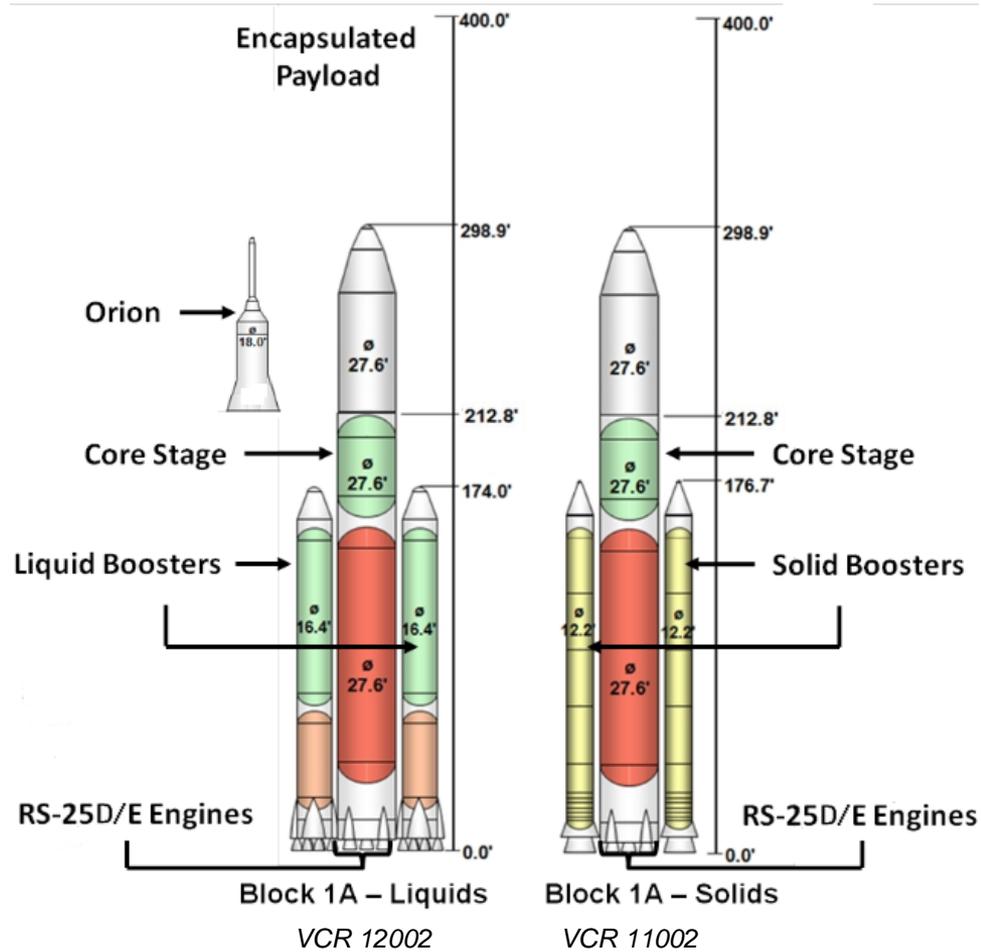


Appendix A – SLS Technical Information



Block 1A Configuration

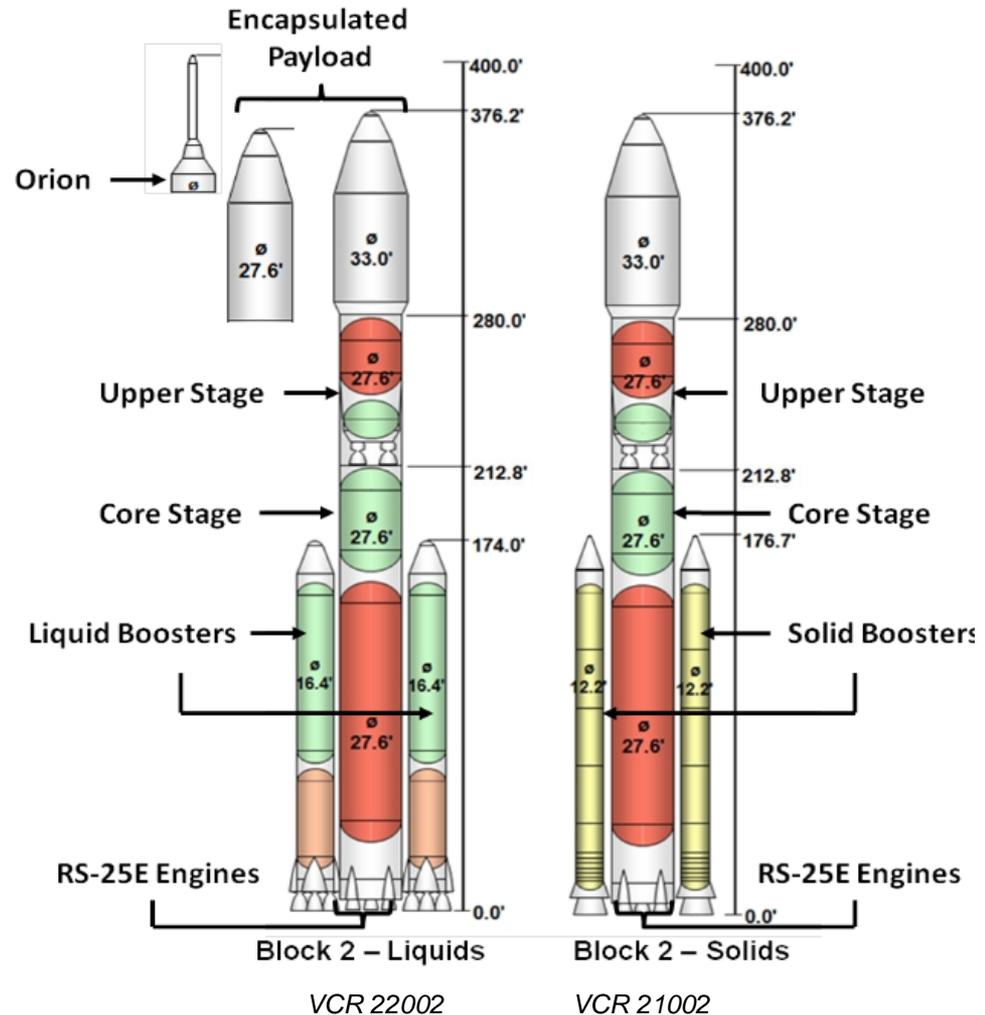
- Block 1A encompasses replacement of the SRB with a new expendable advanced booster (SRB or LRB).
 - LRB uses Refined Petroleum (RP-1) propellant.
- Advanced booster attaches at the same points as the SRBv.
- Core stage incorporates the RS-25D or RS-25E engines.
 - Four engines on the core stage
- Block 1A uses a LH₂/LOX stage that may have one or more AUSEs.
- Block 1A is the same height as the Block 1 configuration.



Block 2 Configuration

- This upgrade adds an upper stage that derives from the core stage.
- One to three J-2X engines are used on the upper stage.
- The upper stage uses the same propellant as the core stage.

NOTE: This NRA does not solicit Block 2 upgrades to the vehicle.





Broad Advanced Development Topics include, but are not limited to:

◆ Concept Development, Trades, and Analyses:

- Support upgrades to the vehicle through systems engineering work efforts.
- Address work efforts that may include demonstrations, tests, and analytical tools.
- Identify multi-discipline or multi-element aspects of vehicle integration.
- Improve design tools and design methodologies to facilitate concept development.
- Conduct high-fidelity trade studies.

◆ Propulsion:

- Develop advancements in liquid engines, main propulsion systems, solid rocket motors, and their subsystem components.
- Study and refine AUSE requirements and assess functionality.
- Reduce both development and operational costs, while increasing system hardware commonality.
- Mature high-fidelity design tools and design methodologies with accompanying validation data, including prototyping and simulation.
- Assess use of non-toxic propellants.



Broad Advanced Development Topics include, but are not limited to:

◆ Manufacturing, Structures, and Materials:

- Use advanced materials and manufacturing processes in an innovative manner.
- Develop innovative lightweight structures (metallic or non-metallic).
- Improve analytical tools to meet damage tolerance requirements and reduce the volume of testing.
- Expand friction stir weld processes using lightweight alloys.
- Use digital and virtual methods to reduce the cost of design, manufacturing, and inspection.
- Address solutions for material obsolescence and environmental compliance.

◆ Avionics and Software:

- Improve vehicle robustness with sustainable avionics, sensors, power, and software subsystems for real-time fault detection and mission recovery.
- Upgrade avionics modules to improve navigation, telemetry, redundancy, simplified check-out, and ground support equipment.
- Enable avionics modernization through technology maturation tasks.
- Use advanced flight computers and simulations to enable and verify expanded vehicle guidance, fault detection, and mission recovery.
- Evolve STS legacy steering and control subsystems into sustainable, safer, and greener alternatives.

Appendix B – SLS Launch Vehicle Specification



National Aeronautics and
Space Administration

SLS-SPEC-032

REVISION A

RELEASE DATE: JANUARY 26, 2012

SPACE LAUNCH SYSTEM (SLS) PROGRAM LAUNCH VEHICLE SPECIFICATION

Approved for Public Release; Distribution is Unlimited.

*The electronic version is the official approved document.
Verify this is the correct version before use.*

Appendix C – SLS Program CON OPS Document



National Aeronautics and
Space Administration

SLS-PLAN-020

BASELINE

RELEASE DATE: OCTOBER 27, 2011

SPACE LAUNCH SYSTEM (SLS) PROGRAM CONCEPT OF OPERATIONS (CON OPS) DOCUMENT

Approved for Public Release; Distribution is Unlimited.

*The electronic version is the official approved document.
Verify this is the correct version before use.*

Appendix D – Acronym List



ADN	ammonium dinitramide	LaRC	Langley Research Center
BEO	beyond Earth orbit	LEO	low Earth orbit
BOE	Basis of Estimate	LH ₂	liquid hydrogen
CAGE	Contractor and Government Entity	LO ₂	liquid oxygen
CAI	compression after impact	LRB	liquid rocket booster
CAS	cost accounting standards	MPCV	multi-purpose crew vehicle
CASB	Cost Accounting Standards Board	MSFC	Marshall Space Flight Center
CD ROM	compact disk read-only memory	NAIS	NASA Acquisition Internet Service
CFD	computational fluid dynamics	NASA	National Aeronautics and Space Administration
CFR	Code of Federal Regulations	NDE	non-destructive evaluation
CON OPS	concept of operations	NFS	NASA FAR Supplement
COR	Contracting Officer's Representative	NIMA	National Imaging and Mapping
CPU	central processing unit	NOI	Notice of Intent
CTN	Communications and Tracking Network	NPE	non-propulsive payload element
DPD	Data Procurement Document	NRA	NASA Research Announcement
DRD	Data Requirements Document	NSPIRES	NASA Solicitation and Proposal Integrated Review and Evaluation
DUNS	Data Universal Numbering System	ODC	Other Direct Cost
DFRC	Dryden Flight Research Center	PC	personal computer
EAR	Export Control Regulations	PEG	powered explicit guidance
EP	equivalent people	PI	principal investigator
ETR	Eastern Test Range	PPIRS	Past Performance Information Retrieval System
FAR	Federal Acquisition Regulations	RANS/LES	Reynolds-averaged Navier-Stokes/large eddy simulation
FBO	Federal Business Opportunities	RINU	redundant inertial navigation unit
FFRDC	Federally Funded Research and Development Center	SAA	Space Act Agreement
GAO	General Accounting Office	SHE	safety, health, and environmental
GNC	guidance, navigation, and control	SIL	System Integration Laboratory
GPGPU	General Purpose Graphics Processing Unit	SLS	Space Launch System Program
GPU	graphical processing unit	SOW	Statement of Work
GRC	Glenn Research Center	SRB	solid rocket booster
GSDO	Ground Systems Development and Operations Program	SRBv	solid rocket booster (five-segment)
GSFC	Goddard Space Flight Center	SRBA	Sponsored Research Business Activity
HAN	hydroxylammonium nitrate	SSC	Stennis Space Center
HAT	Human Architecture Team	STEM	science, technology, engineering, and mathematics
HEO	Human Exploration and Operations Directorate	STS	Space Transportation System
HNF	hydrazinium nitroformate	TPS	Thermal Protection System
HSPD	Homeland Security Presidential Directive	TRL	technology readiness level
ICPS	interim cryogenic propulsion stage	TVC	thrust vector control
ISS	International Space Station	WBS	Work Breakdown Structure
IT	information technology		
ITAR	International Traffic in Arms Regulations		
JPL	Jet Propulsion Laboratory		
JSC	Johnson Space Center		
KSC	Kennedy Space Center		

Appendix E – Subcontractor Information



SUBCONTRACTOR INFORMATION

1. COMPANY NAME: _____
ADDRESS: _____

POINT OF CONTACT/PHONE NUMBER _____

CONTRACT VALUE: _____ TYPE OF CONTRACT: _____

BRIEF DESCRIPTION OF WORK: _____

2. COMPANY NAME: _____
ADDRESS: _____

POINT OF CONTACT/PHONE NUMBER _____

CONTRACT VALUE: _____ TYPE OF CONTRACT: _____

BRIEF DESCRIPTION OF WORK: _____

3. COMPANY NAME: _____
ADDRESS: _____

POINT OF CONTACT/PHONE NUMBER _____

CONTRACT VALUE: _____ TYPE OF CONTRACT: _____

BRIEF DESCRIPTION OF WORK: _____

Appendix F – Element of Price Detail for Contracts



Element of Price Detail for Contracts

(\$K)		Base	Opt 1	Opt 2	Total
1.	Direct Labor Hours				
	Program Administration				
	Engineering				
	Manufacturing				
	Subcontract				
	Total Hours				
2.	Direct Labor Cost				
	Program Administration				
	Engineering				
	Manufacturing				
	Total Direct labor Cost				
3.	Indirect Labor Cost				
4.	Sub Total Labor				
5.	Non-Labor				
a.	Material				
b.	Subcontracts				
c.	Other Direct Cost				
	Total Non-Labor				
6.	Sub Total Labor and Non Labor				
7.	General & Administrative				
8.	Total Cost				
9.	Profit/Fee				
10.	Less Proposed Corporate Resources (if any)				
11.	Total Cost and Profit				
12.	Proposed Space Act Agreement Cost				
13.	Total Project Price				

Appendix G – Budget Summary for Grants



Budget Summary for Grants

PERIOD OF PERFORMANCE: FROM _____ TO _____

	COST
1. DIRECT LABOR (salaries, wages, fringe benefits)	\$ _____
2. OTHER DIRECT COSTS:	
a. Subcontracts	\$ _____
b. Consultants	\$ _____
c. Equipment	\$ _____
d. Supplies	\$ _____
e. Travel	\$ _____
f. Other	\$ _____
3. INDIRECT COSTS _____ % _____	\$ _____
4. OTHER APPLICABLE COSTS	\$ _____
5. SUBTOTAL-ESTIMATED COST	\$ _____
6. LESS PROPOSED COST SHARING (if any)	\$ (_____)
7. TOTAL ESTIMATED COST	\$ _____



- **NRA Body**

- Executive Summary

- 1.0 – Funding Opportunity Description

- 2.0 – Award Information

- 3.0 – Eligibility Information

- 4.0 – Proposal and Submission Information

- 5.0 – Proposal Review Information

- 6.0 – Award Administration Information

- 7.0 – NASA Contact

- 8.0 – Other Information

- 9.0 – Concluding Statement

- Appendix A – SLS Advanced Development Technical Information

- Appendix B – SLS Program Launch Vehicle Specification

- Appendix C – SLS Program CON OPS Document

- Appendix D – Acronym List

- Appendix E – Subcontractor Information

- Appendix F – Element of Price Detail for Contracts

- Appendix G – Budget Summary for Grants

- **Model Contract**

- Sections A-I

- Attachment J-2, DPD

- **Model Grant**

Section 4 – Model Contract (if applicable)

- ◆ Model contract
- ◆ Contract terms and conditions
- ◆ Statement of Work (SOW)
- ◆ Data Procurement Document (DPD)
- ◆ Work Breakdown Structure (WBS)
- ◆ Meeting and review requirements

- ◆ Also, if selected for award:
 - Subcontract Plan
 - Safety, Health, and Environmental (SHE) Plan
 - Organizational Conflict of Interests Avoidance Plan
 - Information Technology (IT) Security Management Plan



Clause B.3, Consideration and Payment

- ◆ Milestone payment schedule (Kickoff; Final Report – required)
- ◆ Changes/additions to the milestone payment schedule – may be proposed by Offeror

Section G – Government Furnished Property Clauses – incorporated at contract award, as appropriate

Clause H.5, Key Personnel and Facilities

- ◆ To be proposed by Offeror
- ◆ Modification required if change

Clause H.12, Representations, Certifications, and Other Statements of Offeror

- ◆ If any significant changes to the representations and certifications, the Contractor shall notify the CO in writing as soon as the condition is known.



Clause H.14, Evaluation of Subcontracting Plan

- ◆ This clause only applies to Offerors who submit a proposal totaling \$650,000 or greater and who are selected for award.
- ◆ Offeror's independent assessment of small business subcontracting opportunities will be evaluated.
- ◆ Coordination is performed with MSFC Office of Small Business.

Clause H.16, Advanced Agreement in Rights in Data

- ◆ Agreement will be proposed by Offeror.
- ◆ Clause will contain Contractor and Subcontractor Unlimited Rights, Limited Rights, and Restricted Rights.
- ◆ This clause constitutes an advanced agreement between the Government and Contractor regarding the interpretation of Clause 52.227-14, Rights in Data – General, Alternates I and II.

Section I – Listed as full text:

- ◆ Rights in Data – General (52.227-14) (DEC 2007)
- ◆ Additional Data Requirements (52.227-16) (JUN 1987)
- ◆ Payments Under Fixed-Price Research and Development Contracts (52.232-2) (APR 1984)
- ◆ Limitation on Withholding of Payments (52.232-9) (APR 1984)
- ◆ Changes – Fixed Price (52.243-1) (AUG 1987) – Alternate V (APR 1984)
- ◆ Termination for Convenience of the Government (Fixed-Price) (52.249-2) (MAY 2004)
- ◆ Default (Fixed-Price Research and Development) (52.249-9) (APR 1984)
- ◆ NFS 1852.204-76, Security Requirements for Unclassified Information Technology Resources
- ◆ NFS 1852.237-72, Access to Sensitive Information
- ◆ NFS 1852.237-73, Release of Sensitive Information

Section J – List of Attachments, as provided by NASA

- ◆ Attachment J-2, Data Procurement Document/
Data Requirements

Key Concepts

- ◆ Offeror can propose additions, modifications, or deletions to DPD.
- ◆ Selected offeror(s) shall provided Alternate SHE Plan no later than 30 days after award.
- ◆ Key deliverables are “Monthly Progress Reports” and “Final Scientific and Technical Report.”

List of Attachments, as proposed by Offeror

- ◆ With initial submission
 - Attachment J-1, Statement of Work (SOW)
 - Attachment J-3, Work Breakdown Structure (WBS)

NRA Data Procurement Document (DPD)

◆ Data Requirements List (DRL)

<u>DRD</u>	<u>DATA TYPE</u>	<u>TITLE</u>	<u>OPR</u>
CD-XXCD-OELL	3	On-Site Employee Location Listing	PS12
CD-XXCD-LTR	3	Technology Reports	ED10
MA-XXMA-MPR	3	Monthly Progress Report	XP70
MA-XXMA-FSTR	3	Final Scientific and Technical Report	XP70
SA-XXSA-ASHE	2	Alternate (Off-Site) SHE Plan	AS10/QD12
SA-XXSA-MSR	3	Mishap and Safety Statistics Reports	QD12

Type 3: Data shall be delivered by contractor as required by the contract and do not require NASA approval. However, to be a satisfactory delivery, the data shall satisfy all applicable contractual requirements and be submitted on time.

Type 2: Contractor shall submit data with the plan for review. NASA reserves a time-limited right to disapprove in writing any issues and interim changes to those issues.



Statement of Work (SOW)

- ◆ Offeror shall submit a detailed SOW that includes a schedule with technical milestones, and a detailed description of deliverables (other than those in the DPD).
- ◆ Offeror shall submit a detailed schedule of all work items to be undertaken. This schedule shall outline the dependencies of work items and critical path. All long lead items and facility schedule conflicts shall be identified.

Data Procurement Document (DPD)

- ◆ Offeror shall provide rationale for any addition or deletion taken to the model DPD and show all exceptions in a redline version as part of the proposal submittal.

Work Breakdown Structure (WBS)

- ◆ Offeror shall submit a WBS at a sufficient level to facilitate a complete evaluation and understanding of the work responsibilities and distribution.

Documents Required IF SELECTED for Award



- ◆ **Detailed WBS and BOEs required for negotiations**
- ◆ **Attachment J-4, Subcontracting Plan**
- ◆ **Attachment J-5, Alternate Safety, Health, and Environmental (SHE) Plan**
- ◆ **Attachment J-6, Organizational Conflict of Interest Avoidance Plan**
- ◆ **Attachment J-7, IT Security Management Plan**



Section 4 – Model Grant (if applicable)

- ◆ **Model Grant**
- ◆ **General Provisions, Special Conditions, and Additional Terms**
- ◆ **Required Publication and Reports**
- ◆ **Statement of Work**

General Provisions – Incorporated by Reference

1260.22 – Technical Publications and Reports

- ◆ Required listing will be located as an Exhibit to the Model Grant.

1260.24 – Termination and Enforcement

1260.25 – Change in Principal Investigator (PI) or Scope

- ◆ Offeror proposes PI.
- ◆ Change requires modification.

1260.28 – Patent Rights

1260.30 – Rights in Data

1260.37 – Safety

- ◆ Offeror shall comply with all applicable federal, state, and local laws relating to safety.

Special Conditions – Listed as full text

1260.52 – Multiple Year Grant or Cooperative Agreement

1260.56 – Withholding

Additional Terms

1260.35 – Investigation Requirements

Statement of Work (SOW)

- ◆ Offeror shall submit a detailed SOW, including a detailed description of deliverables and a schedule with technical milestones.
- ◆ Offeror shall submit a detailed schedule of all work items to be undertaken. This schedule shall outline the dependencies of work items and critical path. All long lead items and facility schedule conflicts shall be identified.

Changes to Document



- ◆ **Additional details on Block configurations (Appendix A)**
- ◆ **NASA/USAF partnership and potential funding changes**



The posted NRA takes precedence over any discrepancies or inconsistencies noted between this presentation and the NRA.

This Industry and Academia Day presentation will be publicly available within 48 hours at www.nasa.gov/sls

Offeror shall submit proposal package to Monica Heidelberg at:

NASA

George C. Marshall Space Flight Center

Attn: Monica Heidelberg/PS42

MSFC, AL 35812

- ◆ 1 original plus 10 paper copies
- ◆ 2 digital copies
- ◆ Digital copies shall be provided on a virus-free CD ROM in PC format and shall be readable by Microsoft Office Word 2007 edition or Microsoft Office Excel 2007 edition.

The Offeror is advised that proposal submittal will not be made via NSPIRES or email.

Questions?

