

National Aeronautics and Space Administration



AIAA SpaceOps 2014 NASA Space Launch System Operations Outlook

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A Deeper Purpose, A Bolder Mission



**“We reach for new heights and
reveal the unknown for the
benefit of mankind.”**



The Future of Human Space Exploration

NASA's Building Blocks to Mars

U.S. companies provide affordable access to low Earth orbit

Learning the fundamentals aboard the International Space Station

Expanding capabilities at an asteroid redirected to lunar orbit

Exploring Mars and other deep space destinations

Traveling beyond low Earth orbit with the Space Launch System rocket and Orion crew capsule

*Missions: 6 to 12 months
Return: hours*

*Missions: 1 month up to 12 months
Return: days*

*Missions: 2 to 3 years
Return: months*

Earth Reliant

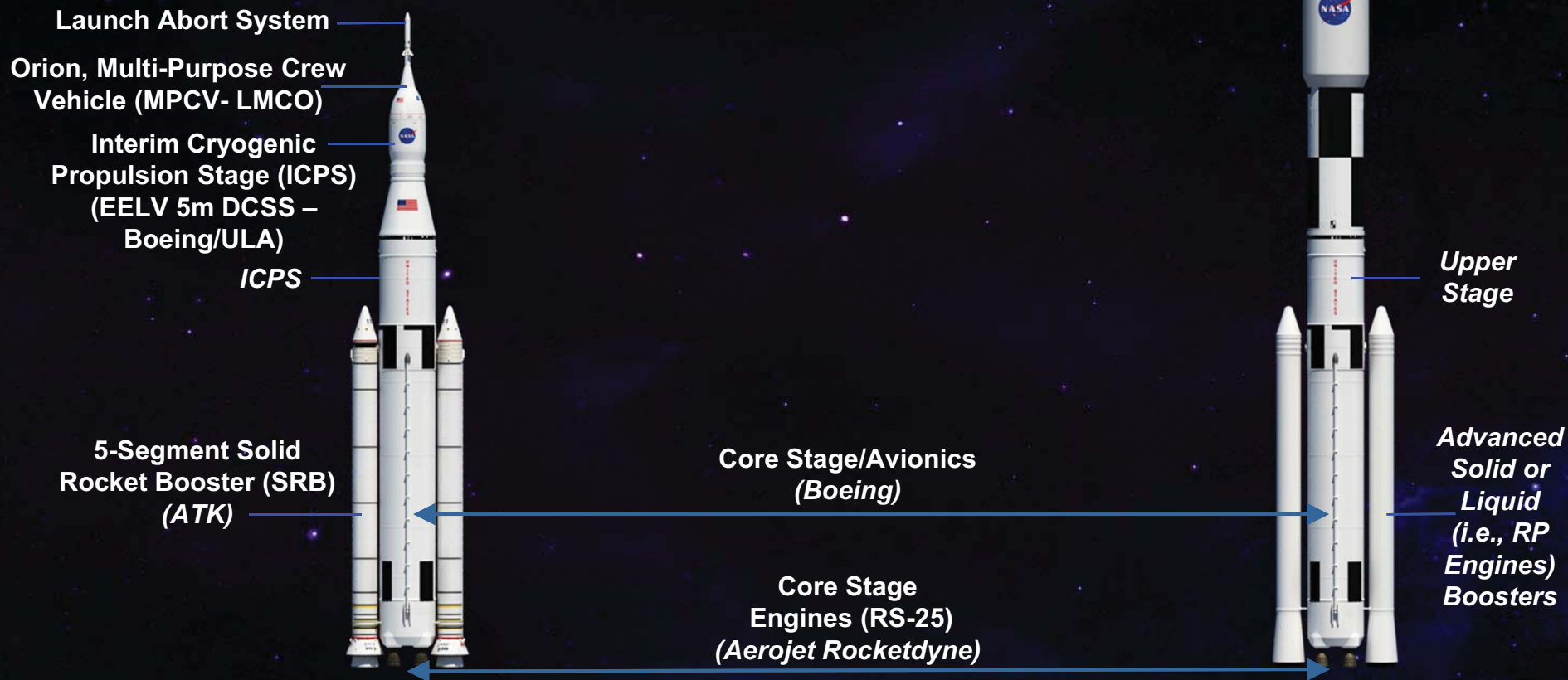
Proving Ground

Earth Independent

SLS Block Commonality



33 ft (10 m)



Block 1 Initial Capability
2017
70 metric ton Payload

Evolutionary Path to Future Capabilities

- Minimizes unique configurations
- Allows incremental development

Block 2 Capability
130 metric ton
Payload

Milestone Reviews



NASA Life Cycle Phases	Approval for Formulation	FORMULATION			Approval for Implementation	IMPLEMENTATION		
Program Life Cycle Phases	Pre-Phase A: Concept Studies	Phase A: Concept & Technology Development	Phase B: Preliminary Design & Technology Completion	Phase C: Final Design & Fabrication	Phase D: System Assembly, Int. & Test Launch & Checkout	Phase E: Operations & Sustainment	Phase F: Closeout	
SLS Program Life Cycle Gates and Major Events	KDP A ✓ FAD ✓ Draft Project Requirements ✓	KDP B ✓ Draft PCA ✓ Preliminary Program Plan ✓	KDP C ✓ Baseline Program Plan ✓	Final PCA	KDP D ✓ Launch	KDP E ✓	KDP F ✓ End of Missions Final Archival of Data	
SLS Agency Reviews	ASM ✓	SpaceOps 2012 Conference		SpaceOps 2014 Conference				
SLS Human Space Flight Project Reviews	MCR ✓	SRR/SDR Steps 1 & 2 ✓	PDR ✓	CDR DCR SIR	(pre-)FRR PLAR		DR	
GSDO Program Life Cycle Gates	KDP A ✓	KDP B ✓	KDP C ✓	KDP D ✓	KDP E ✓	KDP En ✓	KDP F ✓	
Program Documents	FAD ✓	Preliminary PCA ✓	Final PCA ✓			Updated PCA ✓	Final Archival of Data ✓	
Program Updates		Preliminary Program Plan ✓	Baseline Program Plan			Updated Program Plan ✓		
GSDO Agency Reviews		ASM ✓						
Program/Project Life Cycle Reviews	MCR ✓	SRR/SDR ✓	PDR ✓	CDR SIR	ORR FRR	PLAR	DR	
Other Reviews					SAR LRR SMSR			
Supporting Reviews		Peer Reviews, Subsystem CDRs, and System Reviews						

Existing hardware and facilities are critical to cost and schedule goals.



Orion-to-Stage Adapter for EFT-1 and EM-1



Design once. Build and fly many times.

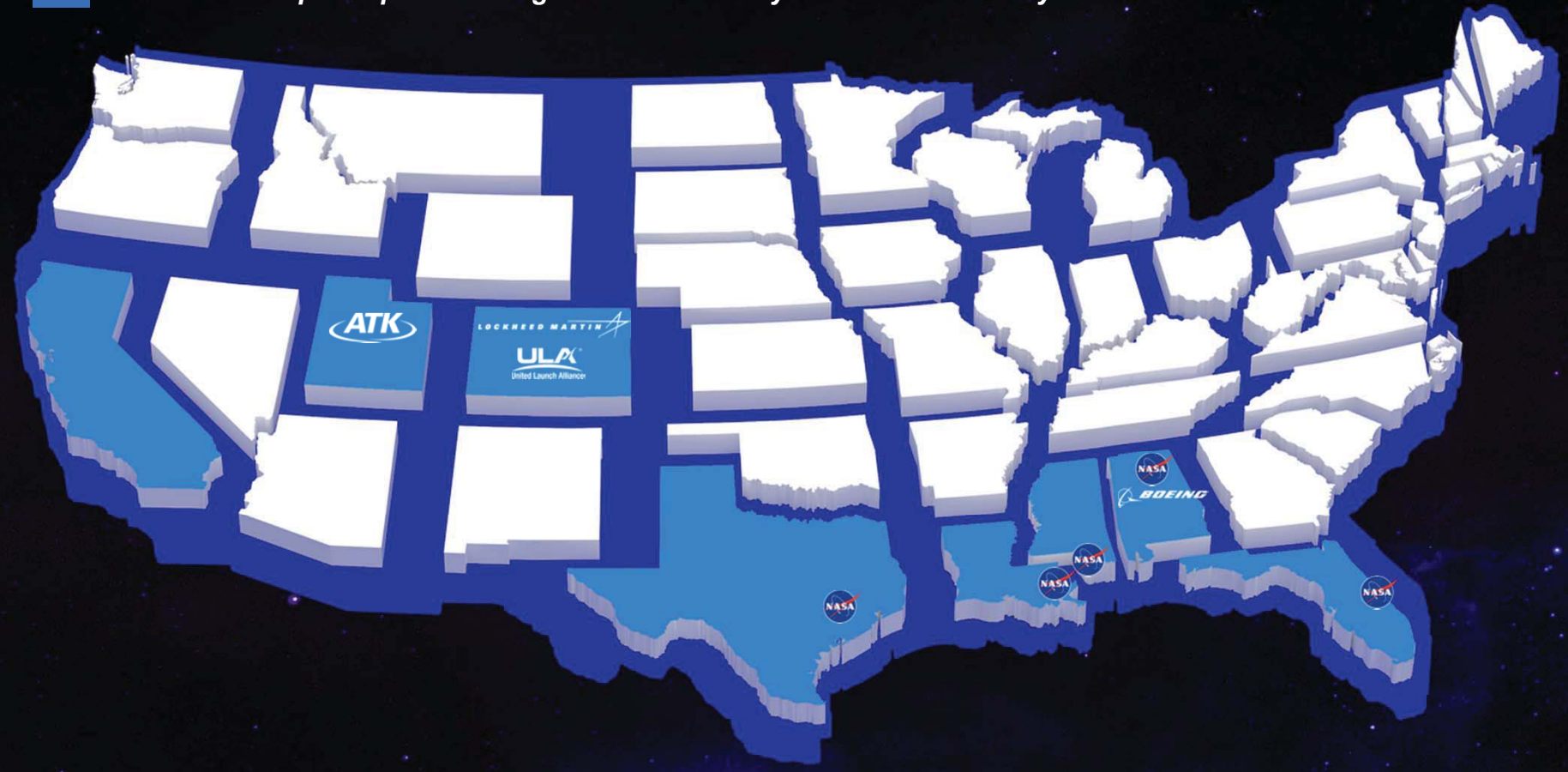
Multi-Use Launch Pad



Smart, Flexible Workforce Approach



GSDO liaisons participate at design centers for early hardware familiarity.

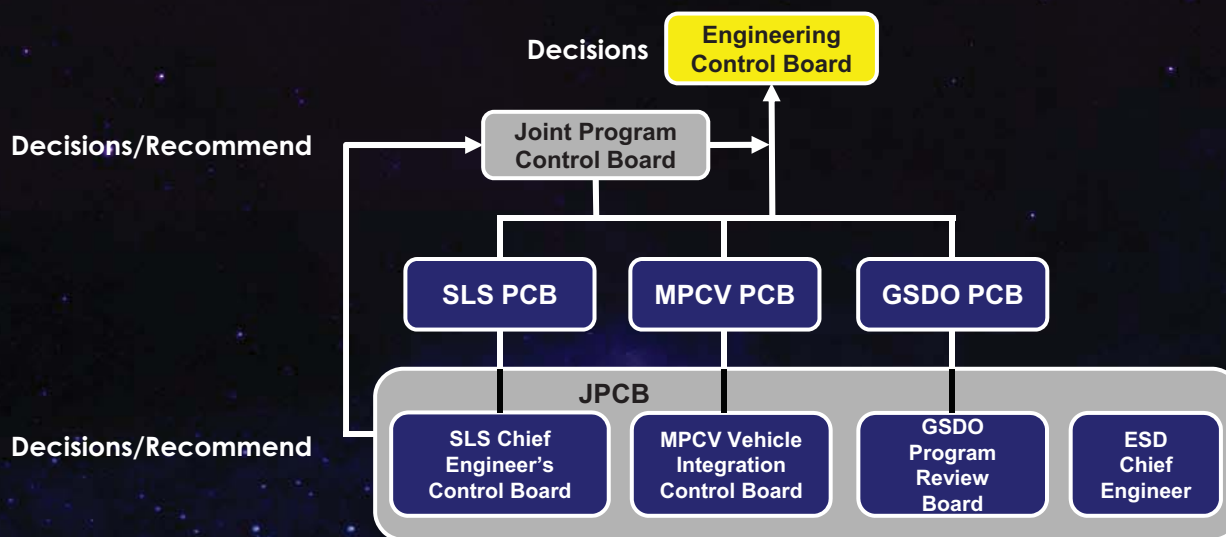
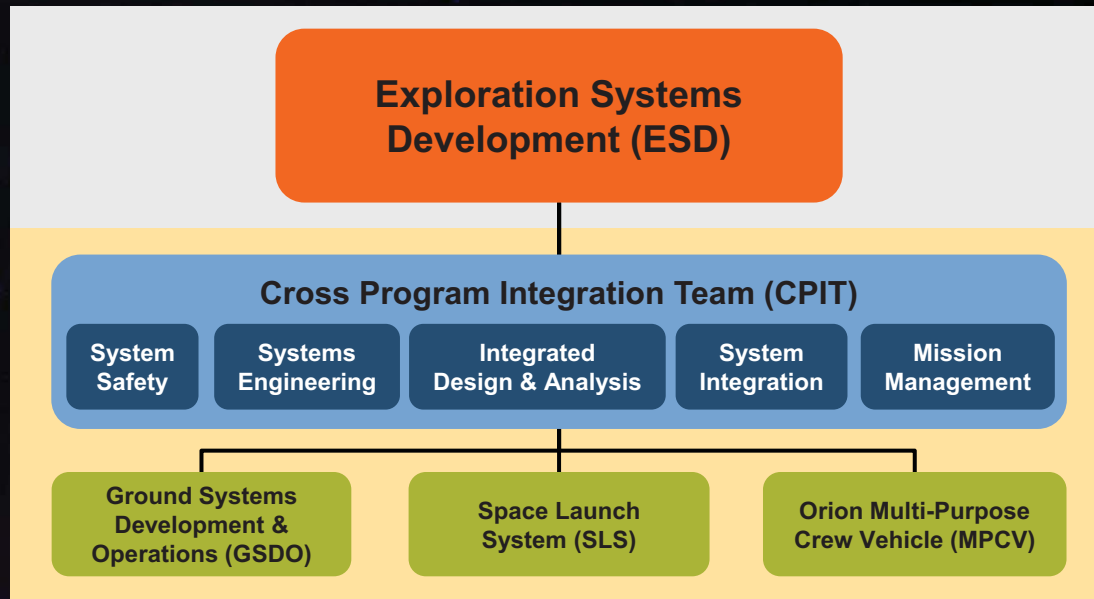


Key SLS personnel arrive at KSC with hardware for reach-back support.

Lean Management Techniques

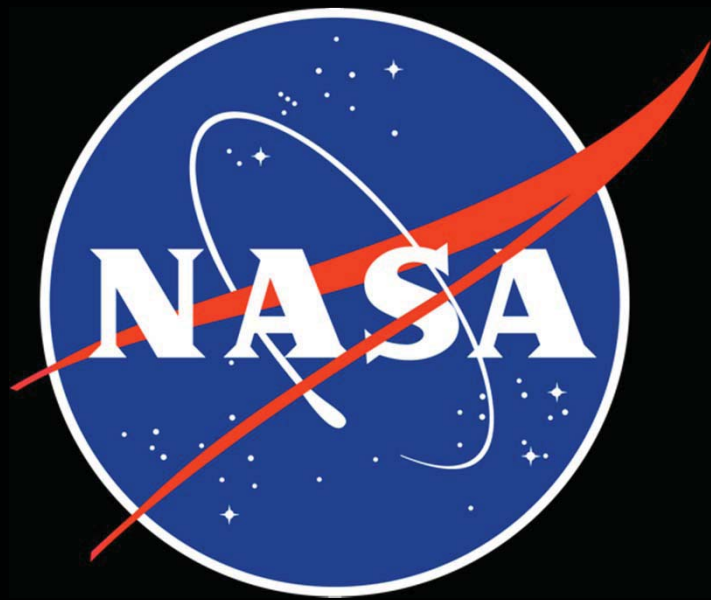


Simple Management Structure



Dawn of Deep-space Exploration





“Man cannot discover
new oceans
unless he has the
courage to lose
sight of the shore.”

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the journey

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