NASA’s Exploration Plans & Progress

AIAA Joint Propulsion Conference

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The Future of Exploration

“This expanded role for the private sector will free up more of NASA’s resources to do what NASA does best — tackle the most demanding technological challenges in space, including those of human space flight beyond low-Earth orbit.”

— John P. Holdren, Science and Technology Assistant to the President
The White House, May 22, 2012

“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
NASA’s Capability Driven Framework

Incremental steps to steadily build, test, refine, and qualify capabilities that lead to affordable flight elements and a deep space capability.

Planetary Exploration
- Mars
- Solar System

Exploring Other Worlds
- Low-Gravity Bodies
- Full-Capability Near-Earth Asteroid Missions
- Phobos / Deimos

Into the Solar System
- Interplanetary Space
- Initial Near-Earth Asteroid Missions
- Lunar Surface

Extending Reach Beyond LEO
- Cislunar Space
- Geostationary Orbit
- High-Earth Orbit
- Lunar Flyby & Orbit

Initial Exploration Missions
- International Space Station
- Space Launch System
- Orion Multi-Purpose Crew Vehicle
- Ground Systems Development & Operations
- Commercial Spaceflight Development

Low-Earth Orbit: Commercial Systems
Beyond LEO: Space Launch System/Orion

ISS: 286 mi / 460 km

Mars: 34,600,000 mi / 55,700,000 km
Moon: 238,855 mi / 384,400 km

www.nasa.gov/sls
The International Space Station

Scientific Laboratory • Technology Test Bed • Orbiting Outpost • Galactic Observatory

Sustain Human Health and Performance • Ensure Systems Readiness • Validate Operational Procedures
Commercial Spaceflight Development Partners

Cargo Transportation
Space Exploration Technologies (SpaceX) and Orbital Sciences Corp.

Future Crew Transportation
Funded Partners: SpaceX, Blue Origin, Boeing, Sierra Nevada Corporation
Unfunded Partners: Alliant Techsystems Inc., Excalibur Almaz, United Launch Alliance
Vehicle Comparisons

Saturn V
- Height: 363 ft
- Thrust: 7,610,000 pounds
- Payload: 262,000 pounds

Space Shuttle
- Height: 184 ft
- Thrust: 7,800,000 pounds
- Payload: 65,000 pounds

SLS (70 Metric Tons)
- Height: 321 ft
- Thrust: 8,400,000 pounds
- Payload: 154,000 pounds

SLS (130 Metric Tons)
- Height: 384 ft
- Thrust: 9,200,000 pounds
- Payload: 286,000 pounds
Space Launch System Program:
Marshall Space Flight Center

- RS-25 Core Stage Engine in Engine Processing Facility at KSC, 2011
- KSC Launch Complex 39B for SLS/Orion operation
- Stages Industry Day at Michoud Assembly Facility, Nov 2011
- Solid Rocket Booster development motor test in Promontory, Utah, Sep 2011
- Subscale Solid Rocket Motor firing at MSFC, Mar 2012
- J-2X Upper Stage Engine at Stennis Space Center (SSC), Apr 2012
- J-2X Upper Stage Engine powerpack test at SSC, Feb 2012
- www.nasa.gov/sls
The Orion Multi-Purpose Crew Vehicle will be capable of sustaining a crew of up to 4 astronauts on deep-space missions that could last anywhere from 6 days for a lunar flyby mission to up to 900 days for a Mars exploration mission when paired with additional propulsion and habitation systems.
Ground Systems Development and Operations Program: Kennedy Space Center

Government and Commercial Launch Services
The Capability To Go Anywhere …

“Space Launch System/Orion and commercial crew … have to co-exist. They have different destinations; they must be executed in parallel … (and) rather than fighting each other for how big our respective splices should be (of the government allocation that NASA gets), I think we should be fighting together for a bigger pie.”

Michael Lopez-Alegria
Former Astronaut and President, Commercial Spaceflight Federation
Space News, May 21, 2012

- NASA’s exploration strategy expands America’s presence in space and contributes to economic growth
- Partnerships with commercial space for low-Earth orbit markets
- Engaging U.S. aerospace for beyond-Earth orbit exploration for the first time since Apollo
- Creates opportunities to enrich the future for people around the world
- We will explore new places where no one has ever gone before