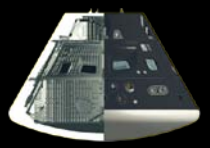
orion

MULTI-PURPOSE CREW VEHICLE

Early Deep Space Mission Capabilities Concepts

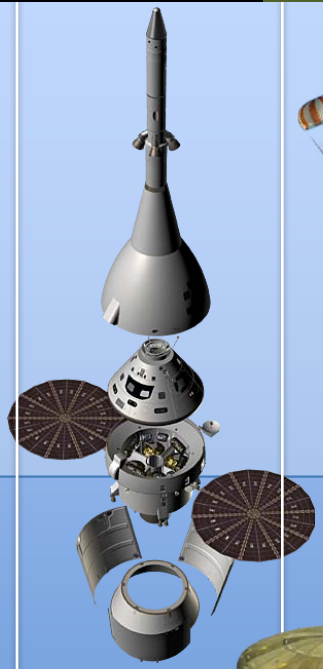
Larry Price
Deputy Program Manager
Lockheed Martin Orion Program

Program Progress



FY05	FY06	FY07	FY08	FY09	FY10	FY11
Phase I: Design Trades	Phase II: Spacecraft Development					MPCV

Orion renamed the Multi-Purpose Crew Vehicle
May 2011



Parachute Tests

Launch Abort Motor Test

LAS Attitude Control Motor Test

Pad Abort 1 Stacking

Orion Crew Exploration Vehicle Concept Developed

Orion Contract Competitively Awarded to Lockheed Martin
Aug 2006

Heat Shield Prototype Developed

Air Bag Drop Tests

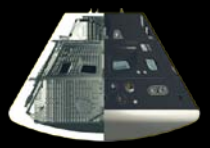
Pad Abort 1 Flight Test Vehicle Built

Orion Water Landing Recovery Training

Pad Abort 1 Flight Test Success
May 2010

First Orion Environmental Testing

Manufacturing and Test Facilities



Michoud Assembly Facility - New Orleans, Louisiana

Space Environmental Test Facility, Glenn Research Center

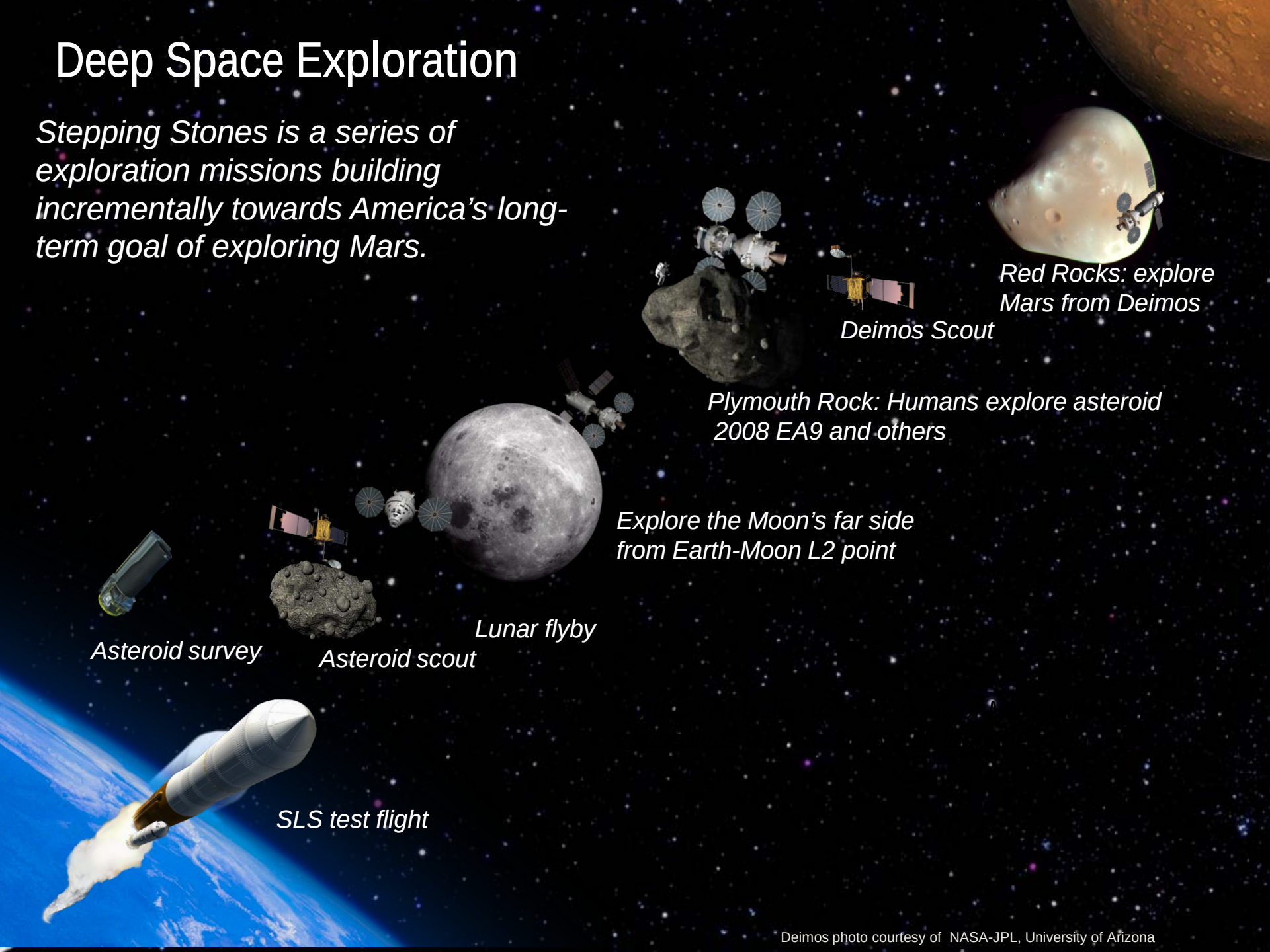
Canister Rotation Facility, Kennedy Space Center

Operations and Checkout Facility – Kennedy Space Center

Hydro Impact Basin, Langley Research Center

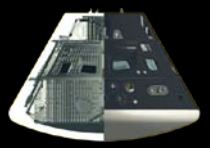
Deep Space Exploration

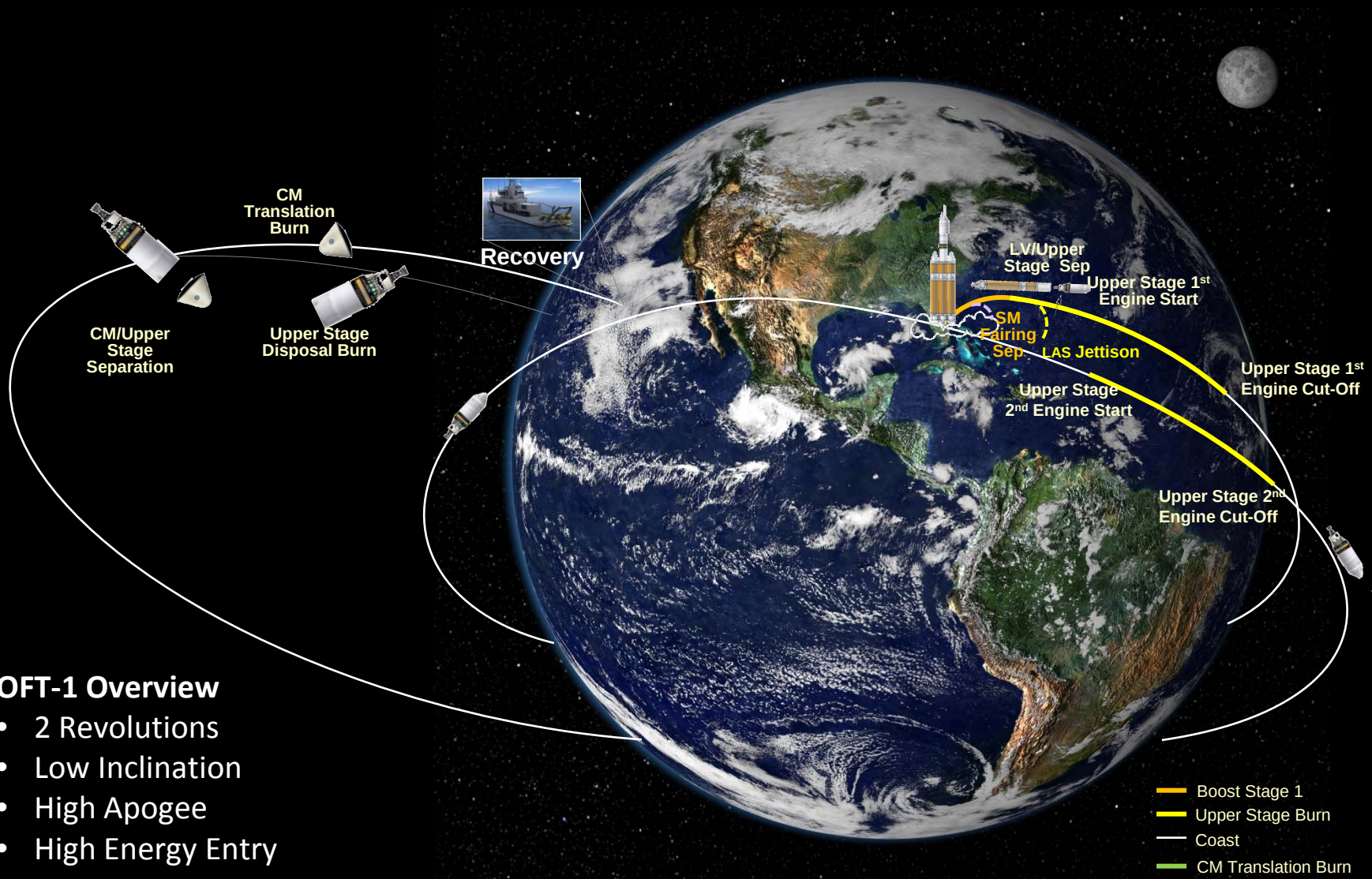
Stepping Stones is a series of exploration missions building incrementally towards America's long-term goal of exploring Mars.



Deimos photo courtesy of NASA-JPL, University of Arizona

Proposed Exploration Flight Test 1

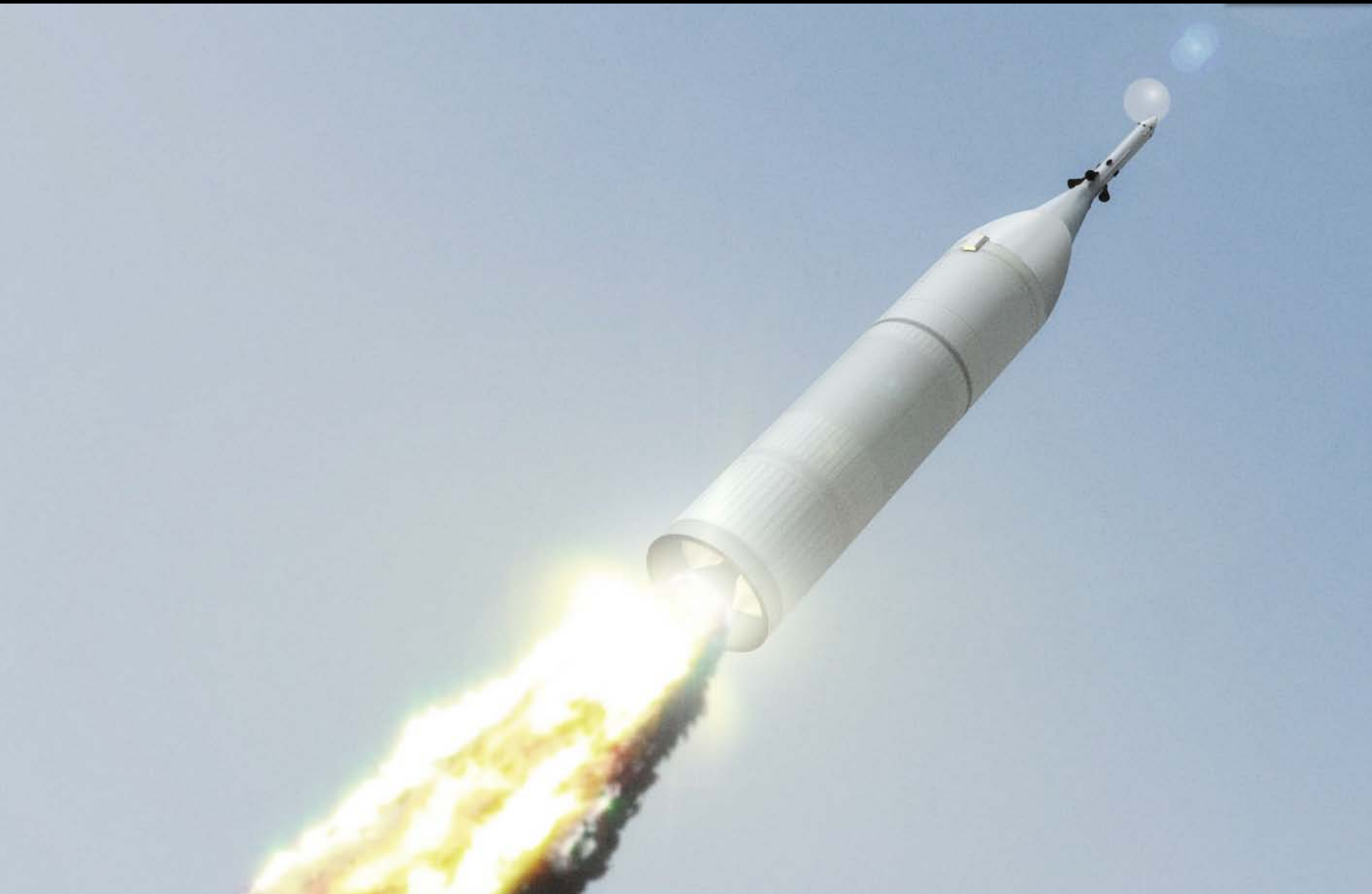




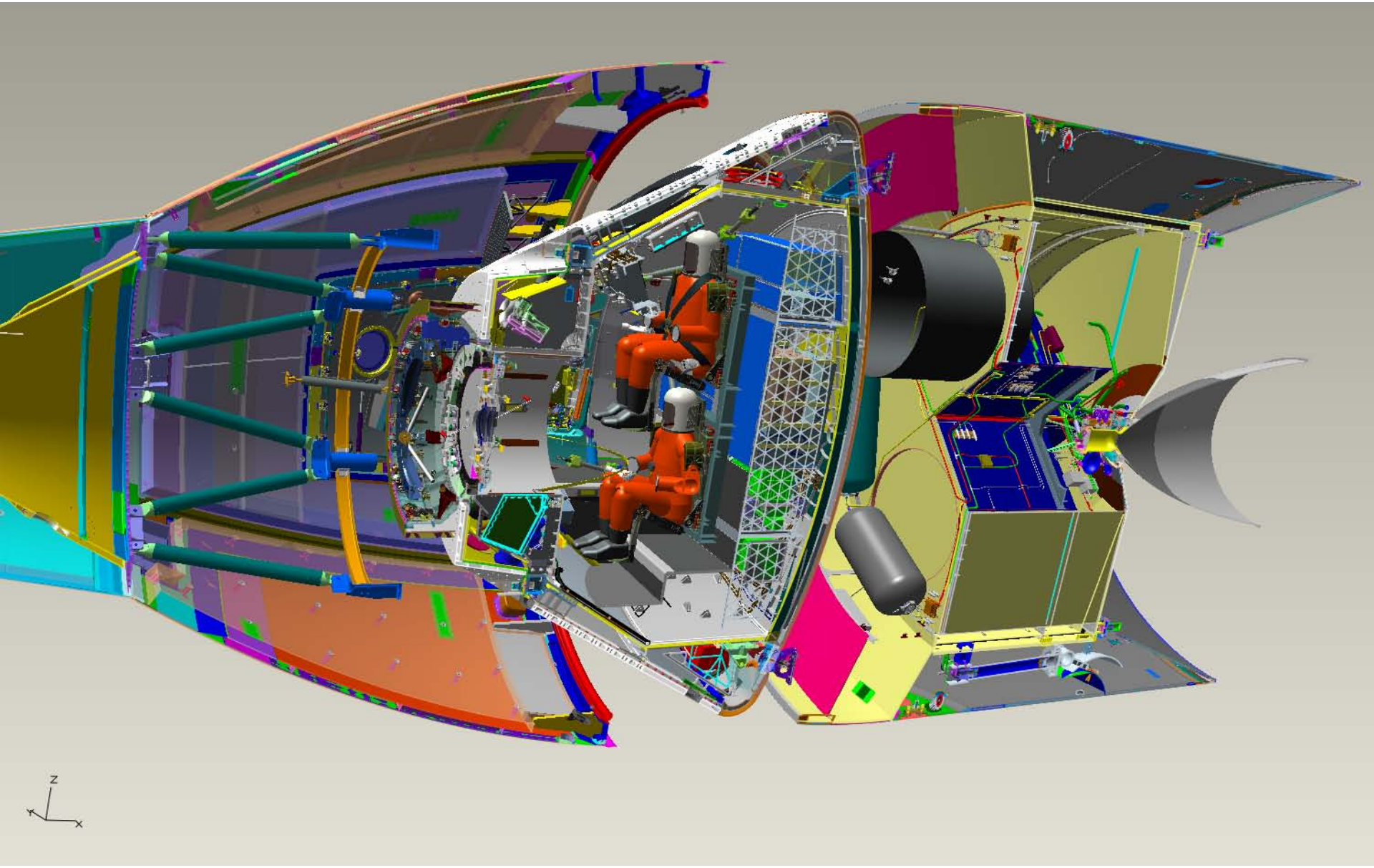
OFT-1 Overview

- 2 Revolutions
- Low Inclination
- High Apogee
- High Energy Entry

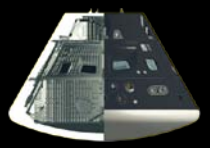
Ascent Abort – 2 (2016)

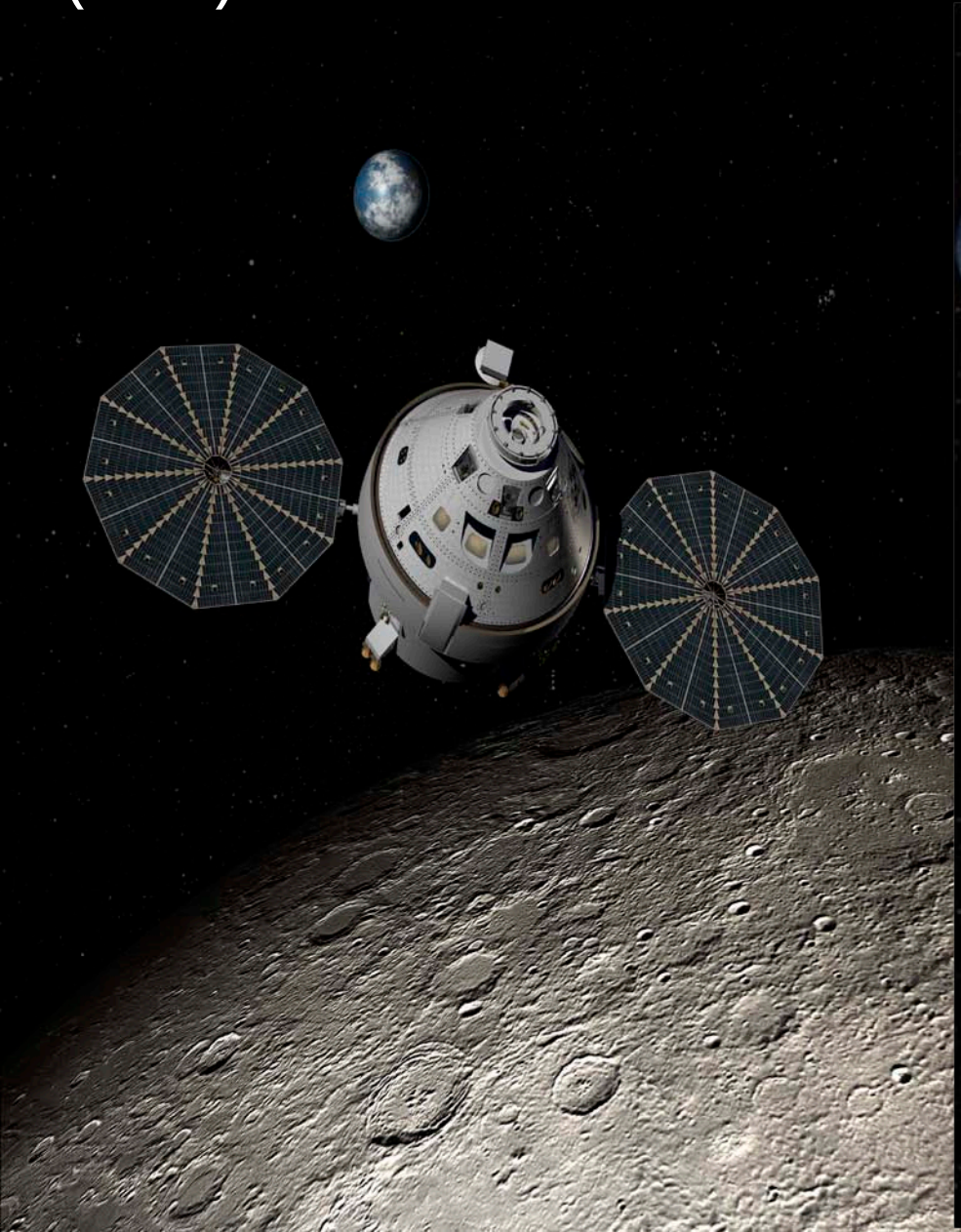


Sub-System Testing and Validation

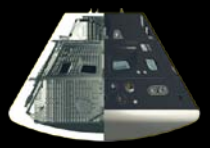


Lunar Fly-by plus Science Payload Mission (2017)





GER Principles and Early Deep Space Mission Capabilities Concepts



Principle	Capabilities Concepts
Capability Driven	Risk Reduction & Early Operations Experience
Exploration Value	Foundation for Future Exploration Missions
International Partnership	Potential ESA Service Module Role
Robustness	Multiple Levels of Sub-System Testing
Affordability	Within Current Budget Plans
Human-Robotic Partnership	Human & Science Operations