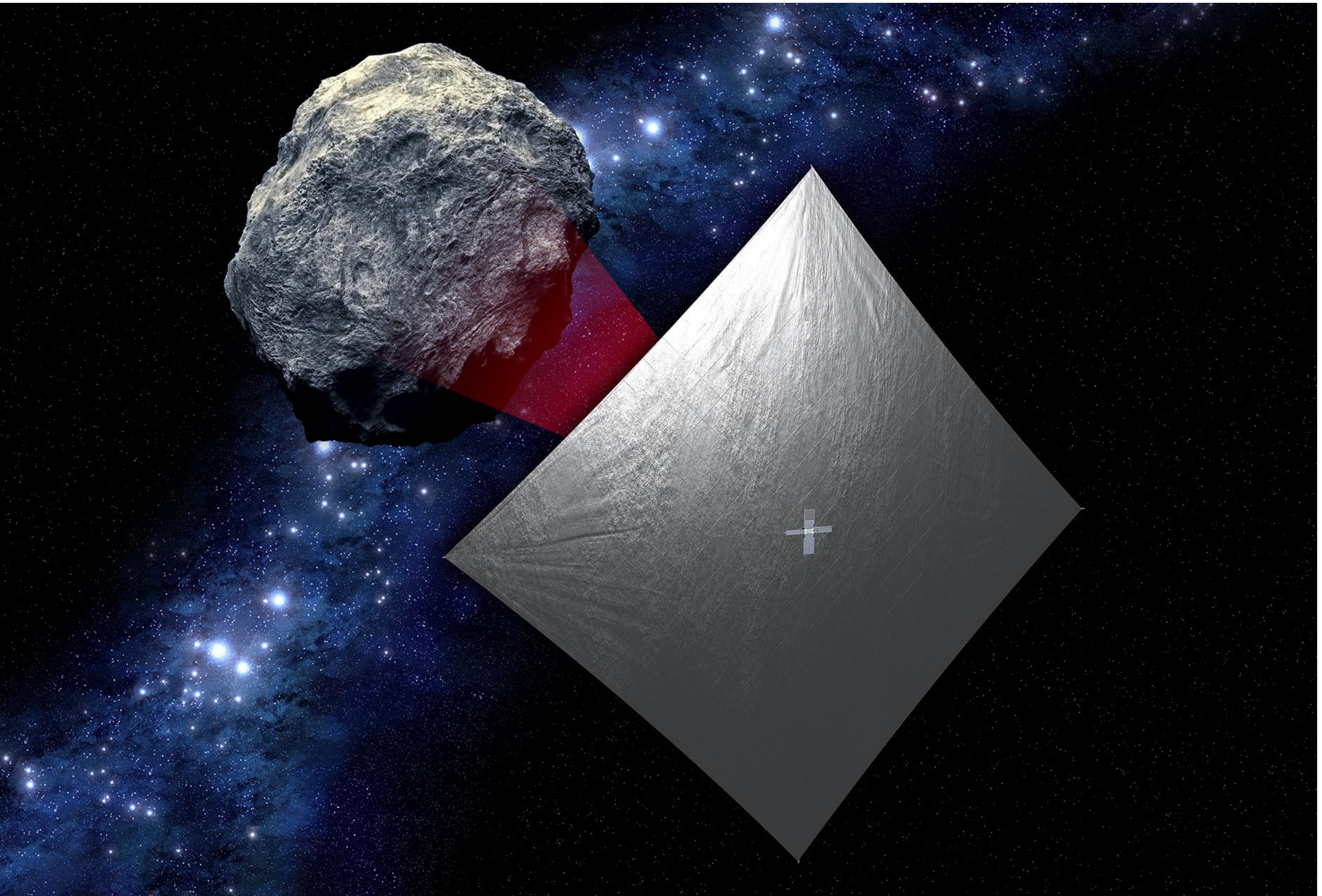
Near Earth Asteroid (NEA) Scout



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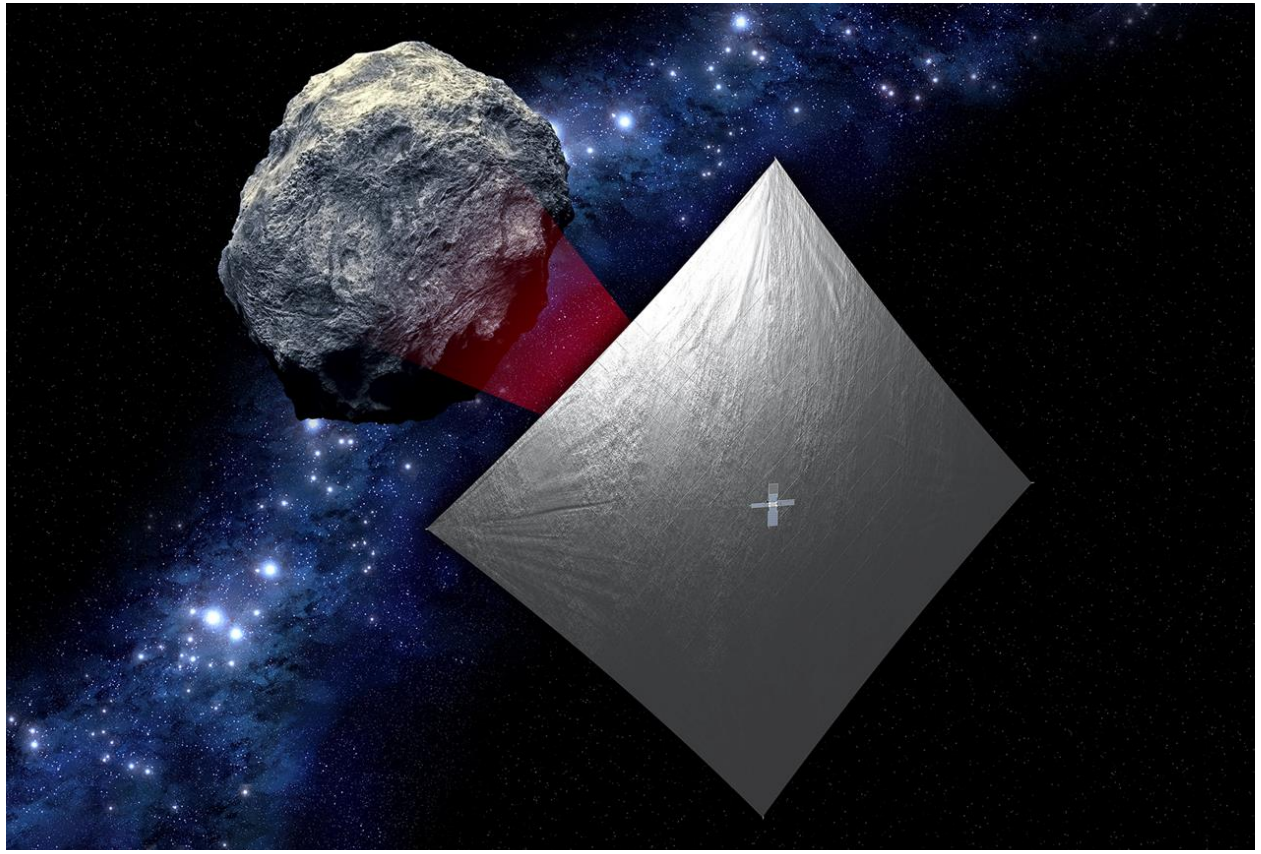
Near Earth Asteroid Scout



The Near Earth Asteroid Scout Will

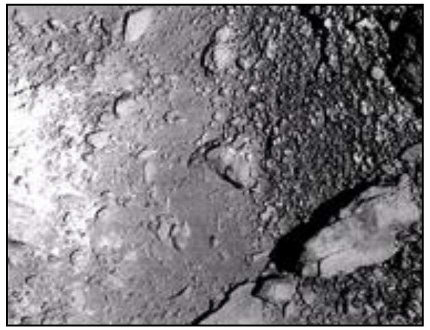
- Image/characterize a NEA during a slow flyby
- Demonstrate a low cost asteroid reconnaissance capability

Key Spacecraft & Mission Parameters

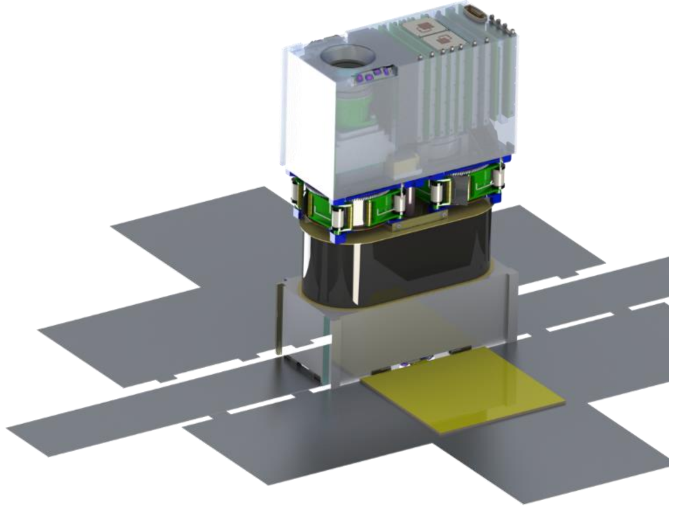
- 6U cubesat (20cm X 10cm X 30 cm)
- ~86 m^2 solar sail propulsion system
- Manifested for launch on the Space Launch System (EM-1/2019)
- 1 AU maximum distance from Earth

Leverages: combined experiences of MSFC and JPL with support from GSFC, JSC, & LaRC

Target Reconnaissance with medium field imaging
Shape, spin, and local environment



Close Proximity Imaging
Local scale morphology, terrain properties, landing site survey



NEA Scout Goals & Objectives

1) Design, develop, integrate and operate a spacecraft for the purpose of demonstrating a low cost reconnaissance capability
2) Enable asteroids as potential destinations for human exploration
3) Characterize a candidate NEA with an imager to address key SKG's

"Precursor robotics, robotic missions that investigate candidate destinations and provide vital information to prepare for human explorers, will lay the groundwork for humans to achieve new milestones in deep space."

HEOMD/AES Strategic Goals/Objectives
(Strategic Goal 1, Objective 1.1)

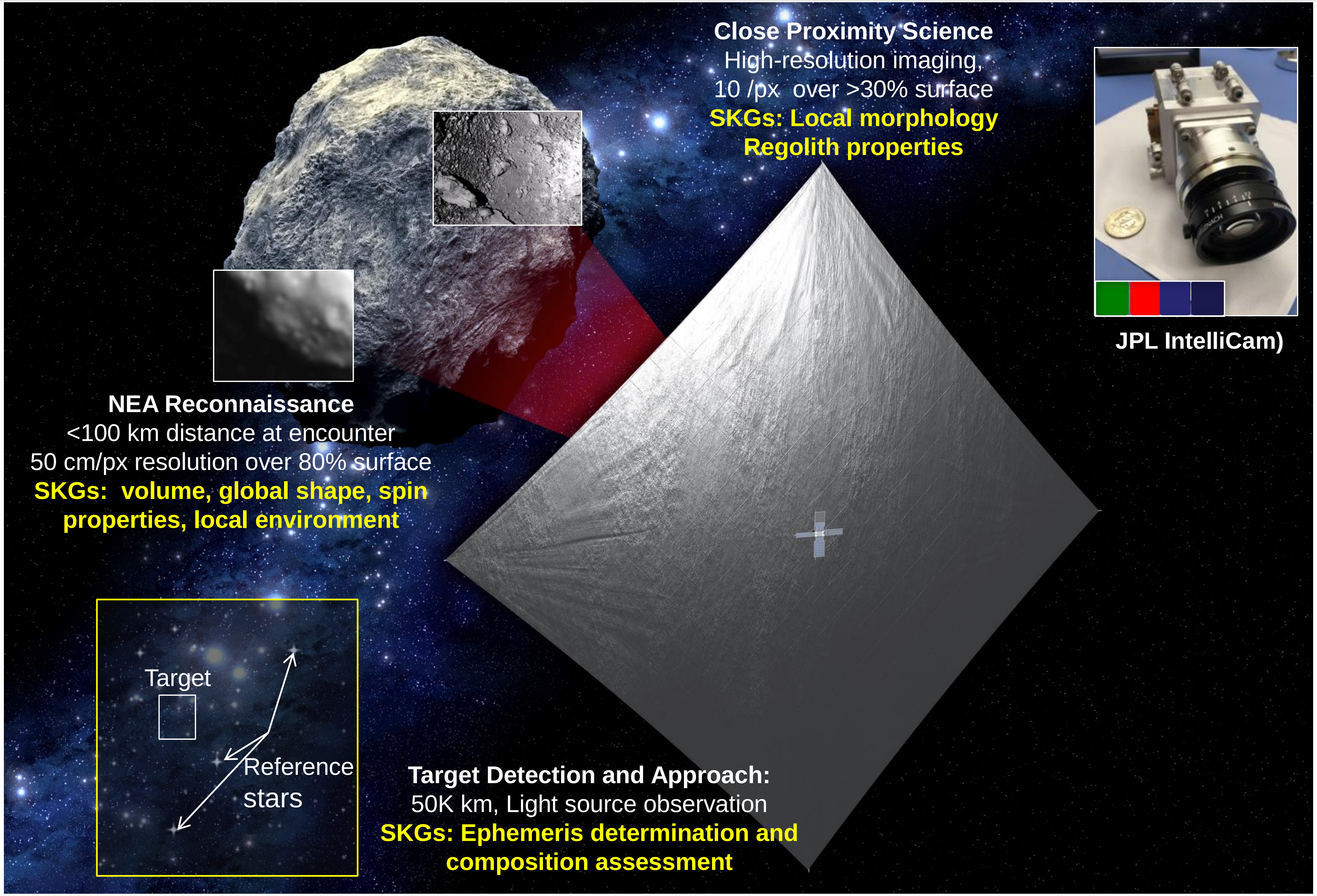
"Robotic exploration is the principal method we use to explore the solar system, and is an essential precursor to human exploration of space."

SMD Strategic Goals/Objectives
(Strategic Goal 1, Objective 1.5)

Baseline Target Asteroid: 1991 VG

- Diameter ~ 5-12 meters
- Albedo is unknown
- Position is known within 2700 km (1-σ) but optical observation opportunity in July '17 will decrease uncertainty to a few 100s km
- Rotation period between a few minutes and less than 1 hour
- Unlikely to have a companion
- Unlikely to retain an exosphere or dust cloud
  - Solar radiation pressure sweeps dust on timescales of hours or day

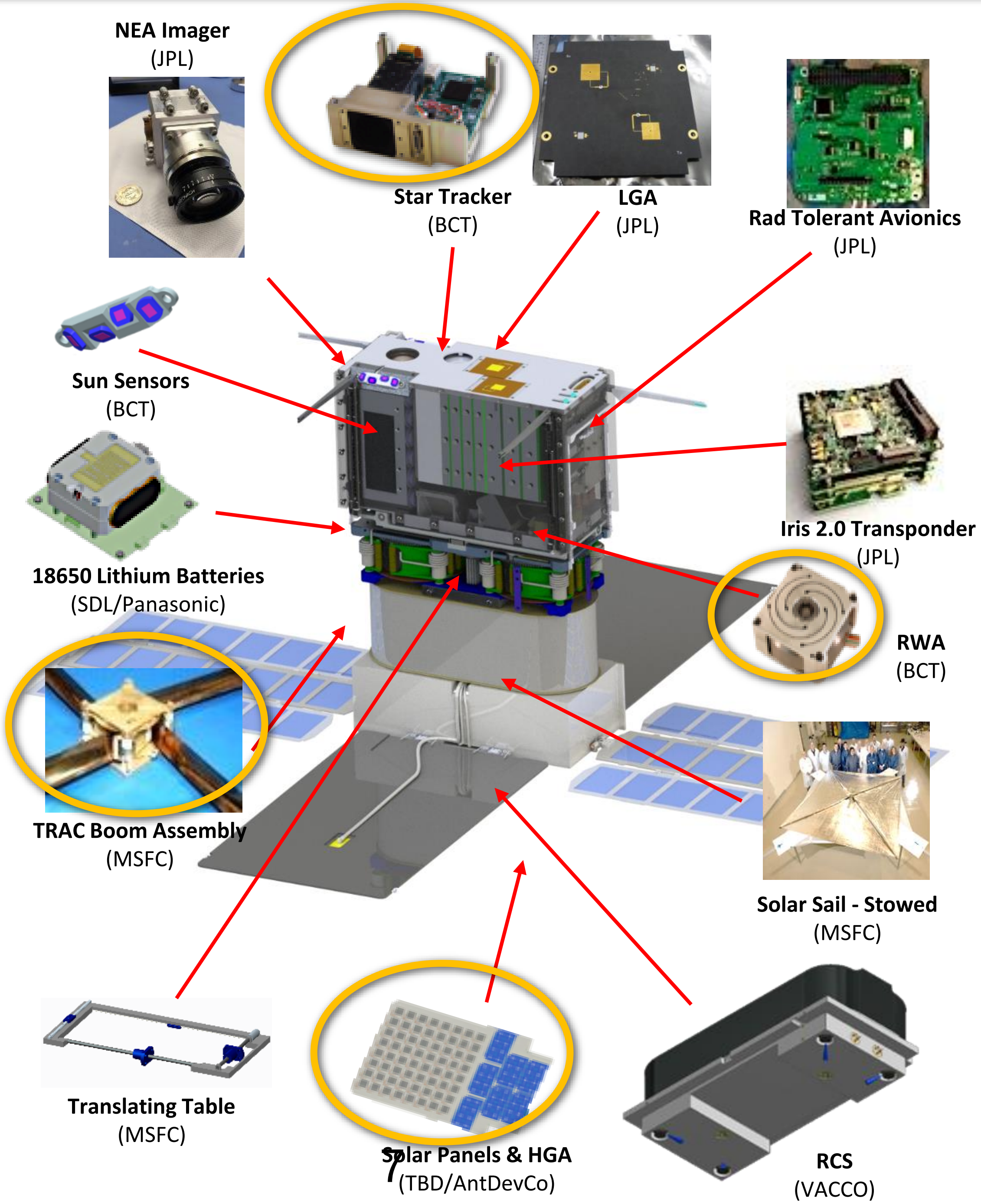
Near Earth Asteroid Scout Mission Overview



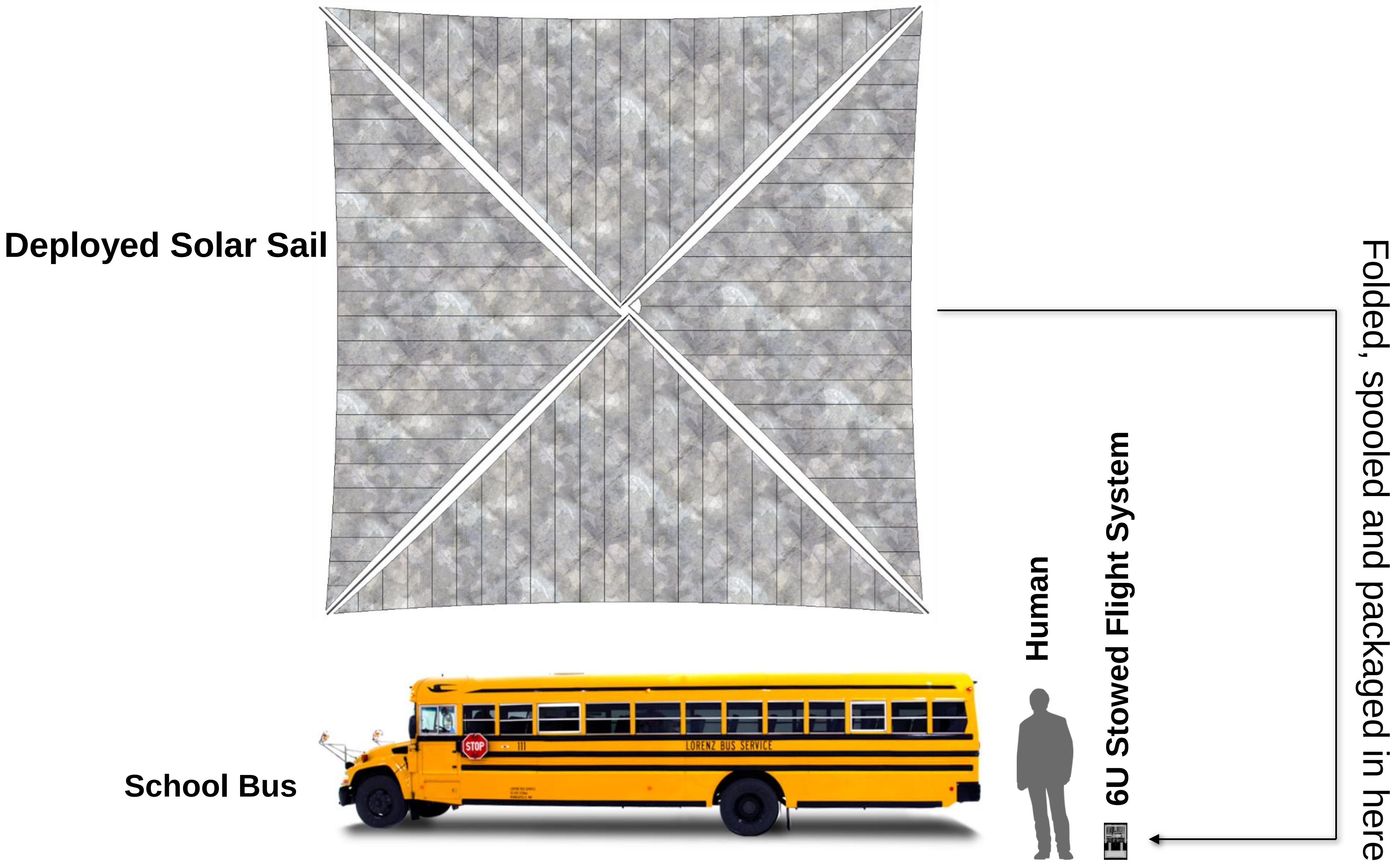
Flight System Overview

Payload	• Context Camera
Mechanical & Structure	• "6U" CubeSat form factor • <14 kg total launch mass • Modular flight system concept
Propulsion	• ~86 m^2 aluminized CP-1 solar sail (based on NanoSail-D2)
Avionics	• Radiation tolerant architecture
Electrical Power System	• Trifold deployable solar arrays with GaAs cells (~51.2 W EOL at 1 AU solar distance) • 6.2 Ah Battery • 10 -12.3 V unregulated, 5 V/3.5 V regulated
Telecom	• JPL Iris 2.0 X-Band Transponder; 4 W RF output power supports doppler, ranging, and D-DOR • 2 pairs of INSPIRE-heritage LGAs (RX/TX) • 8x8 element microstrip array HGA (TX); ~1 kbps to 34m DSN at 0.8 AU
Attitude Control System	• 15 mNm-s (x3) & 100 mNm-s RWAs • Active mass translation system • VACCO R-236fa (refrigerant gas) 'warm gas' RCS system • Nano StarTracker, Coarse Sun Sensors & MEMS IMU for attitude determination

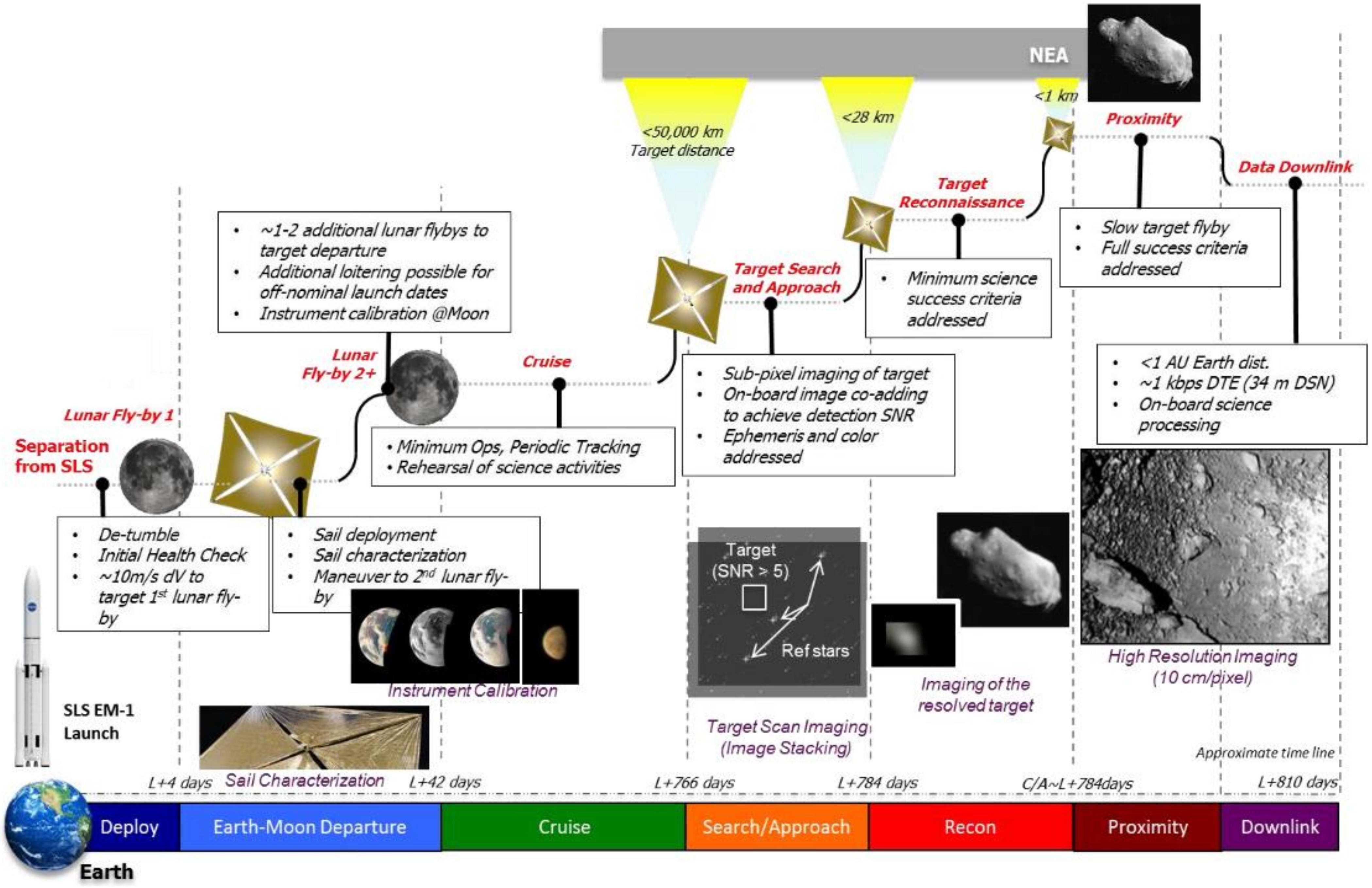
A fully functional planetary spacecraft in a shoebox



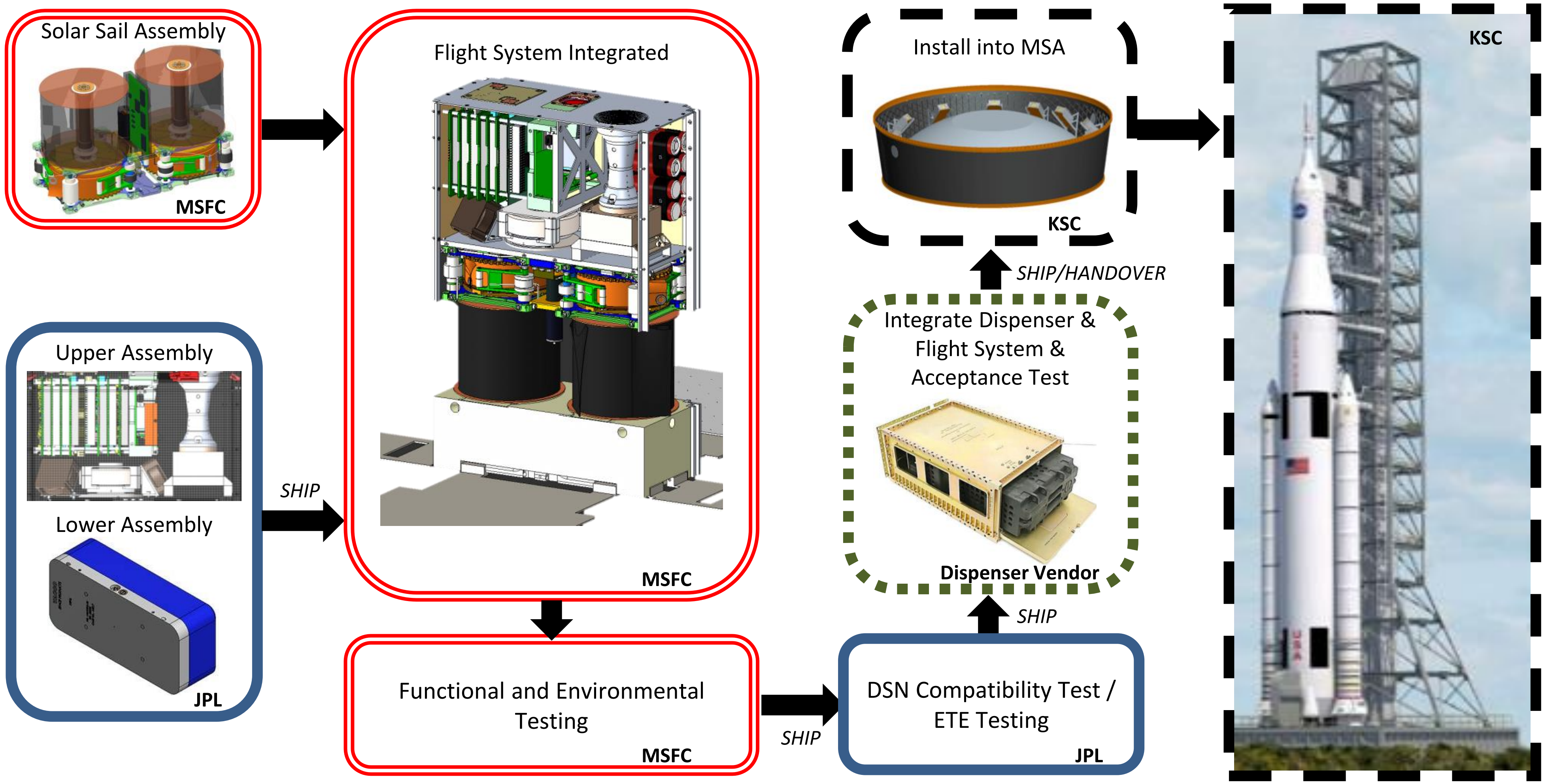
NEA Scout Approximate Scale



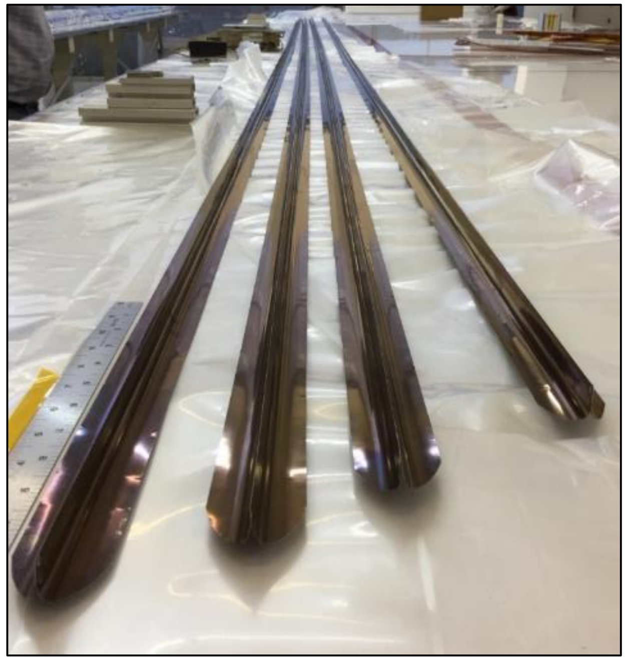
Concept of Operations Overview

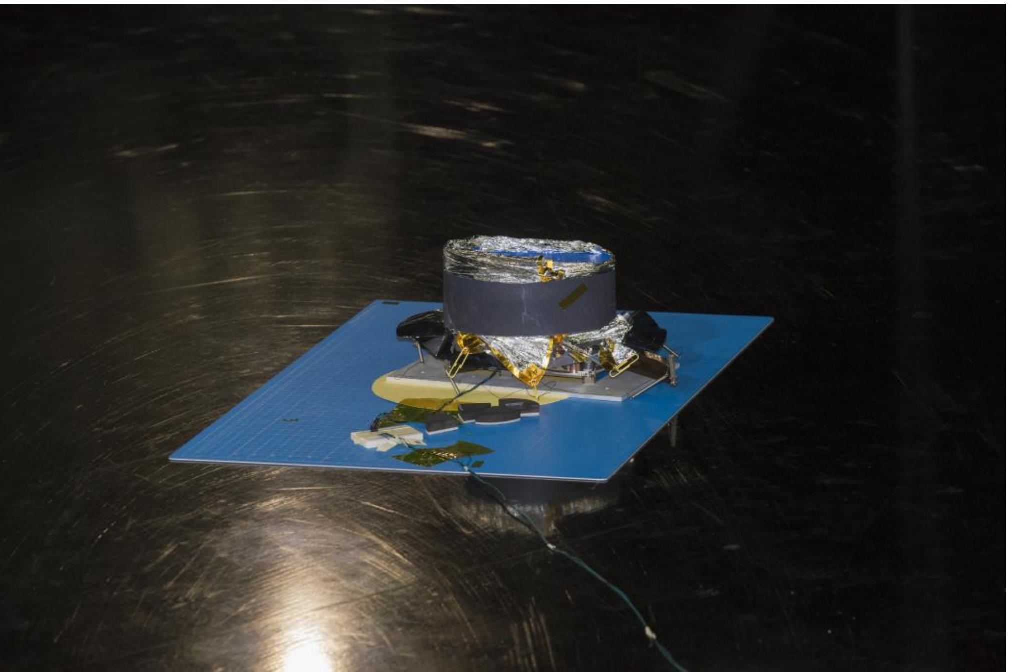


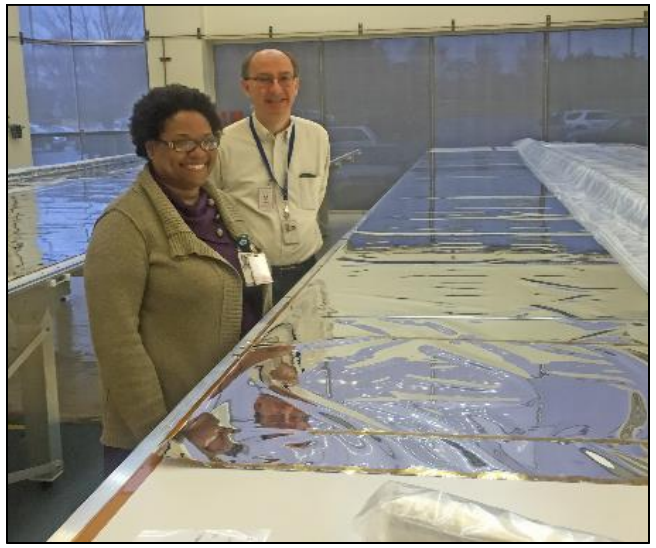
Assembly, Integration, and Test (AI&T) Overview



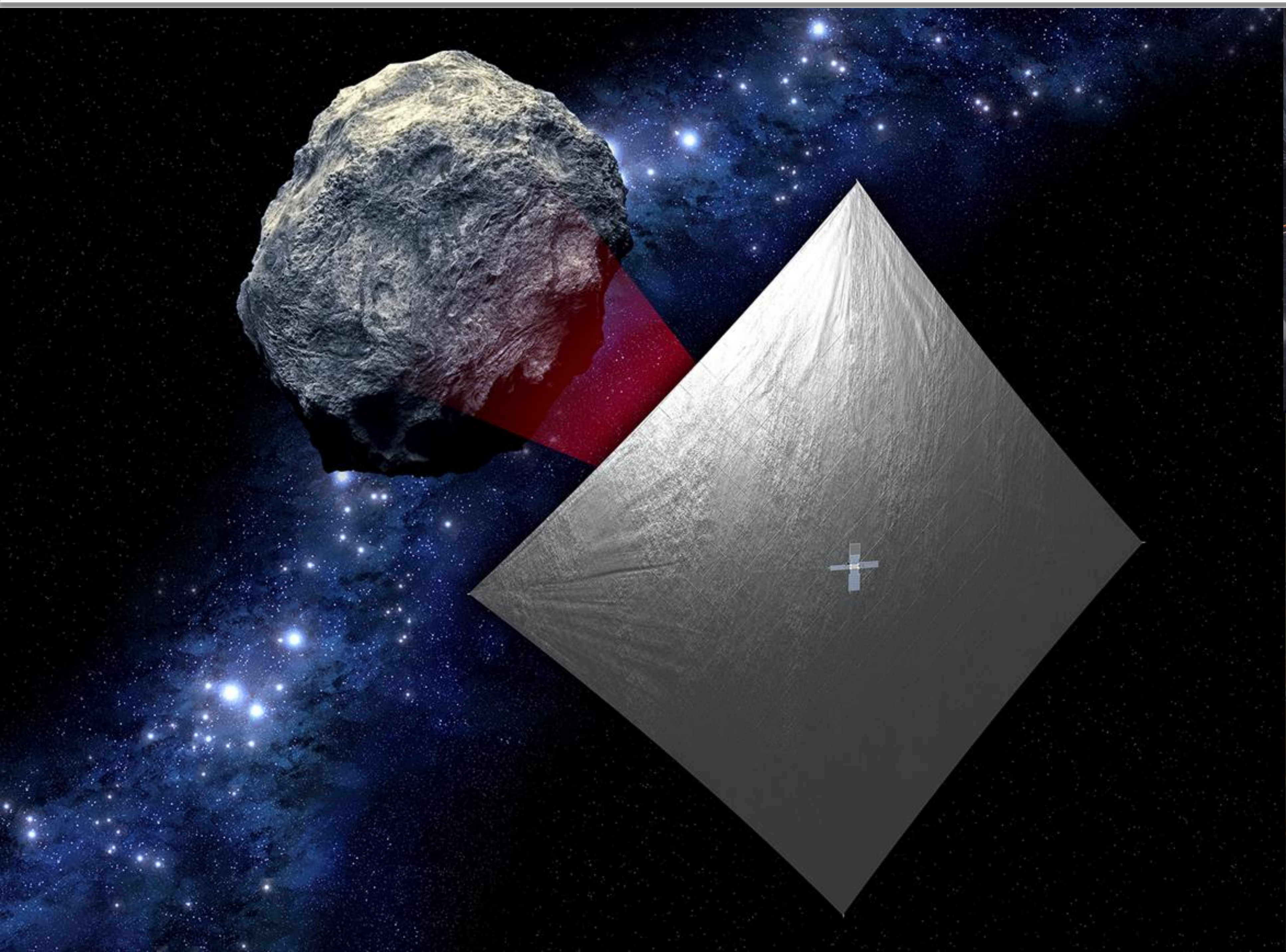
On Schedule to Deliver Spacecraft in 2018

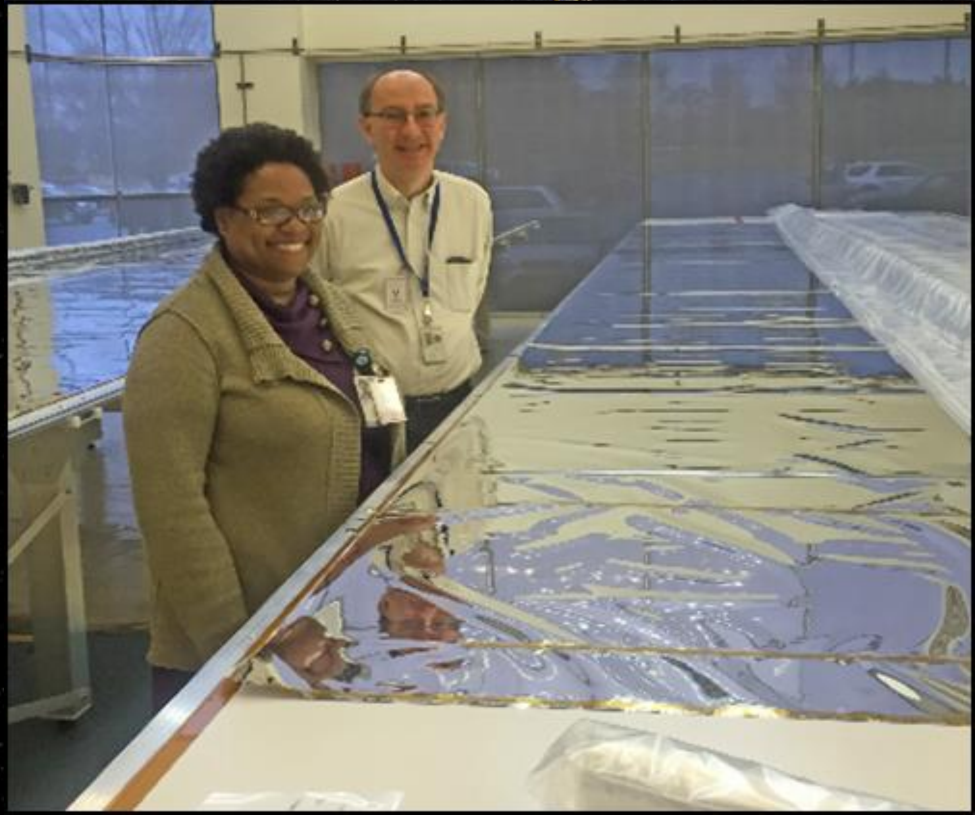






Questions?





Backup Information