# Perspectives on human and robotic spaceflight

Steve Squyres
Chairman, NASA Advisory Council
Cornell University

# The NASA Advisory Council

- Eight committees:
  - Aeronautics
  - Audit, Finance, and Analysis
  - Commercial Space
  - Education and Public Outreach
  - Human Exploration and Operations
  - Information Technology Infrastructure
  - Science
  - Technology and Innovation

# Human Spaceflight: Good News

- International Space Station
- Commercial Cargo and Crew
- Orion and SLS Development

# Human Spaceflight: Concerns

- SLS/Orion capabilities and destination mismatch
  - President's goal: Humans to an asteroid by the middle of the next decade.
  - Actual capability: Cis-lunar space and a 21-day mission.
- Low initial SLS/Orion flight rate
  - Maintaining team proficiency and safety
  - Maintaining program momentum

# Recent NAC Recommendations

- “Integration among the Space Launch System (SLS), Orion, and Ground Systems programs requires definition and implementation. The Council recommends that a small team of experienced integrators, led by an empowered, accountable and responsible leader should be established to ensure adequate integration of the three programs.”

- “Integration at the NASA Headquarters level appears to be insufficient to ensure schedule, technical and cost performance of the system composed of the three separate programs.”

# Recent NAC Recommendations

- “The Council recommends that NASA revisit its near-term human capital planning to include specific new hires with significant outside business experience to enhance implementation of the Agency’s vision of space commercialization.”

- “The Council believes that achieving the expressed Agency vision, which will include new non-NASA markets for human space flight as well as many other new space commercialization initiatives, requires a workforce with significant outside experience in building entrepreneurial businesses, establishing new markets, competing for market share, and managing complex programs in a profit-motivated environment.”

# Recent NAC Recommendations

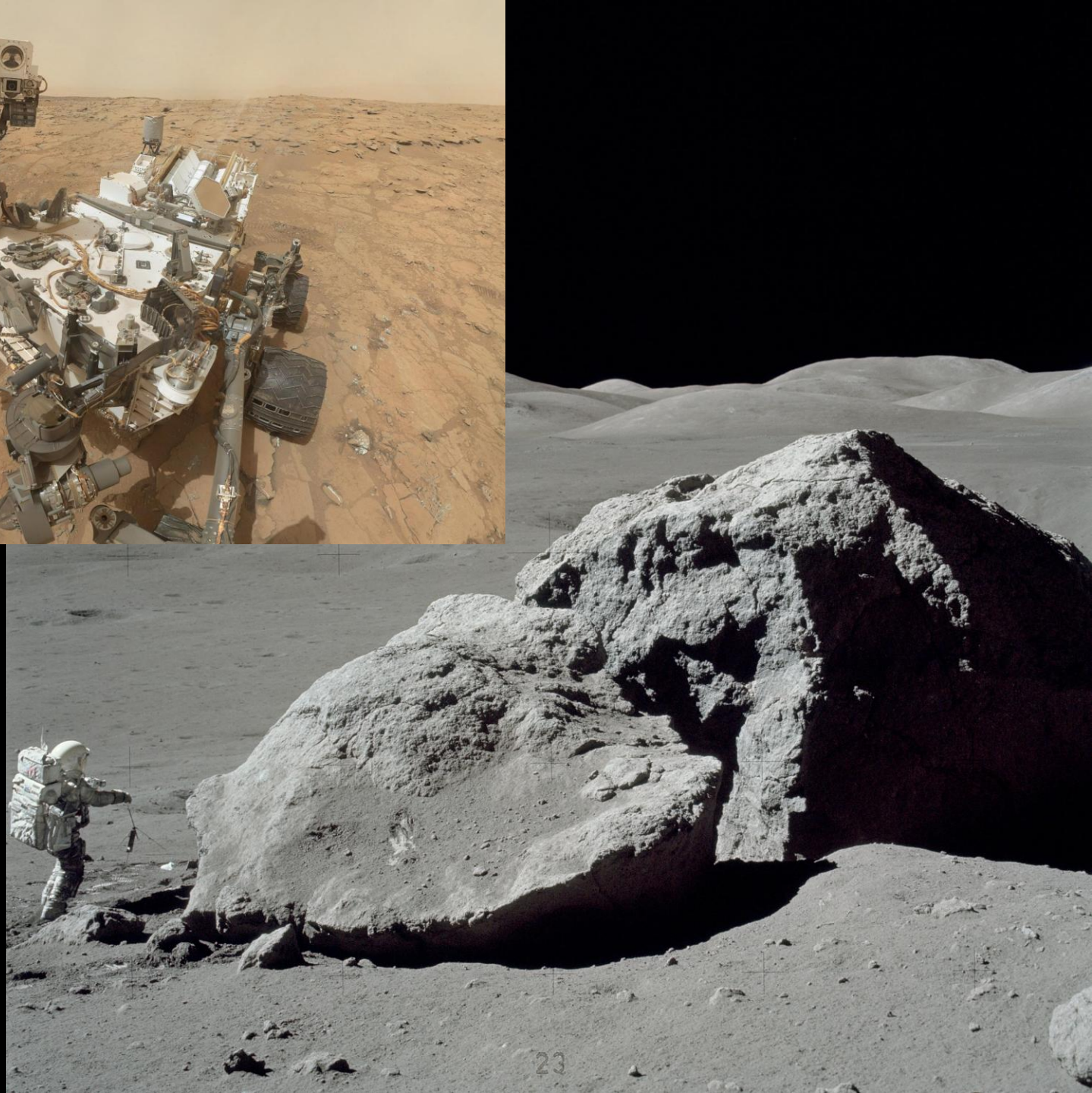
- “The Council recommends that NASA develop the appropriate implementing document to specify planetary protection procedural requirements for human extraterrestrial missions at a level corresponding to the current COSPAR (Committee on Space Research) planetary protection policy and update it as new knowledge becomes available.”

- “NASA Policy Directive 8020.7G on ‘Biological Contamination Control for Outbound and Inbound Planetary Spacecraft’ requires the development of detailed documents delineating the standards and procedures implementing compliance with planetary protection standards and procedures for human spaceflight missions. Currently, however, no such documents exist for human missions.”

# Recent NAC Recommendations

- “The Council recommends that NASA seek restoration of funds in its FYI4 budget proposal to repair the damage done to the Nation's robotic planetary exploration program… The Council concurs with the Science Mission Directorate's (SMD's) initiative to reformulate the Mars Exploration Program… in partnership with human space flight…under the condition that the plan must be consistent with Decadal Survey recommendations.”

NASA needs a compelling and clearly articulated goal for future human spaceflight that is consistent with its budget.




# Briefing to the NASA Review of U.S. Human Space Flight Plans Committee

Steven W. Squyres
August 5, 2009

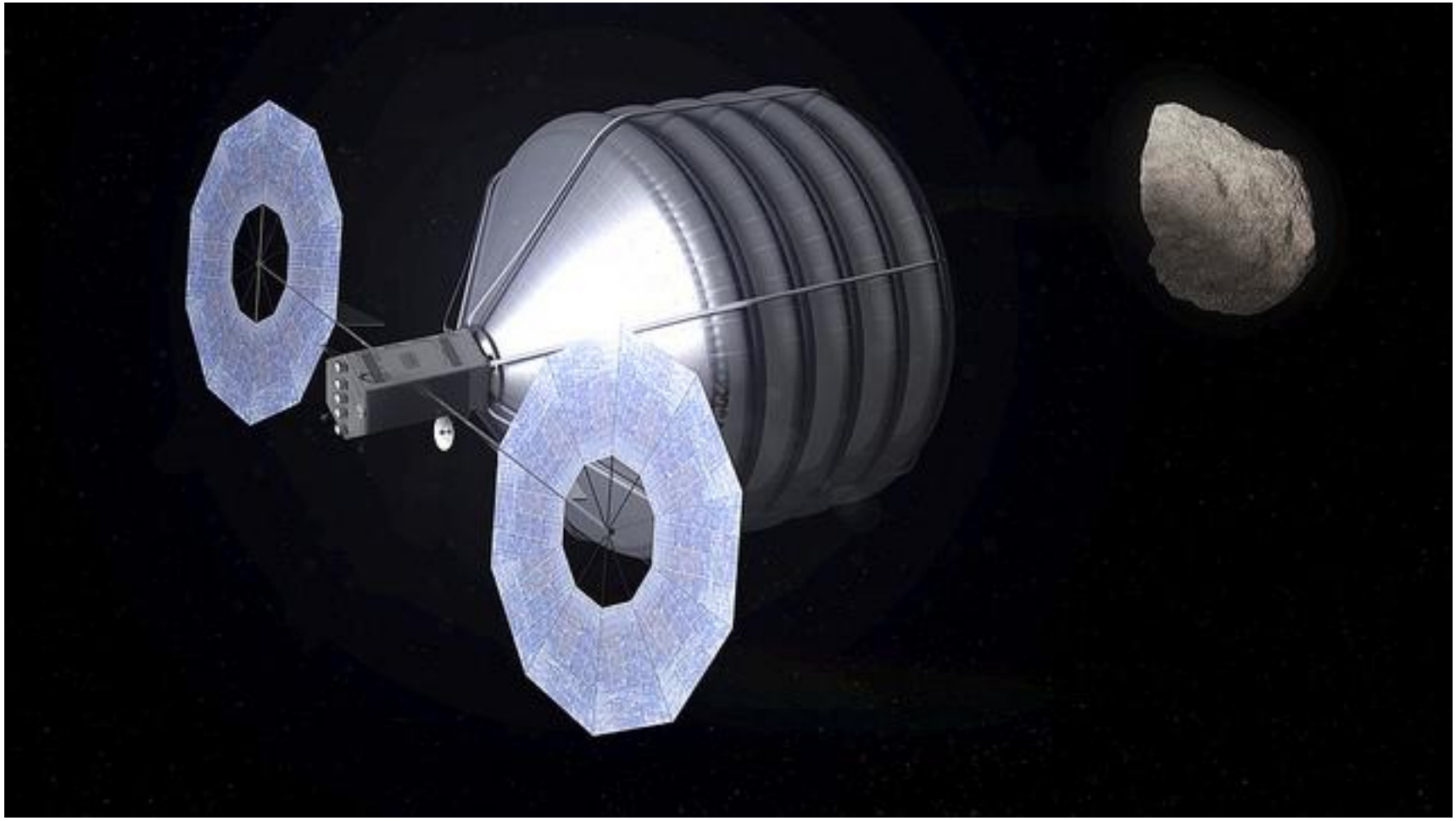
Good morning. I'm pleased to have this opportunity to appear before the committee and share my opinions regarding the role of human explorers in solar system exploration. I should stress that my opinions are my own and do not represent the views of the National Research Council or any other organization.

- There is an important subset of solar system exploration that can benefit from human space flight.

- (For the foreseeable future) humans can only realistically explore the surfaces of the Moon, Mars, the martian moons, and some asteroids.

- Because the capabilities of humans most surpass those of robots in complex environments, the scientific value that humans add is in proportion to the complexity of the environment to be explored.

- Human explorers can contribute more to the scientific exploration of Mars than they can to any other body in the solar system.



# Asteroid Mission Concept Segments

- Target search
- Asteroid capture and redirect
- Rendezvous in cislunar space

# Asteroid Mission Concept Advocacy

- Asteroid exploration

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- Satisfying the President's mandate

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- Asteroid exploration

- Satisfying the President's mandate

"…by 2025, we expect *new spacecraft designed for long journeys* to allow us to begin the first-ever crewed missions *beyond the Moon into deep space*. So we'll start -- we'll start by sending astronauts to an asteroid for the first time in history."

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