

PI-Led Forum Presentation  
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# NASA's Strategic Goals

## **U.S. Space Exploration Policy**

- To advance U.S. scientific, security, and economic interests through a robust space exploration program

## **NASA's Mission**

- To pioneer the future in space exploration, scientific discovery, and aeronautics research

## **NASA's Strategic Goals in Science**

- Study Earth from space to advance scientific understanding and meet societal needs.
- Understand the Sun and its effects on Earth and the solar system.
- Advance scientific knowledge of the origin and history of the solar system, the potential for life elsewhere, and the hazards and resources present as humans explore space.
- Discover the origin, structure, evolution, and destiny of the universe, and search for Earth-like planets.

## **Science Mission Directorate (SMD) Priorities**

- Answer fundamental scientific questions with innovative space missions
- Design and implement programs executable within the budget
- Promote U.S. leadership across space and Earth science
- Advance science as humans explore beyond Earth orbit
- Expand the recognized public benefits of NASA science

# SMD Principles

## **Science Mission Directorate (SMD) implements its programs in conformance to a set of proven basic principles**

- Investment choices consider scientific merit via peer review and open competition
- Active participation by the research community outside NASA is critical to success
  - We look to the Decadal Surveys as the principal source of external recommendations on scientific and mission priorities for NASA
- Scientific discovery is fueled by prompt, broad, and easy access to science data
- Partnerships are essential to achieving NASA's science objectives
- The NASA mandate includes broad public communication
- Sustained progress in advancing US space and Earth science interests requires investments across a broad range of activities
  - Basic research, technology development, missions, data systems
  - Consider long-term health of necessary scientific disciplines
  - Establish mission lines that enable competitive selection
  - Maintain essential technical capabilities at NASA Centers





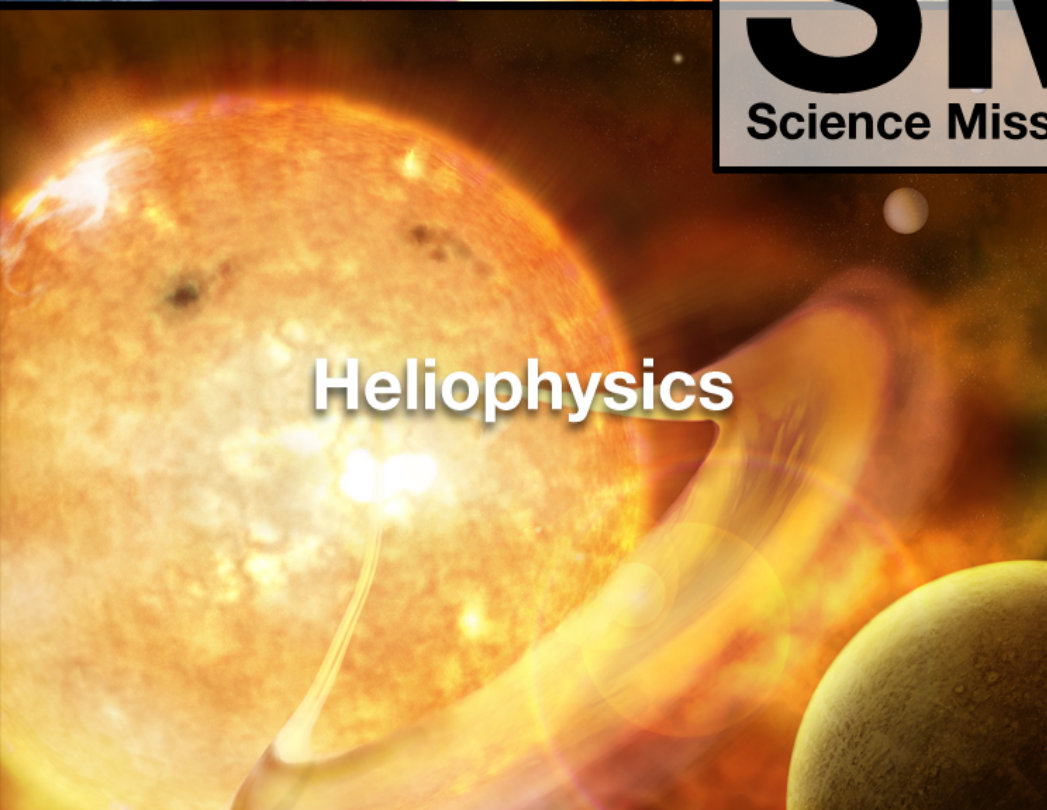
**Earth Science**



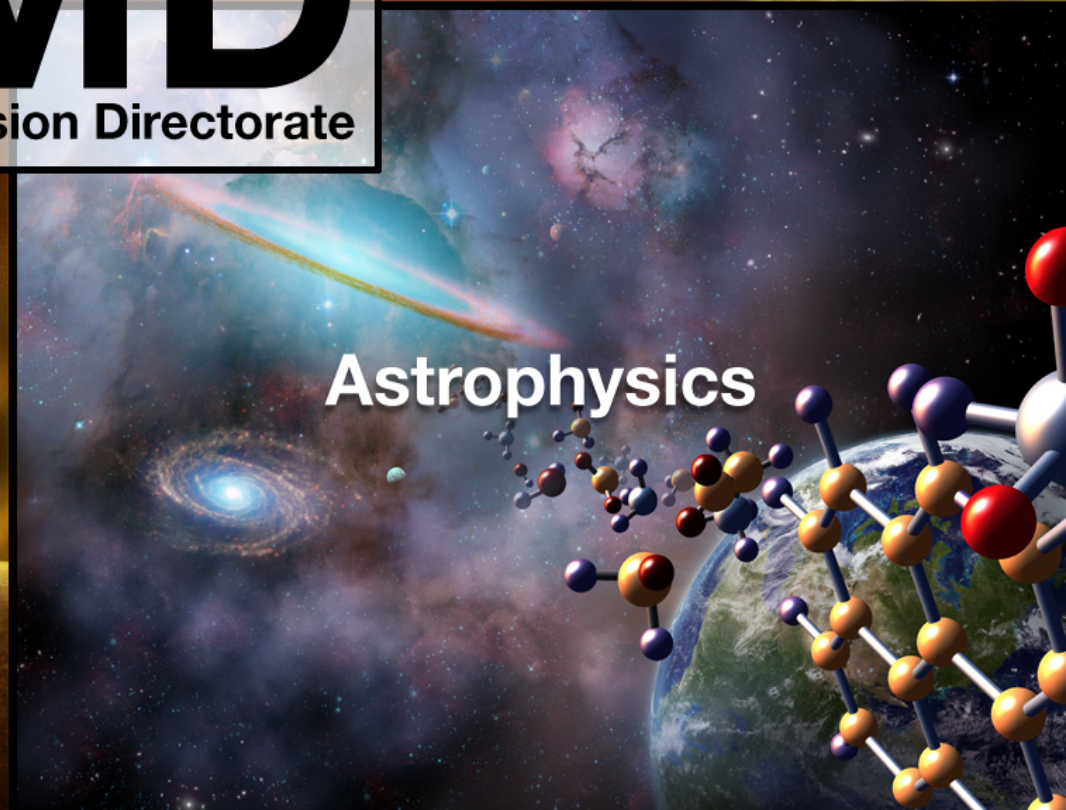
**Planetary Science**

**SMD**

Science Mission Directorate



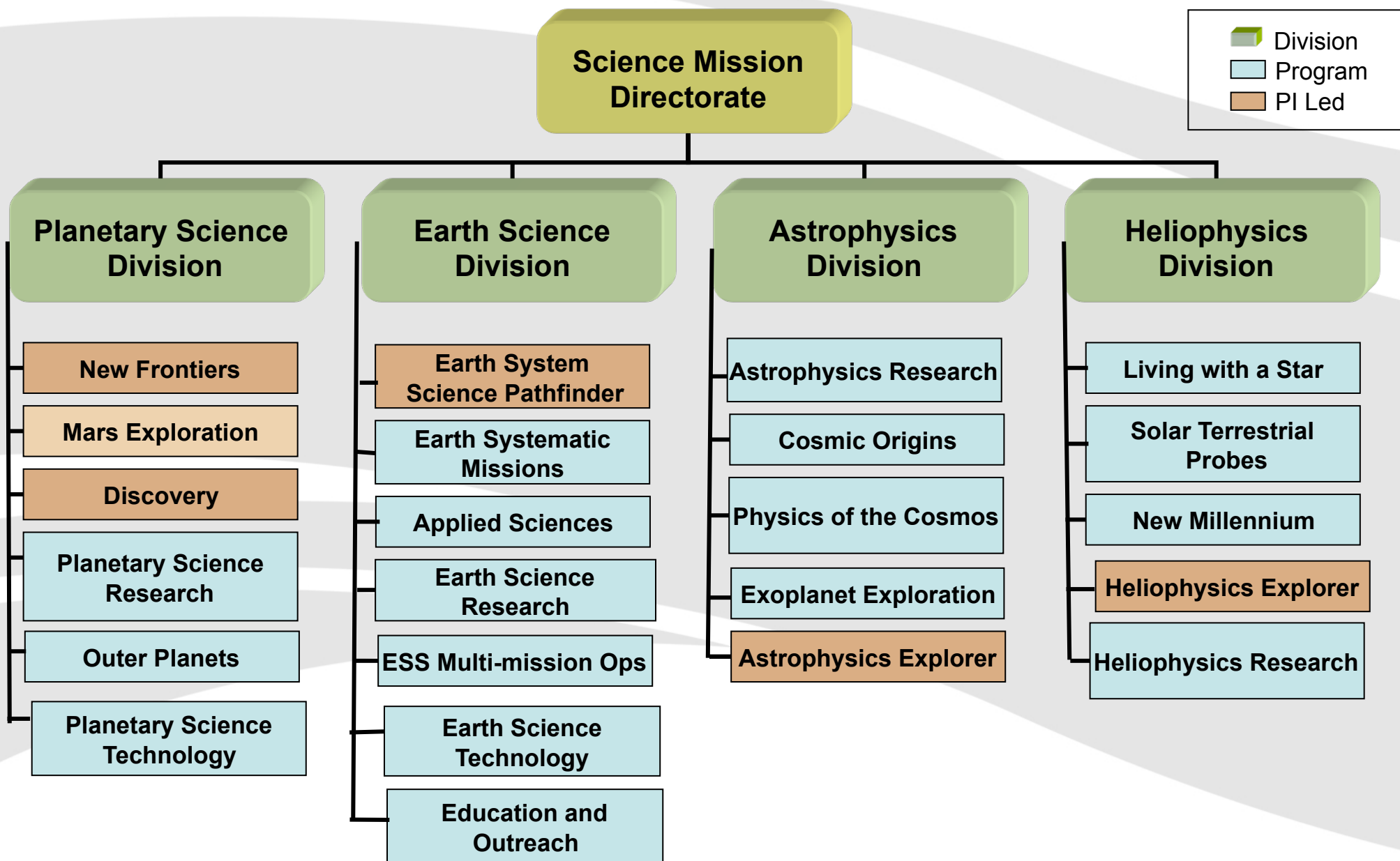
**Heliophysics**



**Astrophysics**



# SMD Programs



# NASA Science Mission Launches (CY07-CY16)

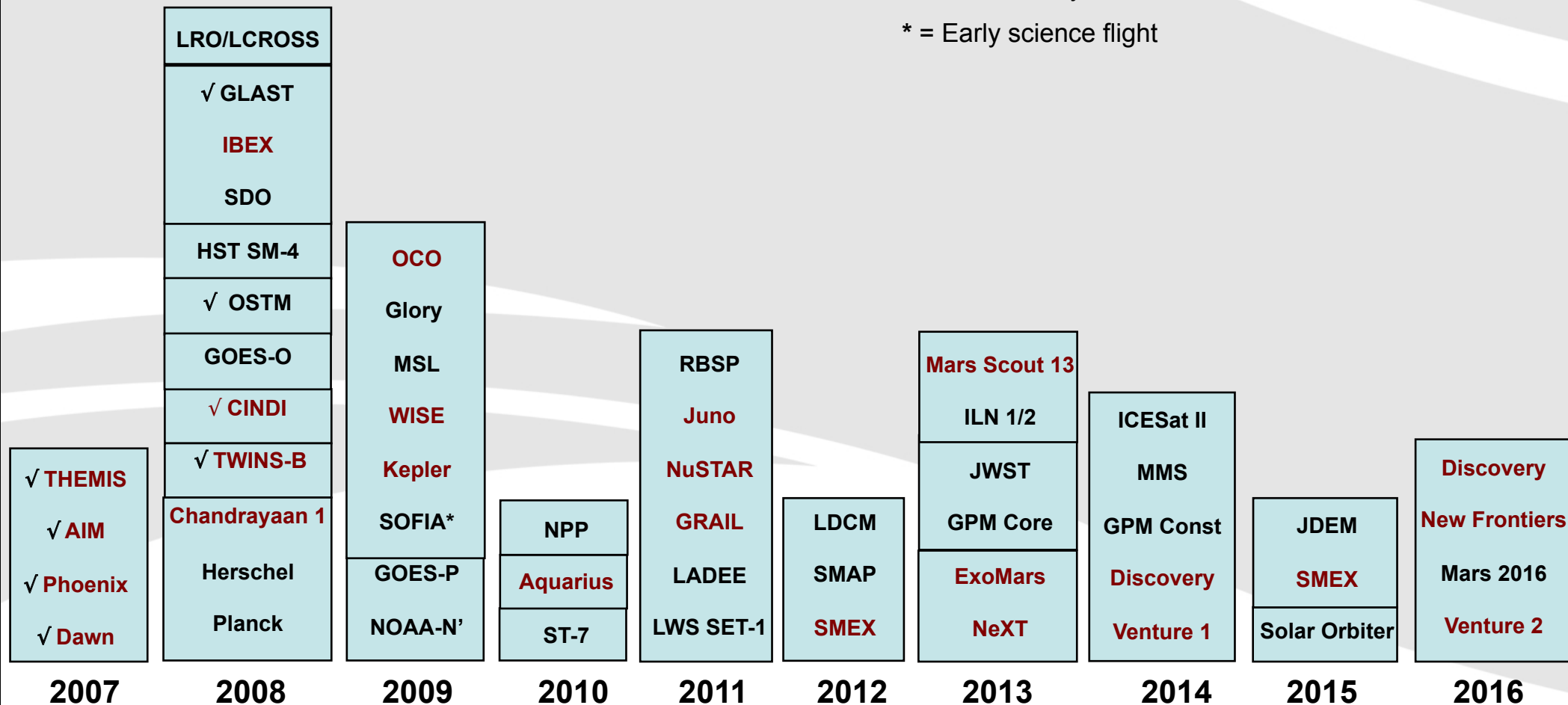
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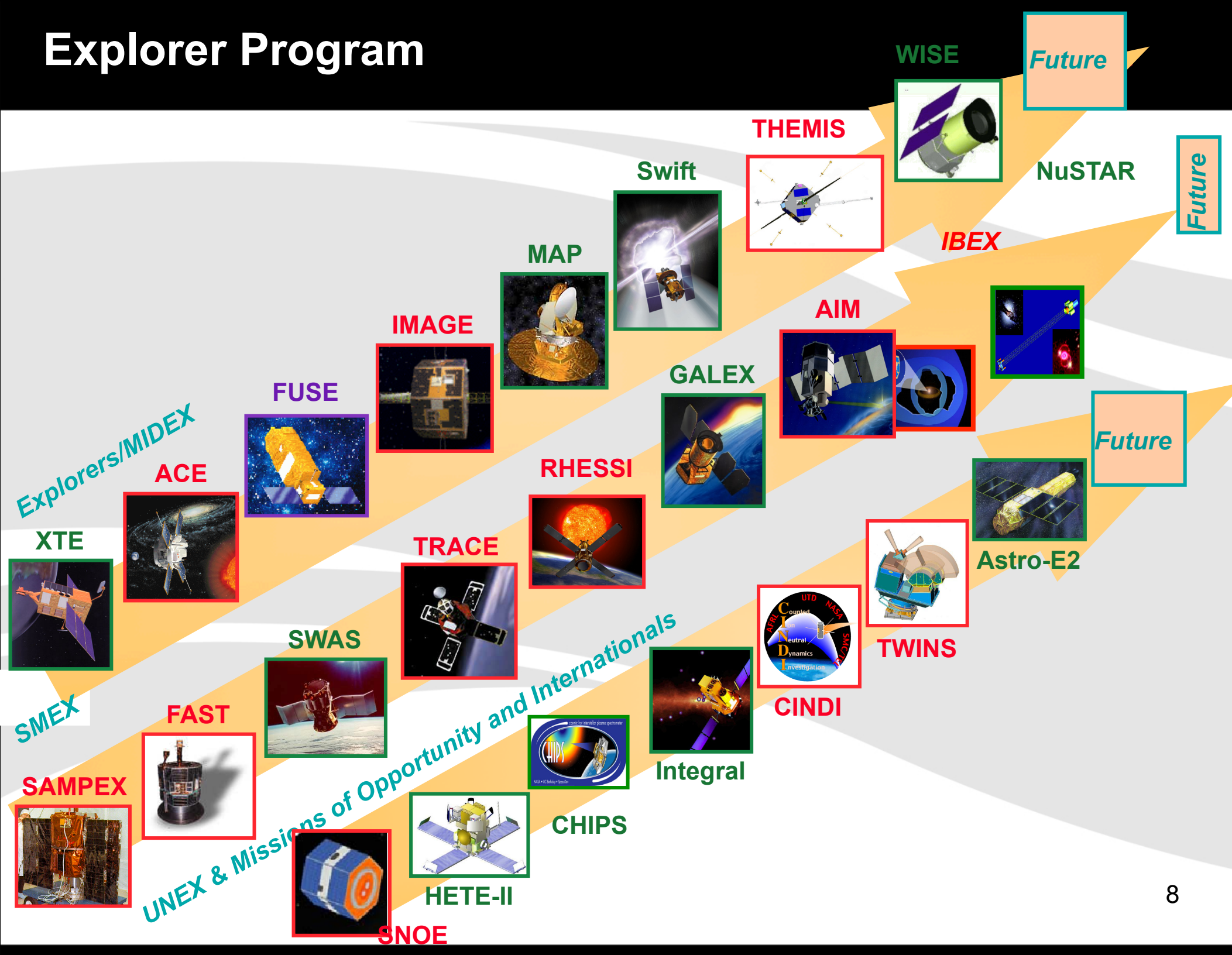
**RED** = PI-led Missions

√ = Successfully launched to date

\* = Early science flight

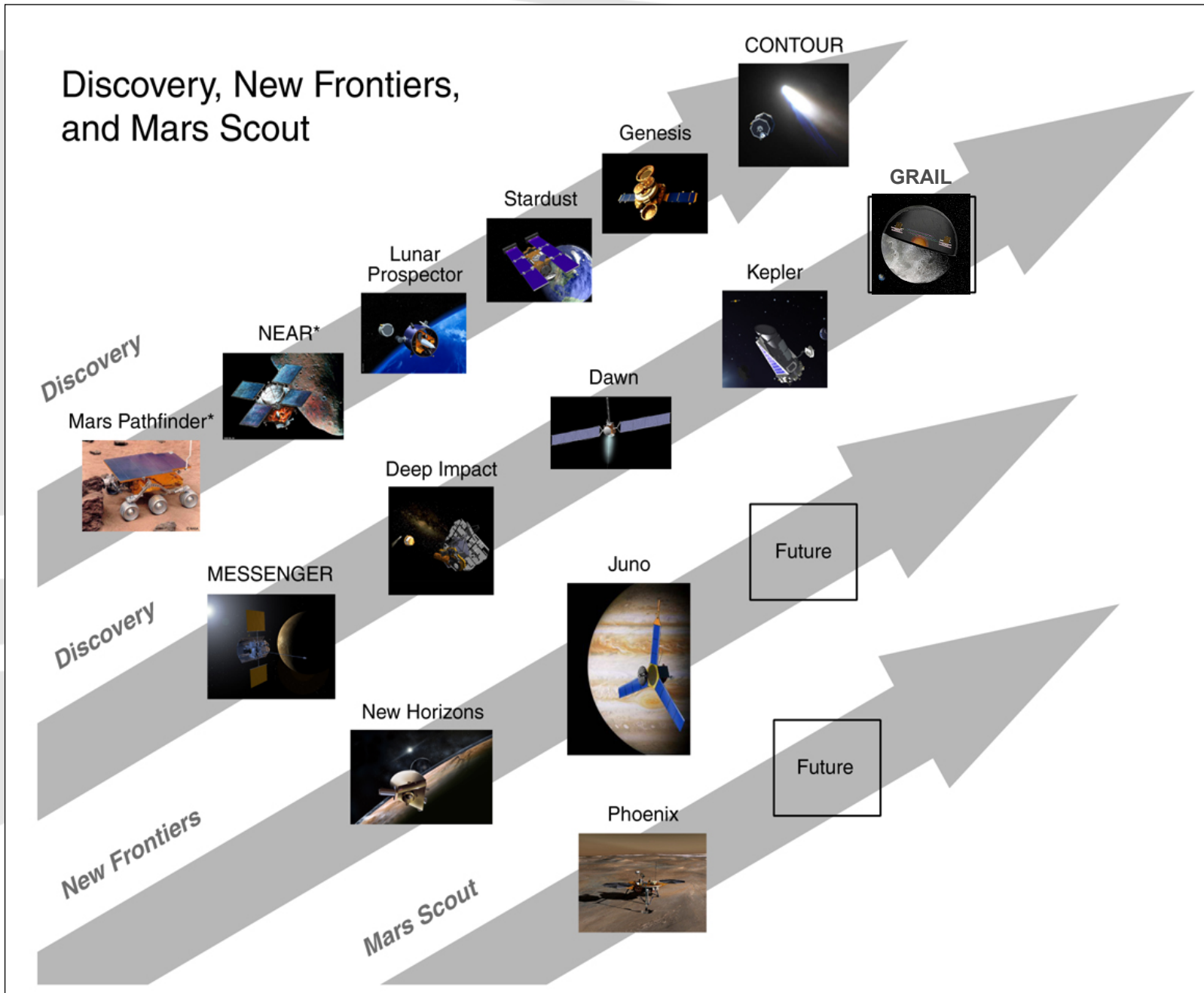


# Explorer Program



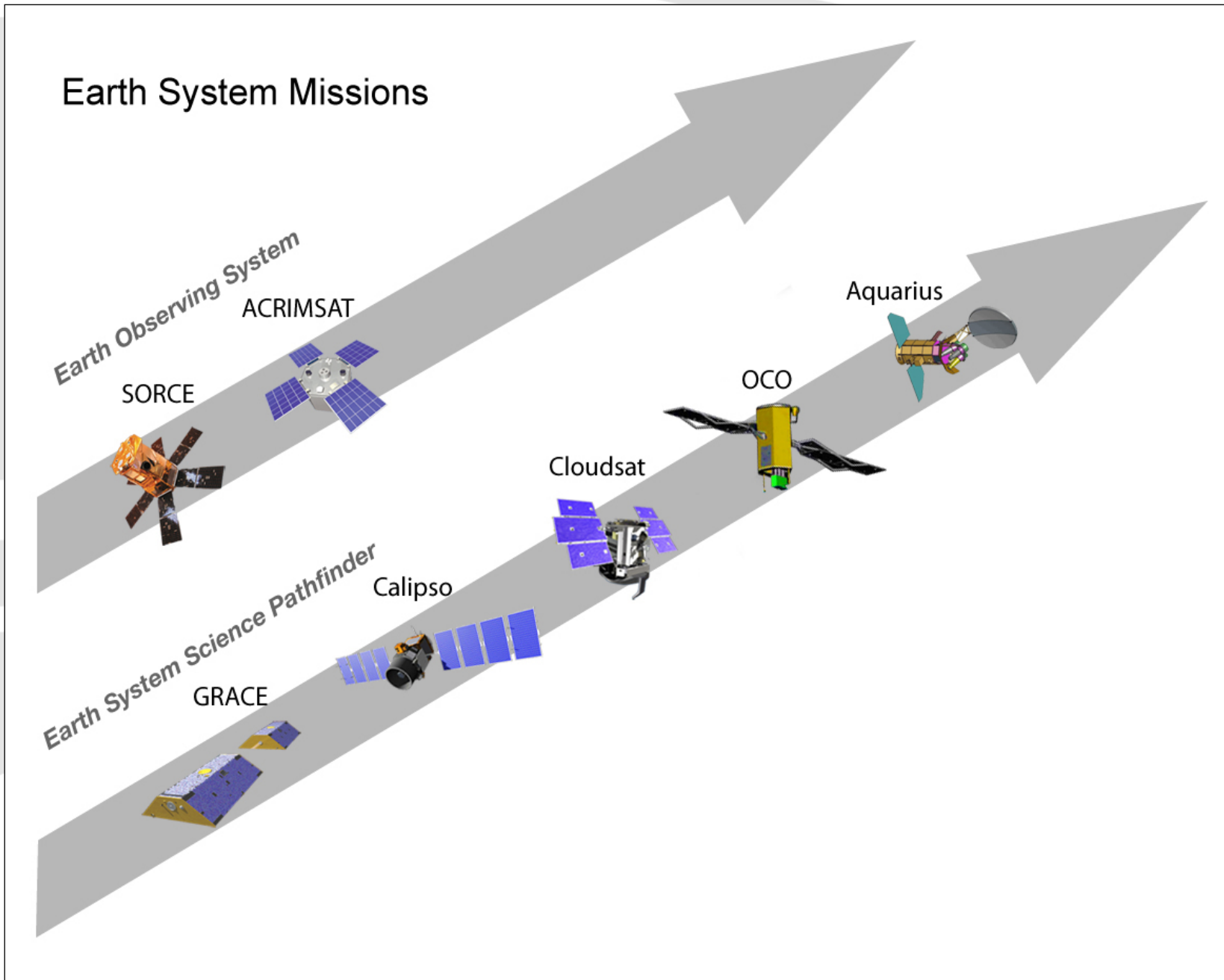


# Discovery, New Frontiers, and Mars Scout



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# Earth Science Missions



# Challenges of PI-Led Missions

1. Keeping mission costs under the cost cap, which may require descoping some science, payloads, or instruments.
2. Managing different partners and service providers (e.g., spacecraft and science teams, mission management, etc.) effectively to meet mission goals.
3. Implementing programmatic requirements consistent with NASA guidelines.
4. Adequately budgeting for data archiving and analysis; having sufficient funds to archive science data for other scientists and researchers to study.





# PI-led Missions: Take Aways

Teamwork and active participation is critical to mission success:

- You cannot operate in isolation; you need the advice from key personnel in your organization such as the program manager, co-investigator, project scientist, business manager, customer, international partners (if applicable), planner, and contractors.
- Leadership skills are essential - Principal investigator has to know when to delegate tasks to team members. It means that the PI must give up some responsibilities to execute the mission.
- Principal investigator must stay engaged with project from concept to completion.



# PI-led Missions: Take Aways

Rely on experienced team members and other experts:

- Take advantage of the experience on Standing Review Boards and Independent Assessment Teams - they are there to help you.
- Well-experienced team members strategically placed throughout the project can do much to keep the team together and operating effectively. Also, experienced team members can keep the whole team focused on the mission and boost morale in difficult times.

# PI-led Missions: Take Aways

Effective communication is key:

- Regular meetings, teleconferences, etc. to keep all team members engaged and lines of communications open for input and exchange of information.
- Critical points of views are raised during daily discussions, peer reviews, and key milestone reviews.
- Do not let any potential problematic issue go unaddressed for an extended period of time. The biggest problems arise when there is conflict on roles and responsibilities and ineffective communication to resolve them.



# PI-led Missions: Take Aways

Missions must be executed within budget and on schedule:

- The PI needs to be involved in all budgetary planning, and fully understand the true life cycle cost for the mission.
- Cost and schedule overruns cause problems to snowball. The PI's mission schedule and cost reserves are reviewed and discussed at monthly NASA senior management meetings. The mission is subject to termination review during any phase of the mission.
- Overruns affect other projects. NASA HQ does not keep financial reserves - budget fixes (if approved) have to come from someone's else project.
- What is truly necessary is that everyone is in agreement up front on the mission science and the descope plan. When there is no viable descope plan, options are limited.



# PI-led Missions: Take Aways

NASA is ultimately responsible for the mission:

- As the PI, you are responsible to NASA for your project—cost, schedule, and mission success - but NASA is held accountable to the President, Congress and the American taxpayers for the money spent.



# Final Thoughts

The path to success is largely determined by people and relationships  
– and your leadership.

Listen and ask questions.

Test as you fly.

The challenges of leading a spaceflight mission make it one of the  
toughest jobs you can imagine – and it's worth it!