



Planetary Protection at NASA: Overview and Status

Catharine A. Conley,
NASA Planetary Protection Officer

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NASA Strategic Goals



Strategic Goal 1: Expand the frontiers of knowledge, capability, and opportunity in space.

Objective 1.1: Expand human presence into the solar system and to the surface of Mars to advance exploration, science, innovation, benefits to humanity, and international collaboration.

Objective 1.2: Conduct research on the International Space Station (ISS) to enable future space exploration, facilitate a commercial space economy, and advance the fundamental biological and physical sciences for the benefit of humanity.

Objective 1.5: Ascertain the content, origin, and evolution of the solar system and the potential for life elsewhere.

NASA Planetary Protection Policy



- The policy and its implementation requirements are embodied in NPD 8020.7G (*NASA Administrator*)
 - Planetary Protection Officer acts on behalf of the Associate Administrator for Science to maintain and enforce the policy
 - NASA obtains recommendations on planetary protection issues (requirements for specific bodies and mission types) from the National Research Council's Space Studies Board
 - Advice on policy implementation to be obtained from the NAC Planetary Protection Subcommittee
- Specific requirements for robotic missions are embodied in NPR 8020.12D (*AA/SMD*)
 - Encompasses all documentation and implementation requirements for forward and back-contamination control
- NASA Policy Instruction 8020.7 “*NASA Policy on Planetary Protection Requirements for Human Extraterrestrial Missions*”
released in NODIS as of May 28, 2014

Role of PPS



- The scope of the PPS includes programs, policies, plans, hazard identification and risk assessment, and other matters pertinent to the Agency's responsibilities for biological planetary protection.
- This scope includes consideration of NASA planetary protection policy documents, implementation plans, and organization.
- The subcommittee will review and recommend appropriate planetary protection categorizations for all bodies of the solar system to which spacecraft will be sent.
- The scope also includes the development of near-term enabling technologies, systems, and capabilities, as well as developments with the potential to provide long-term improvements in future operational systems to support planetary protection.

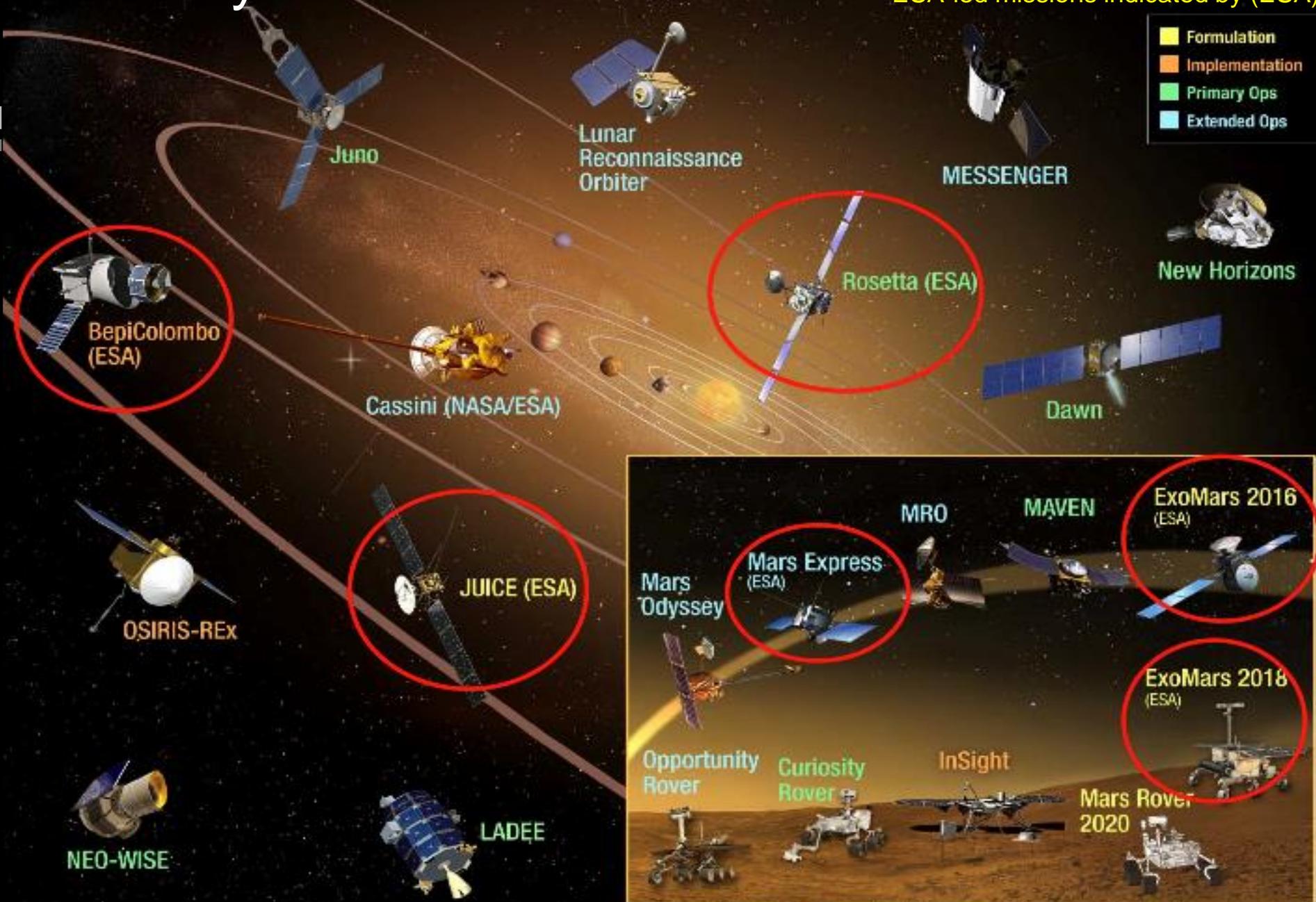
Recent PPS Recommendations



- Nov. 2014 meeting
 - Recommendations
 - Improve MSL Project Office – Planetary Protection Officer Communications
 - Ensure Planetary Protection input to NASA assessment of launch and reentry license applications to the DoT/FAA by Non-Governmental Entities
 - Observations and information
 - Pleased by improved communications with InSight, M2020, and HEO
 - Concerned that the reporting line of the PPO be consistent with responsibility to assure continued treaty compliance across programs in multiple directorates
 - Concerned that joint meetings with ESA were not held
- June 2015 meeting
 - Recommendations
 - M2020 receives Category V Restricted Earth Return
- Oct. 2015: PPS members attend ESA PPWG meeting
- Dec. 2015 meeting
 - Recommendations
 - Adopt 2015 Bern COSPAR workshop findings as NASA policy
 - NASA Planning for Full System-Level Sterilization
 - Observations and information
 - Pleased by SMD plans for MSL operations and Special Regions at Gale Crater
 - Appreciated detailed presentation on M2020 Caching System implementation

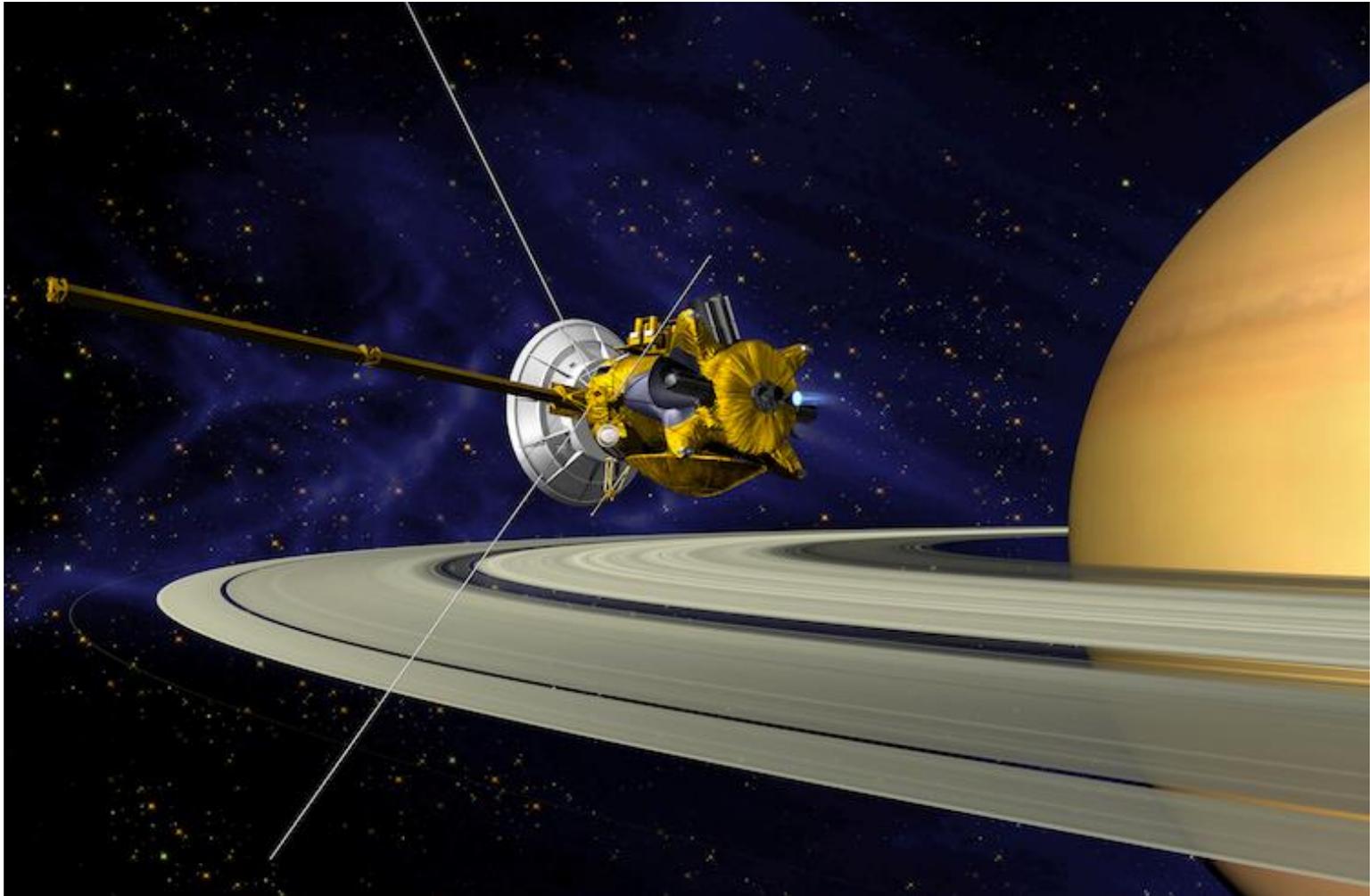
Planetary Missions

Nearly all NASA missions have multiple-agency contributions; ESA-led missions indicated by (ESA)



Cassini-Huygens Extended Mission

Planetary Protection



New Frontiers Program

Planetary Protection



1st NF mission
New Horizons:

**Pluto-Kuiper Belt
Mission**



Launched January 2006
Retarget post Pluto
Category II

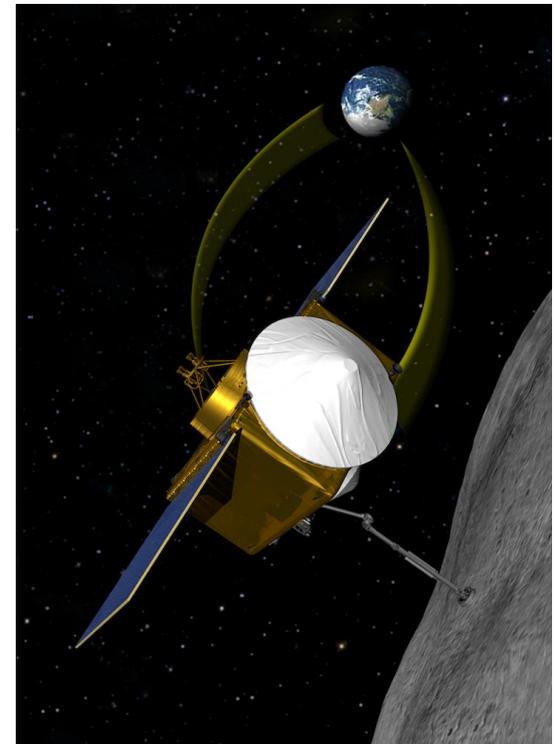
2nd NF mission
JUNO:

**Jupiter Polar Orbiter
Mission**



August 2011 Launch
JOI: July 4, 2016
Category III

3rd NF mission
OSIRIS-REx
Asteroid Sample Return



September 2016 Launch
Arrival 2018
Category V Unrestricted 8

Discovery: Dawn & Phase A Selections

Deep Atmosphere Venus Investigation of Noble gases, Chemistry, and Imaging (DAVINCI)

- chemical composition of Venus' atmosphere during a 63-minute descent

Venus Emissivity, Radio Science, InSAR, Topography, and Spectroscopy mission (VERITAS)

- produce global, high-resolution topography and imaging of Venus' surface

Psyche

- explore the origin of planetary cores by studying the metallic asteroid Psyche

Near Earth Object Camera (NEOCam)

- discover ten times more near-Earth objects than all NEOs discovered to date

Lucy

- perform the first reconnaissance of the Jupiter Trojan asteroids

Dawn:



Category II: will not impact Ceres due to orbital mechanics constraints

2012 Discovery Selection



InSIGHT:

Mars Interior Mapping

Category IVa

Launch postponed to 2018

- Mole shall not access or create Mars special regions
- Storage review ongoing; spacecraft hardware returned to L-M Denver and JPL

Ongoing Office Activities



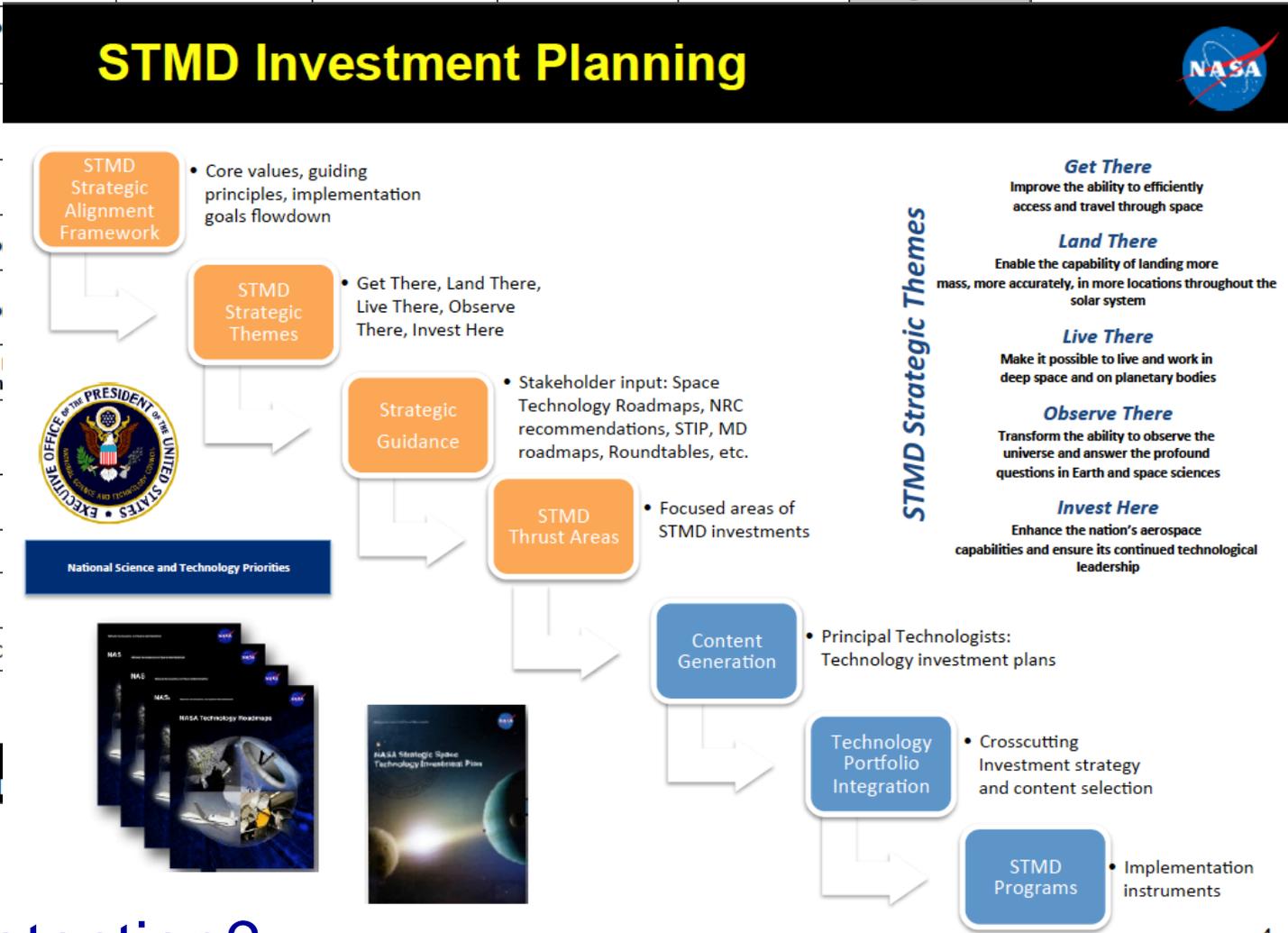
- Responses to MSL Lessons Learned
 - Ensure appropriate requirements flowdown
 - Revise/coordinate planetary protection documentation
 - Expand training options
- Continue cross-directorate coordination
 - Expanding opportunities for interaction with SMA, HEO, STMD
 - Planetary Protection Coordination Group
- Internal SMD activities
 - Ensure appropriate separation of implementation activities in PSD from regulatory/oversight activities of PPO
 - Develop and support Office of Planetary Protection operating plan
 - support needed
 - Work closely with missions, active and in development
 - MSL, M2020, InSight; MAVEN, MOM, MRO
 - Cassini, Dawn, New Horizons, Juno,
 - Europa missions; Discovery and New Frontiers AOs
 - missions supporting HEO – e.g. ARM
 - commercial space: SpaceX Red Dragon & others
 - add planetary protection in Launch Services Contract; for cubesats, etc.

Capability Development Risk Reduction

= Plan/resources understood
 = Plan/resources finalization required



		Mission					
Capability		ISS	Cis-lunar Short Stay (e.g. ARM)	Cis-lunar Long Stay	Mars Robotic	Mars Orbit	Mars Surface
Working in Space and On Mars	In Situ Resource Utilization & Surface Power		Exploratory ISRU Regolith	Exploratory ISRU	Exploratory ISRU & Atmosphere	Exploratory ISRU	Operational ISRU & High Power
	Habitation & Mobility	Lo	STMD Investment Planning				
	Human/Robotic & Autonomous Ops						
	Exploration EVA						
Crew Health	Lo						
Staying Healthy	Environmental Control & Life Support	Lo					
	Radiation Safety	Un					
	Ascent from Planetary Surfaces						
Transportation	Entry, Descent & Landing						
	In-space Power & Prop						
	Beyond LEO: SLS & Orion						
	Commercial Cargo & Crew	C					
	Communication & Navigation						



Planetary Protection?

Planetary Protection Budget

Proposals to PPR in ROSES 2015
Programmatic needs being assessed

