National Aeronautics and Space Administration

SMD STATUS AND ISSUES MARCH 2008

Alan Stern
Associate Administrator/SMD

SMD's Science Program Leads The World

- $4.441B/yr budget.
- Large Earth science, heliophysics, planetary science, & astrophysics programs.
- 53 flight missions in operation.
- 41 flight missions in development.
- 3000+ operating R&A grants.
- These numbers exceed the combined efforts of all other Earth & space science programs of the World.

SMD Missions Next 12 Months

Astrophysics

GLAST
Launch–5/29

HST SM4
Launch–8/7

Herschel
Launch–10/31

Planck
Launch–10/31

Earth Science

GOES-O
Launch–4/1

OSTM
Launch–6/15

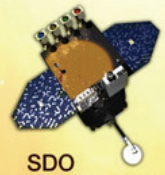
OCO
Launch–12/15

Heliophysics

TWINS-B Launch

CINDI
Launch

IBEX
Launch–6/15



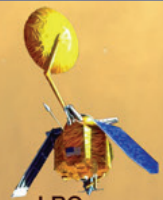
SDO
Launch–12/15

Planetary Science

MESSENGER
Mercury Flyby–1/14

M3 on Chandrayaan-1
Launch–4/8

Phoenix
Landing–5/25



LRO
Launch–10/28

Jan 2008 Feb Mar Apr May June July Aug Sept Oct Nov Dec 2008

PRESENTATION OVERVIEW

- SMD Overview & '08 Events
- FY09 SMD Budget Overview
- Mars Next Decade
- MSL Issues
- Q&A

FY09 PRESIDENT'S BUDGET: OVERVIEW

SMD MANAGEMENT OBJECTIVES

- We will get more science done within our budget.
- We will help ensure that U.S. Space Exploration Policy succeeds.
- We will promote U.S. leadership across all of SMD's science disciplines.
- We will improve SMD's actual and its perceived impact on, and relevance to, the public.
- We will create a better workplace.

MAJOR FY09 BUDGET INITIATIVES

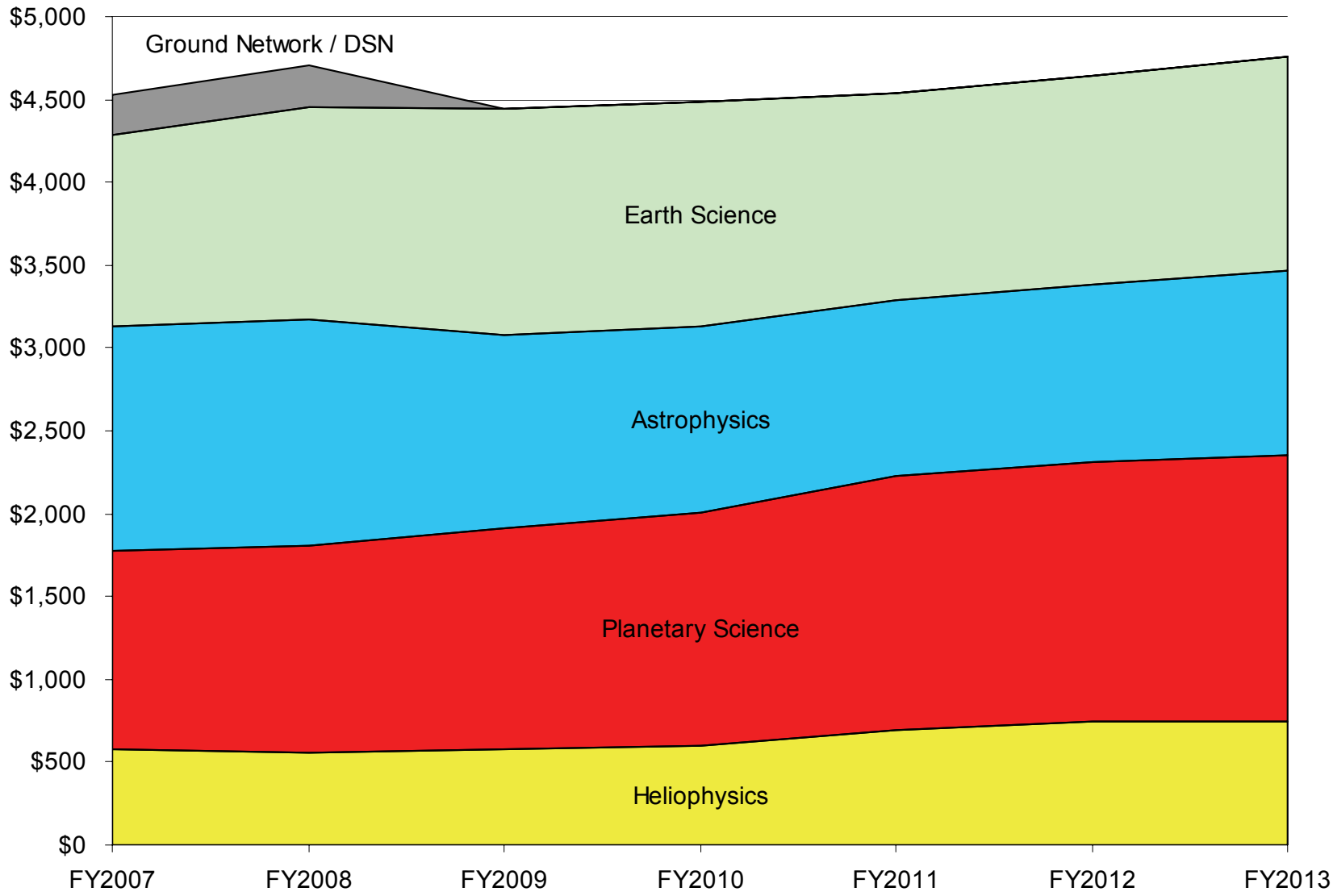
- Increased commitment to Earth Science to accelerate the ES decadal survey.
- Initiated seven new FY09 mission starts: more than in the past four budgets combined; at least one per SMD science area:
  - Earth Science: SMAP and IceSat II (2012, 2015 launches)
  - Astrophysics: JDEM (launch in 2014/2015)
  - Heliophysics: Solar Probe Plus (launch in 2015)
  - Planetary: Outer Planets Flagship (launch by 2017) small lunar science orbiter (launch by 2011), and lunar mini-landers (launch by 2014).
- Substantial increases in astrophysics, heliophysics, and planetary science R&A/MO&DA.
- Increased budgets for suborbital rockets and balloons.

NASA AND SMD PRESIDENT'S BUDGET: FY09-FY13

	* FY2007	* FY2008	FY2009	FY2010	FY2011	FY2012	FY2013
Total NASA	$16,231.0	$17,300.5	$17,610.7	$18,022.9	$18,457.0	$18,901.6	$19,355.4
Science	$4,609.9	$4,706.2	$4,441.5	$4,482.0	$4,534.9	$4,643.4	$4,761.6
Earth Science	$1,198.5	$1,280.3	$1,367.5	$1,350.7	$1,250.9	$1,264.4	$1,290.3
Planetary Science	$1,215.6	$1,247.5	$1,334.2	$1,410.1	$1,537.5	$1,570.0	$1,608.7
Astrophysics	$1,365.0	$1,337.5	$1,164.5	$1,122.4	$1,057.1	$1,067.7	$1,116.0
Heliophysics	$583.7	$590.9	$575.3	$598.9	$689.4	$741.2	$746.6
DSN / Ground Network	$247.2	$250.0					
Aeronautics Research	$593.8	$511.7	$446.5	$447.5	$452.4	$456.7	$467.7
Education	$114.1	$137.9	$112.1	$122.7	$120.4	$120.4	$120.4
Exploration Systems	$2,837.6	$3,143.0	$3,500.5	$3,737.7	$7,048.2	$7,116.8	$7,666.8
Constellation Systems	$2,114.7	$2,471.9	$3,048.2	$3,252.8	$6,479.5	$6,521.3	$7,080.5
Advanced Capabilities	$722.9	$671.1	$452.3	$484.9	$568.7	$595.5	$586.3
Space Operations	$5,093.5	$5,526.2	$5,774.7	$5,872.7	$2,900.1	$3,089.9	$2,788.5
Space Shuttle	$3,295.3	$3,266.7	$2,981.7	$2,983.6	$95.7		
International Space Station	$1,469.0	$1,813.2	$2,060.2	$2,277.0	$2,176.4	$2,448.2	$2,143.1
Space and Flight Support (SFS)	$329.2	$446.3	$732.8	$612.1	$628.0	$641.7	$645.4
Cross-Agency Support	$2,949.9	$3,242.9	$3,299.9	$3,323.9	$3,363.7	$3,436.1	$3,511.2
Agency Management and Operations	$971.2	$830.2	$945.6	$945.5	$939.8	$950.5	$961.3
Institutional Investments	$223.8	$319.7	$308.7	$331.7	$335.9	$330.4	$338.3
Congressionally Directed Items		$80.0					
Center Management and Operations	$1,754.9	$2,013.0	$2,045.6	$2,046.7	$2,088.0	$2,155.2	$2,211.6
Inspector General	$32.2	$32.6	$35.5	$36.4	$37.3	$38.3	$39.2

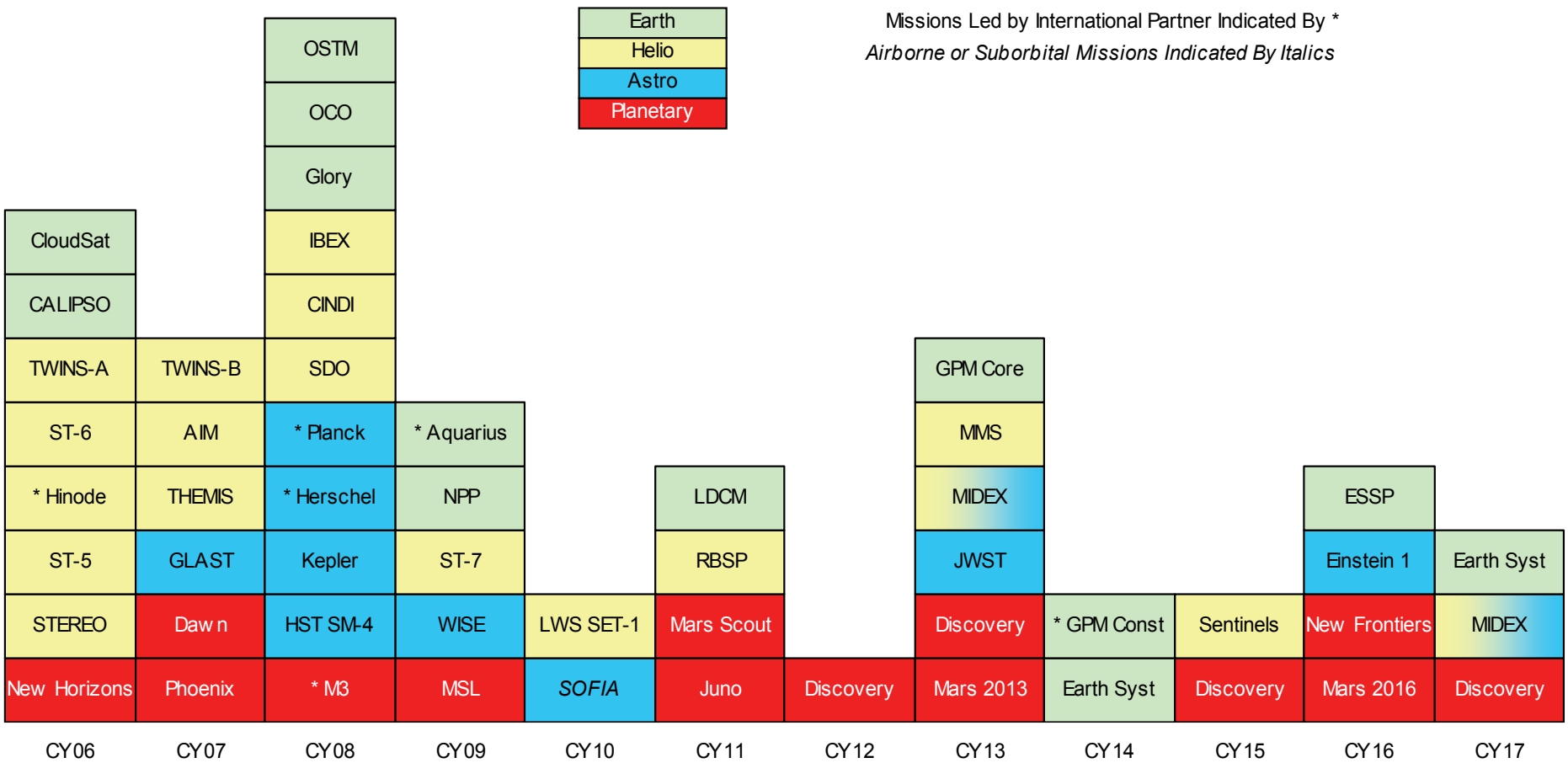
* FY07-08 are consistent with IBPD, and exclude latest Operating Plans. Subsequent charts INCLUDE Operating Plans.

SMD BUDGET BY SCIENCE THEME



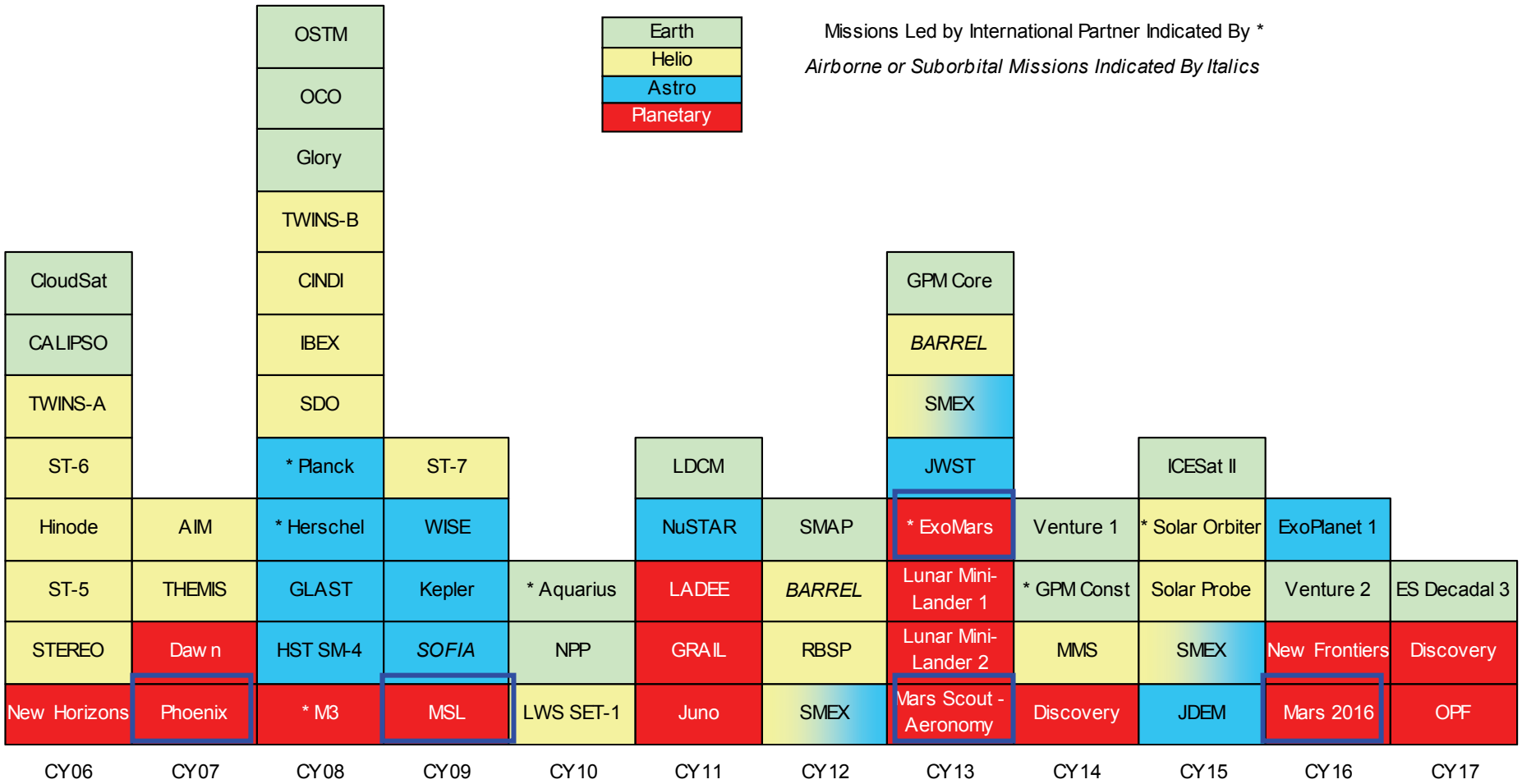
SMD'S FLIGHT PROGRAM: JANUARY 2007

Launches by Calendar Year

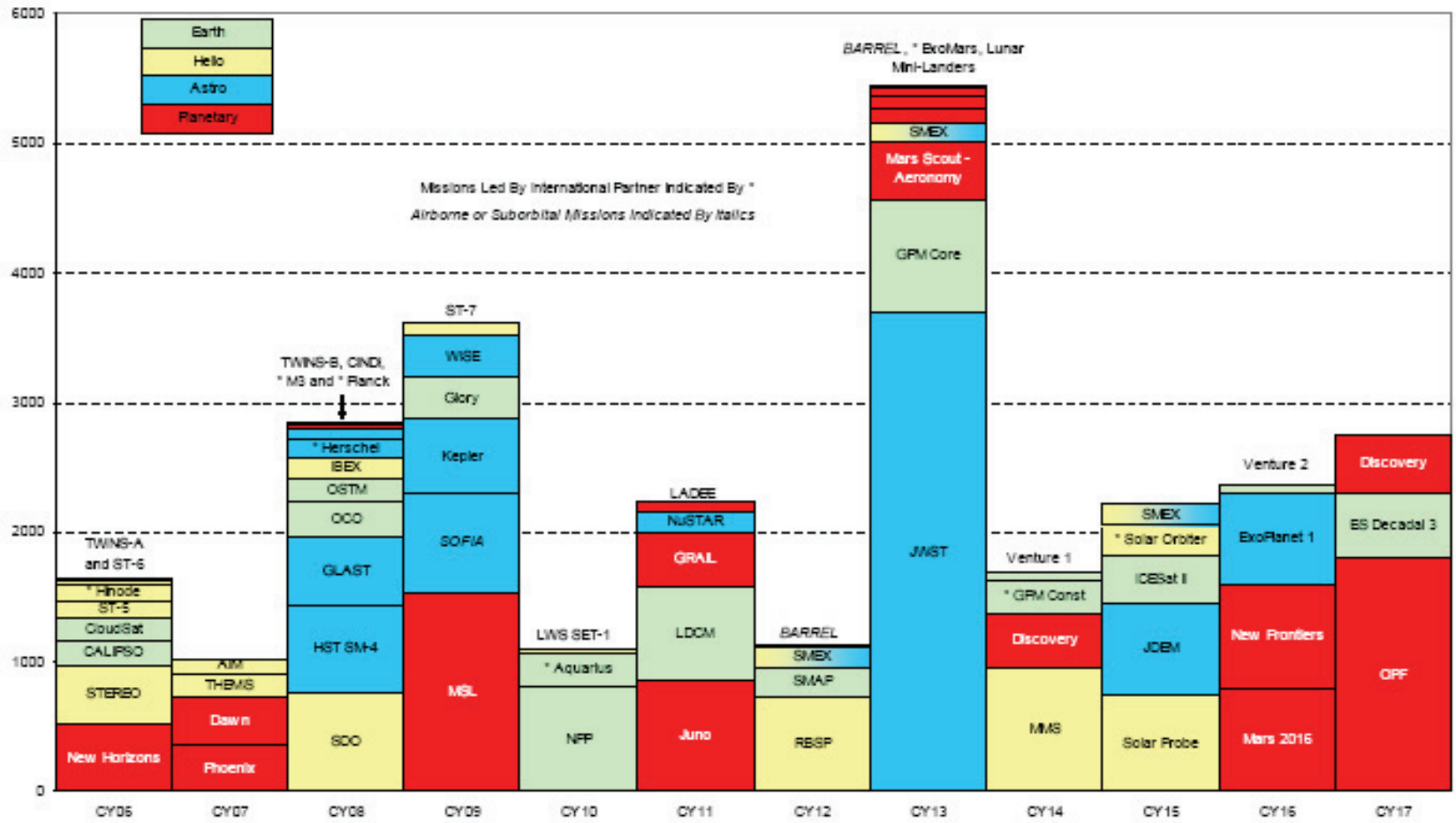


SMD'S FLIGHT PROGRAM: JANUARY 2008

Launches by Calendar Year

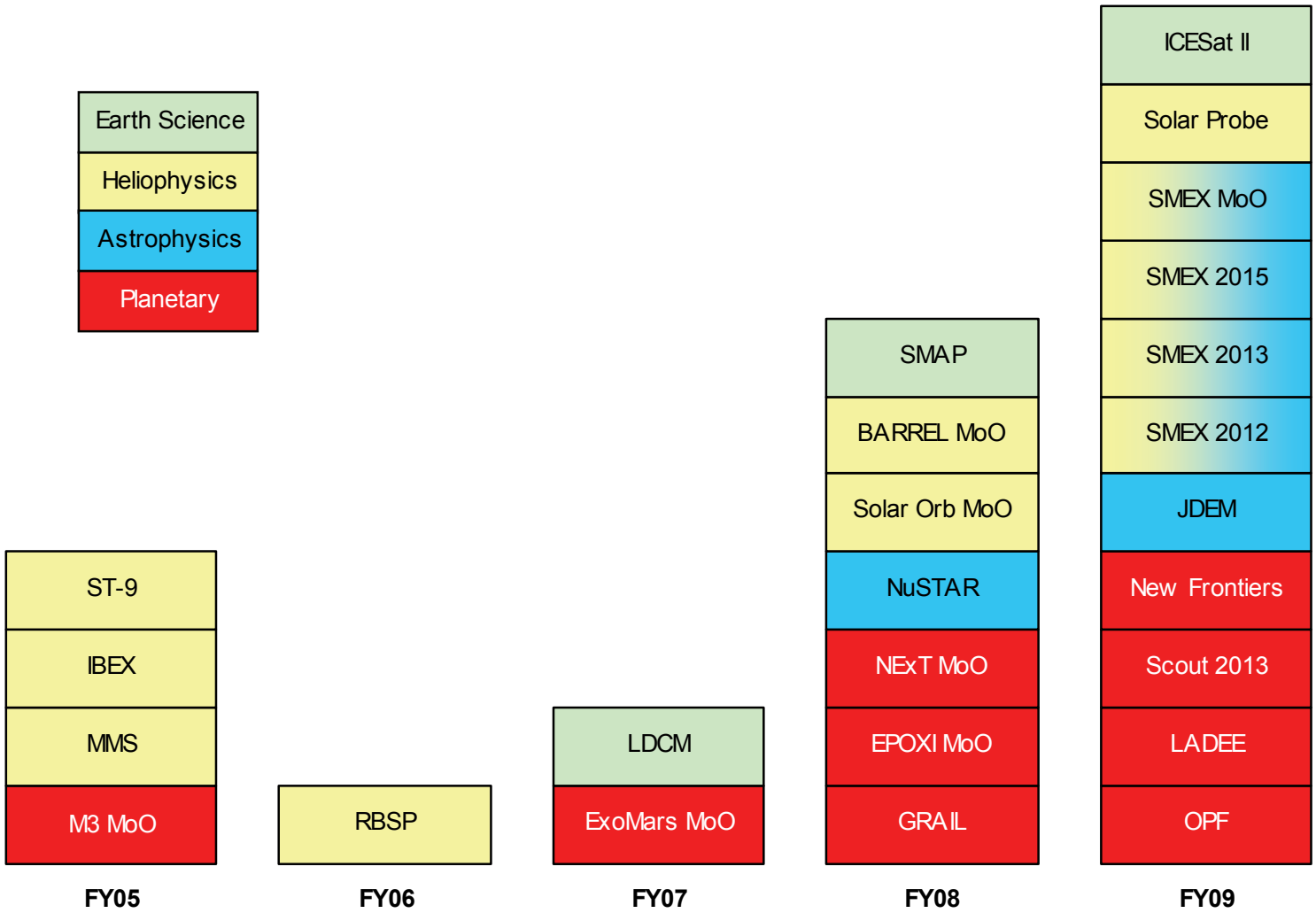


SMD Launches by Year and Development Cost (Phase A-D, $M)

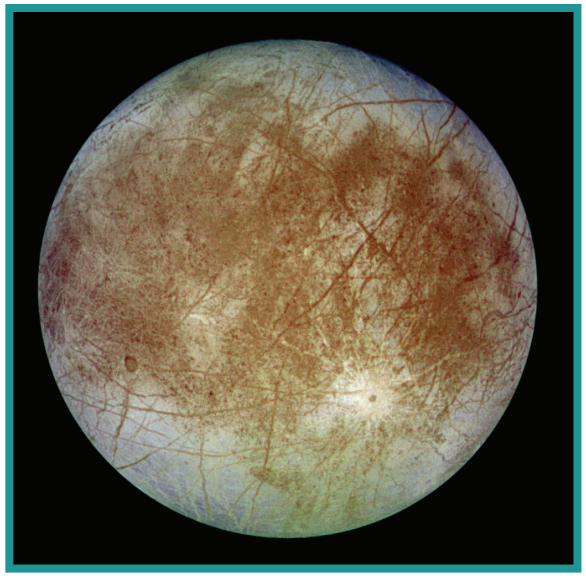


NEWLY STARTED MISSIONS

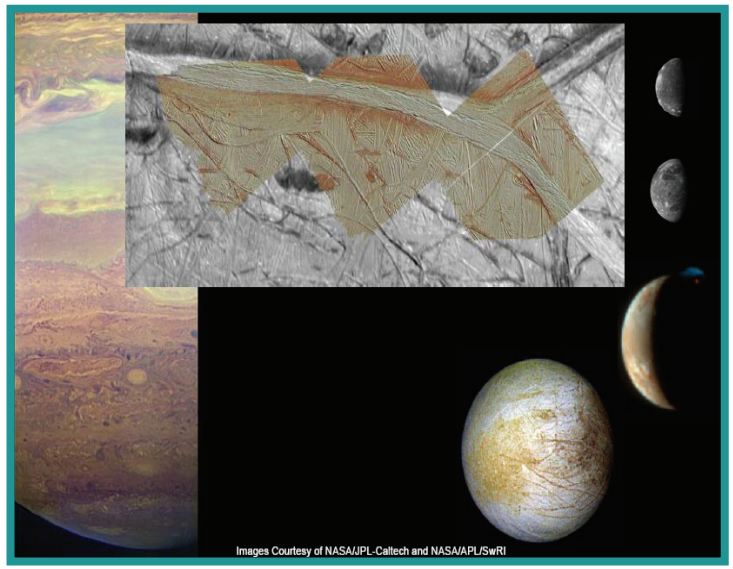
New Starts Defined as a Phase A Start Year or Final Downselect Year—Whichever is Later.



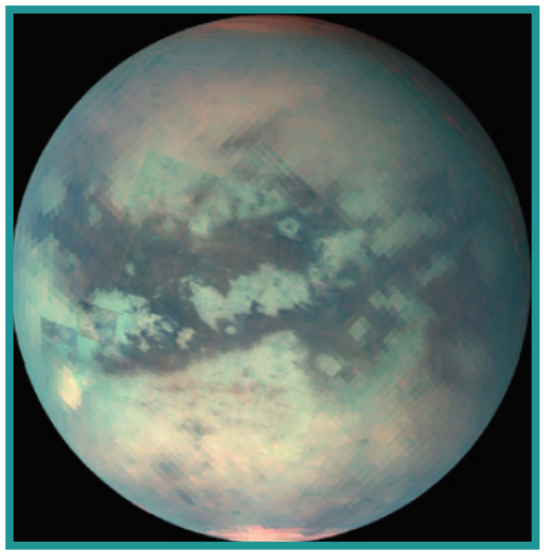
FLAGSHIP MISSION CANDIDATES



Europa Orbiter



Jupiter System Observer (JSO)



Titan Explorer

LUNAR ROBOTIC SCIENCE MISSION INITIATIVE

FY08 | FY09 | FY10 | FY11 | FY12 | FY13 | FY14 | FY15

Lunar Research and Analysis

Mission of Opportunity
Science-Funding-Opportunity Driven

LADEE Launch Goal

Mini Lander Launch Goal

ILN Operation Start Goal

Possible Intl. Partner Early Operations

ESMD | *SMD*

C/D | E | E+

LRO

SMD-Discovery Mission

B | C & D | Cruise | E

GRAIL

SMD-Full Moon Missions

SDT *Science Definition*

A | B | C & D | Cruise | E

LADEE

SDT *Science Definition*

A | B | B/C/D duration finalized during A | E | Node I & II Operations

Mini Lander

Launch date to be set during Phase A

020308

Mars Program - Next Decade

Launch Year

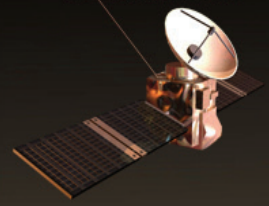
2009

Mars Science Laboratory

2011

2013

Competed Aeronomy Scout Mission



MAVEN or TGE

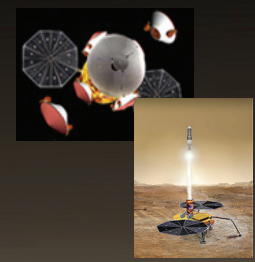
ESA ExoMars cooperation

2016

TBD mission based on budget and science feed-forward

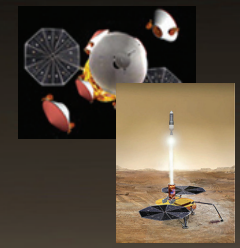
2018

MSR Element #1



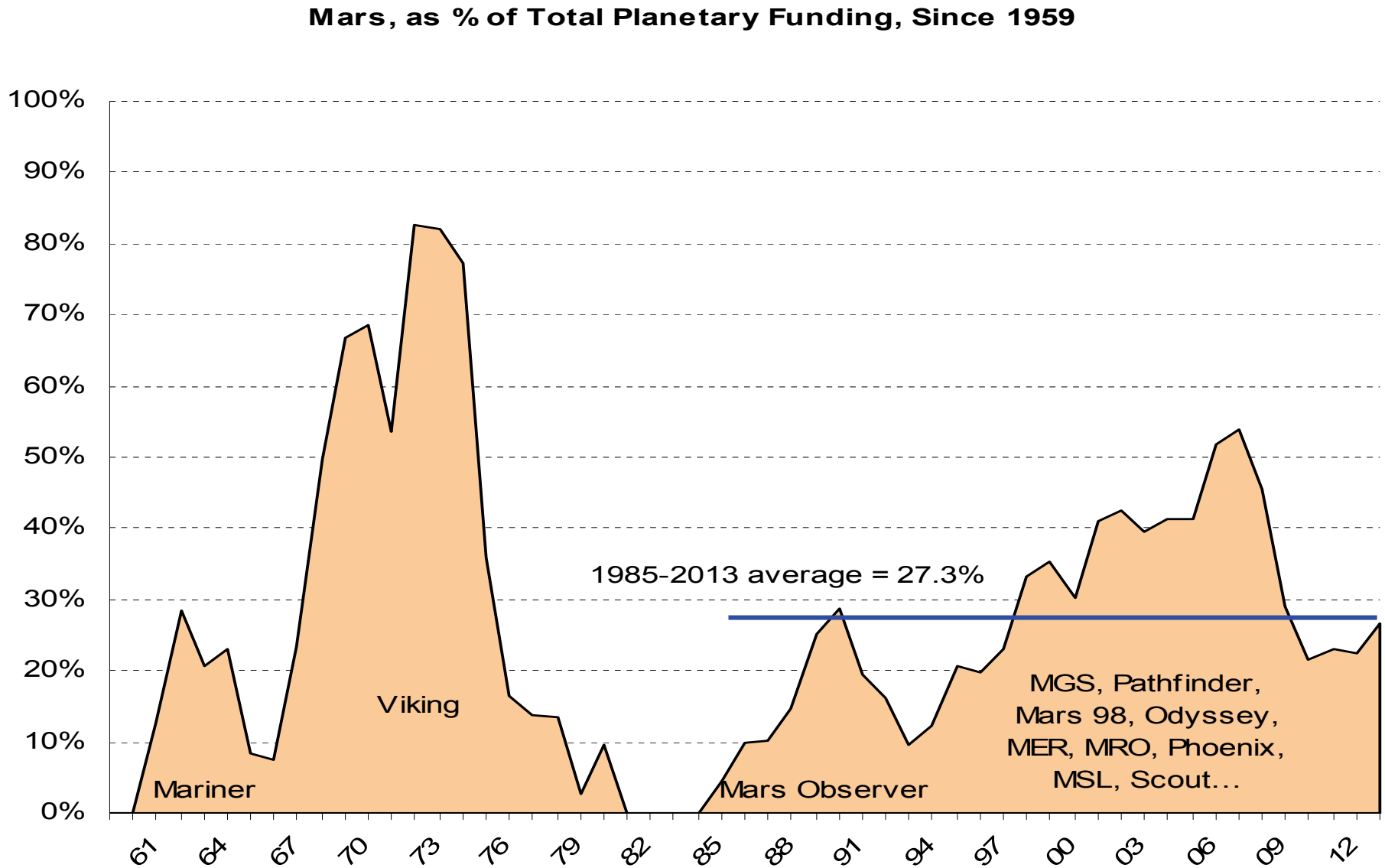
2020

MSR Element #2



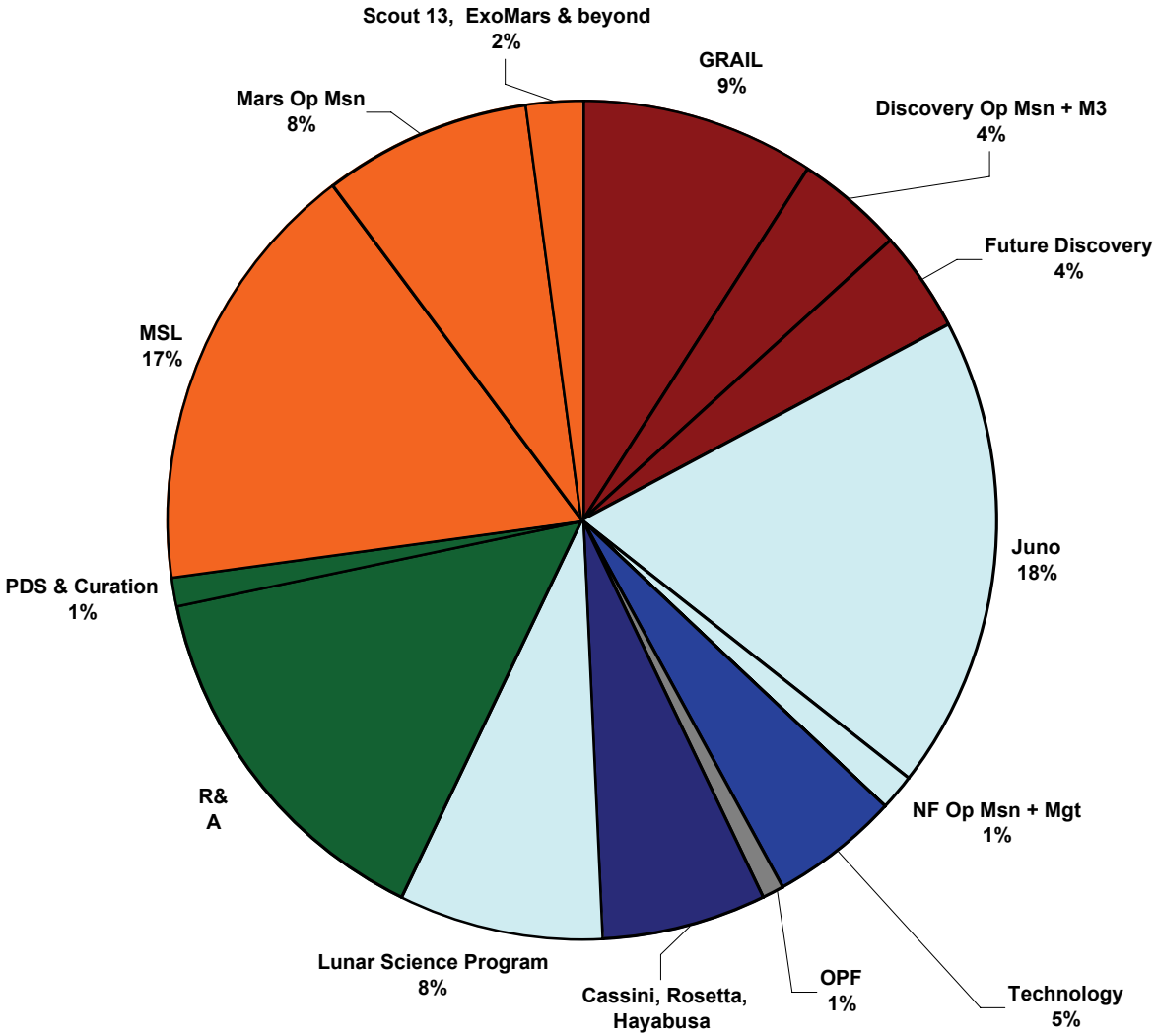
Sample Receiving Facility online by 2022

MARS BUDGET HISTORY



PLANETARY DIVISION BUDGET SPLITS

FY09 President's Budget, $1330M

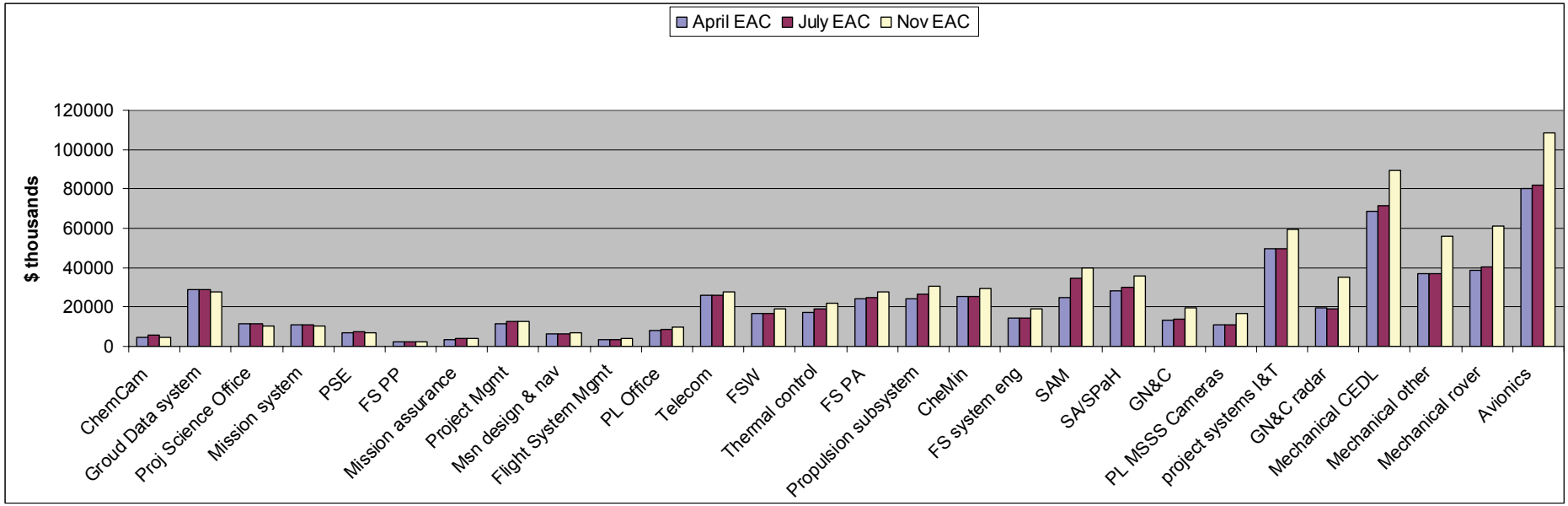


MSL

MSL COST GROWTH HISTORY

- August 2006: MSL Confirmed at a development (C/D) cost of $972M.
  - Program added $32M to increase reserves to 35% (~60% on the S-Curve).
- Late '06/early '07: ~$20M in descopes were taken to control cost growth:
  - TLS, Corer, Sample Crusher, CheMin dual X-ray source, EDL latitude performance.
- June '07: MSL descopes and cash of $62M. Sources of growth included:
  - Instruments; SAM, CheMin, ChemCam, Malin Space Science Systems cameras.
  - Mechanical Design of Rover body, Corer/drill, Sample Acquisition/Sample Processing and Handling
  - Actuator Design
  - Thermal Protection System testing
  - Parts Procurements
  - Fabrication Services/Labor
- Jan '08: MSL estimated need for $165M-$200M cash. Sources of growth include:
  - Actuators, Thermal Protection System testing
  - Parts, Subsystems, Testing
  - Fabrication Services/Labor

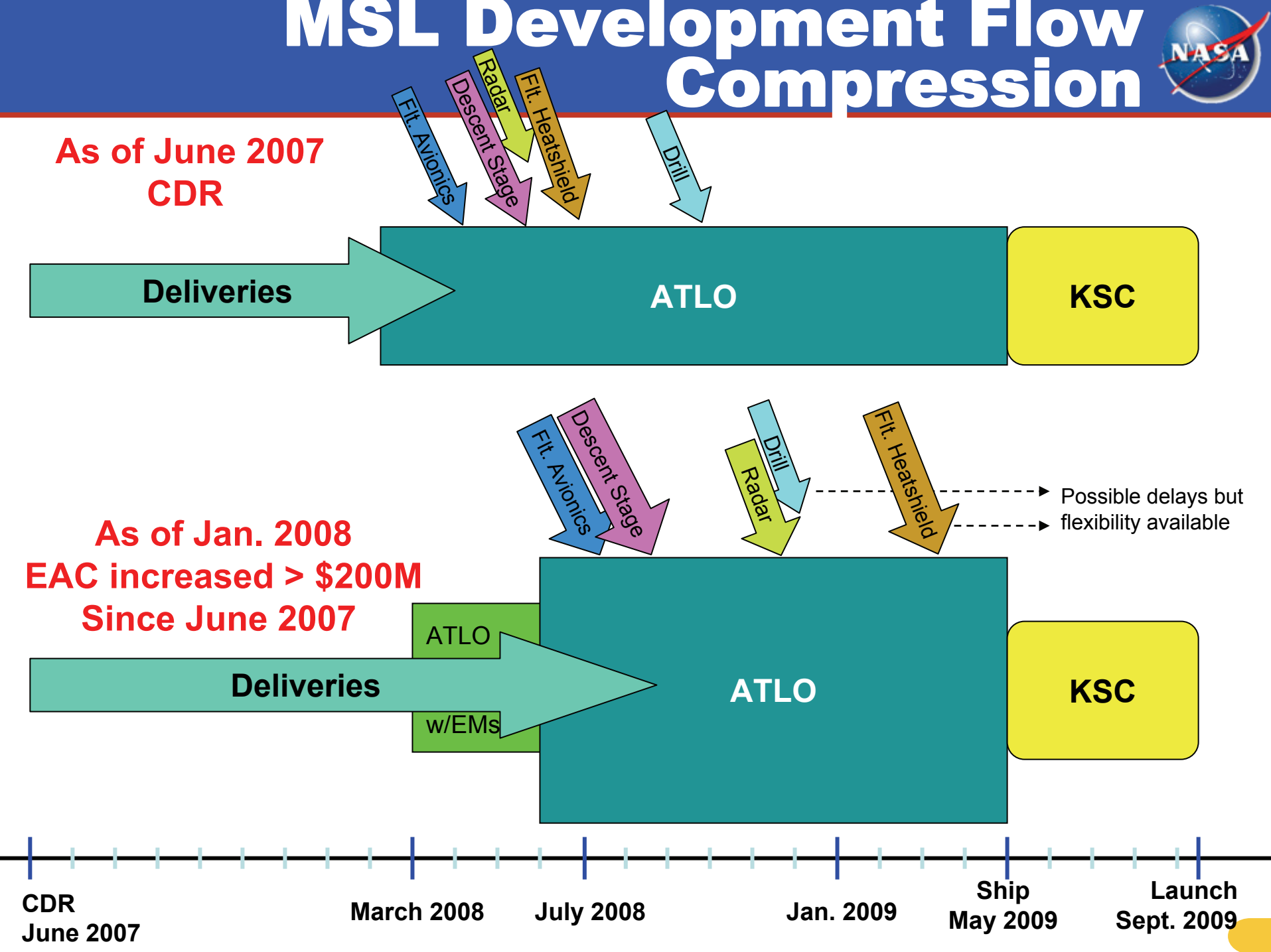
MSL GROWTH BY SUBSYSTEM



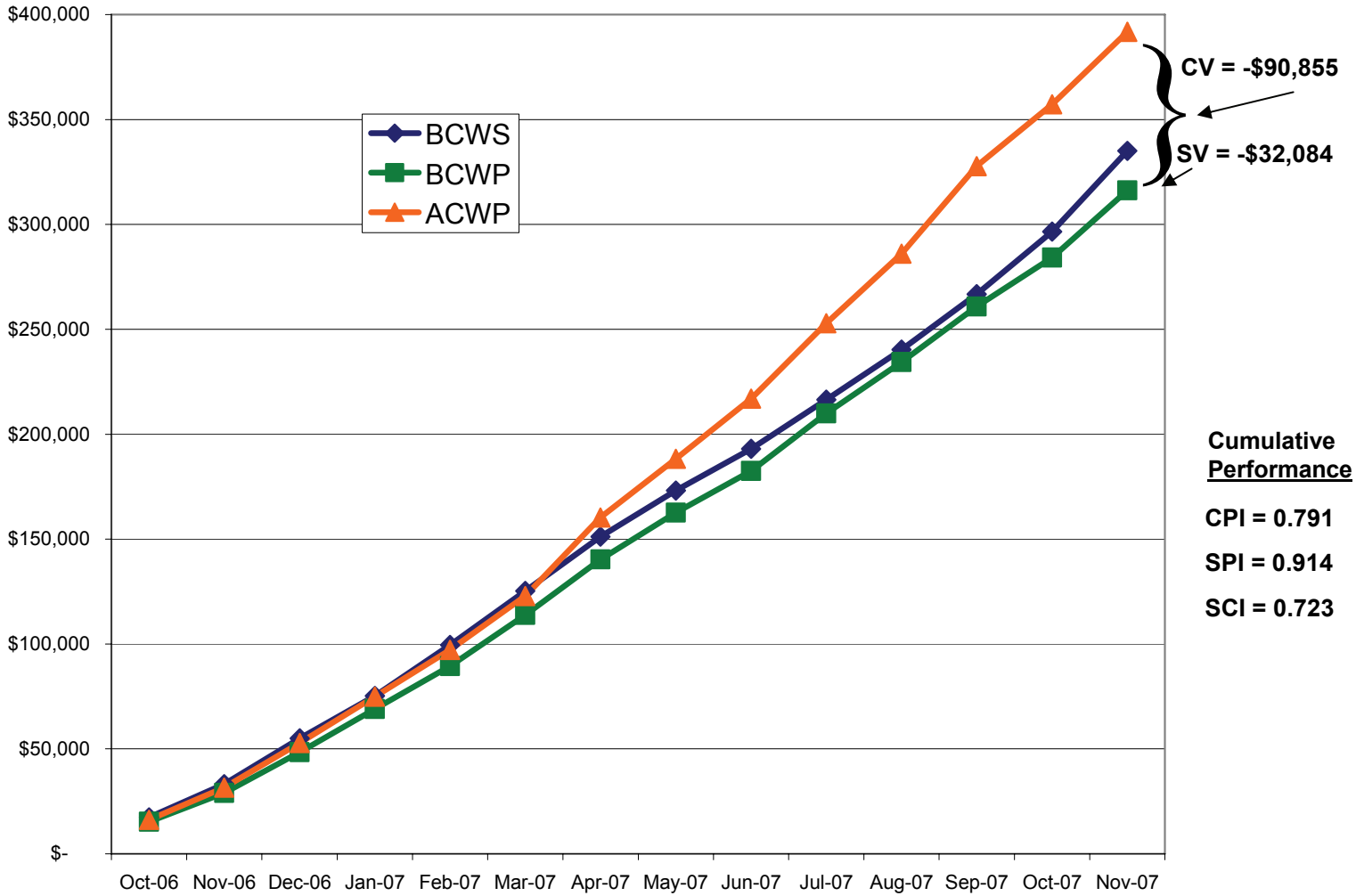
Largest contributors to growth

NOTE: See also Aerospace Corp EVM Charts in b/u at WBS levels 3/4

MSL Development Flow Compression

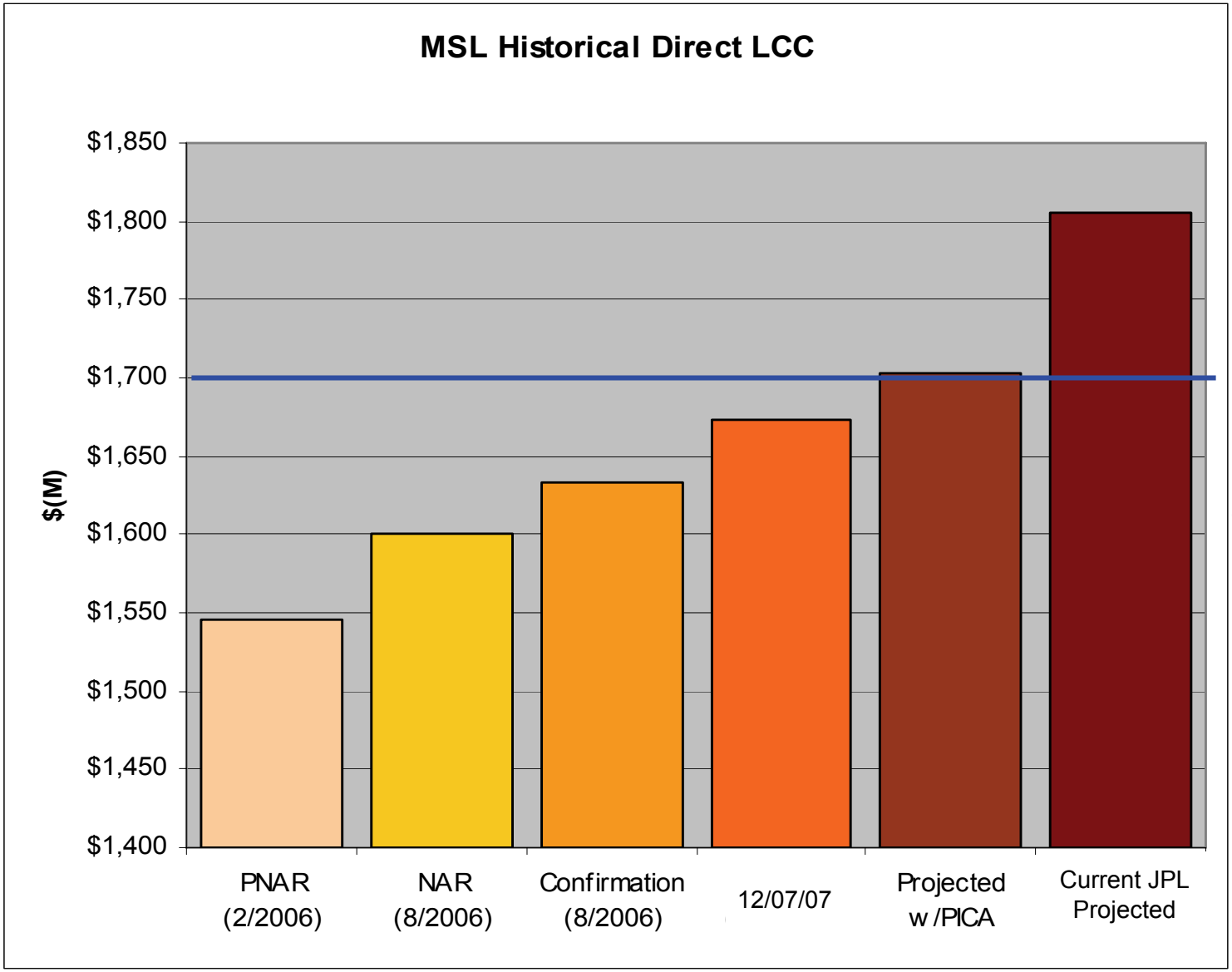


Cost Variance & Schedule Variance Are Increasing



THE AEROSPACE CORPORATION

MSL PROJECT BUDGET GROWTH HISTORY



Blue line $1699M corresponds to the 70% on SRB's S-curve development cost predicted at confirmation