NASA Overview and Discussion

Baseline Performance Review: NASA's Monthly Performance Update and Independent Assessment Forum

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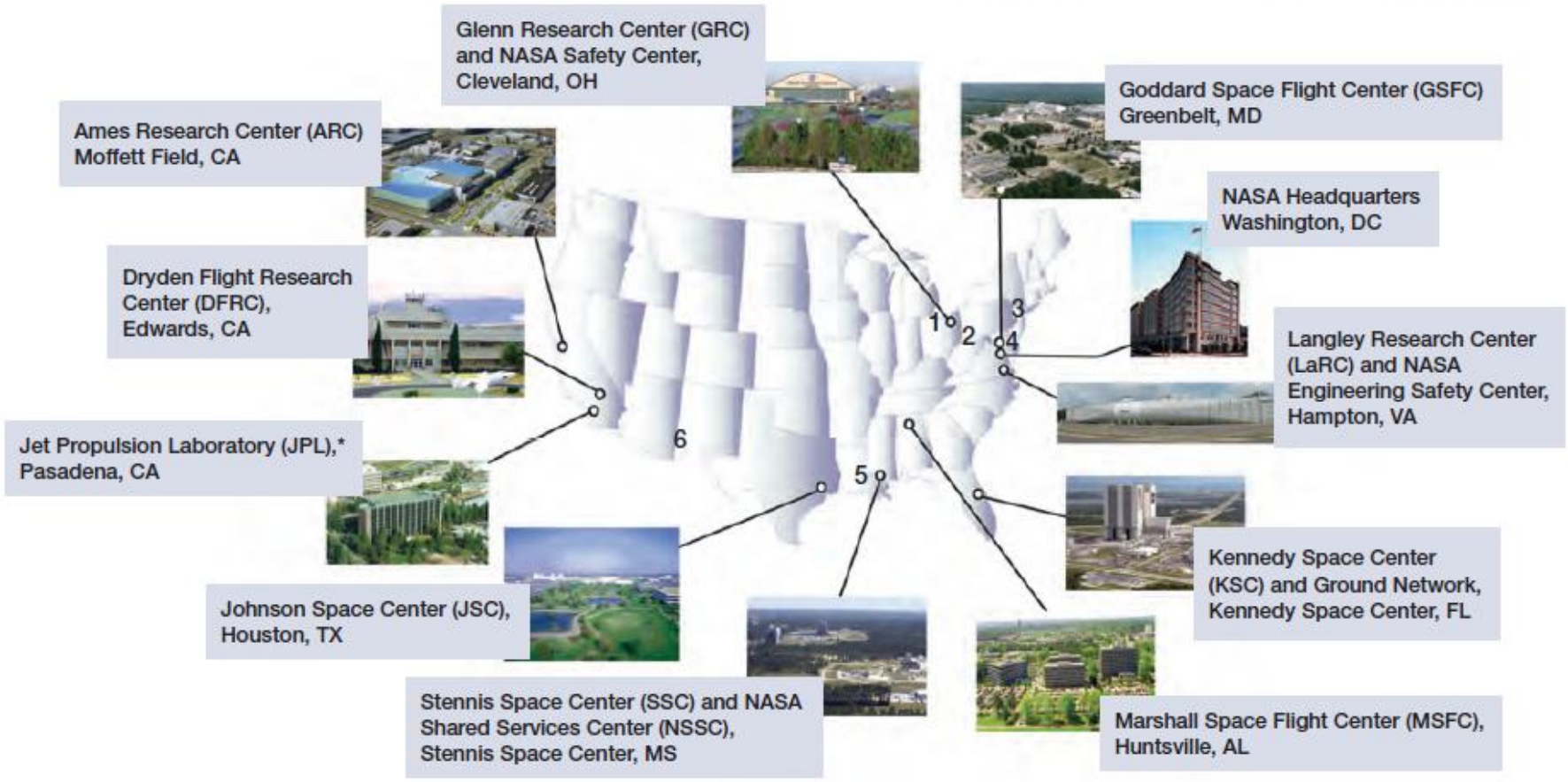
Engineering Program and Project Management Division

NASA Baseline Performance Review

- Objectives
  - Introduce NASA's Baseline Performance Review (BPR) to the National Defense Industrial Association (NDIA) Program Management Systems Committee (PMSC)
  - Summarize NASA's technique for monitoring Agency performance
  - Provide an opportunity to dialogue and exchange information with NDIA members
- Agenda
  - Describe the NASA organization and environment
  - Characterize the BPR objectives, scope, process, and products
  - Lessons Learned

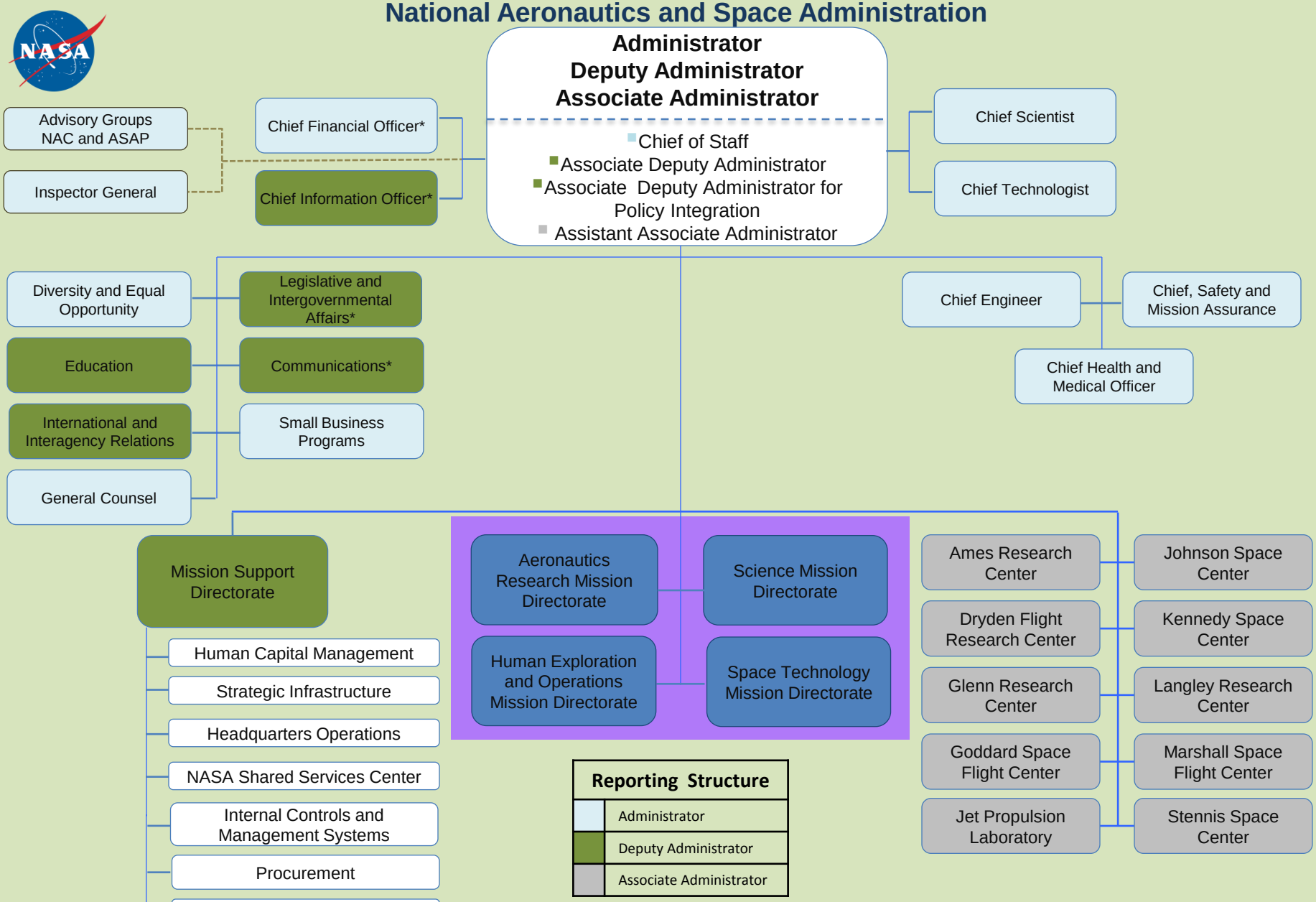
NASA Locations

NASA Centers and Facilities Nationwide



*The Jet Propulsion Laboratory is an FFRDC. The workforce are employees of the California Institute of Technology.

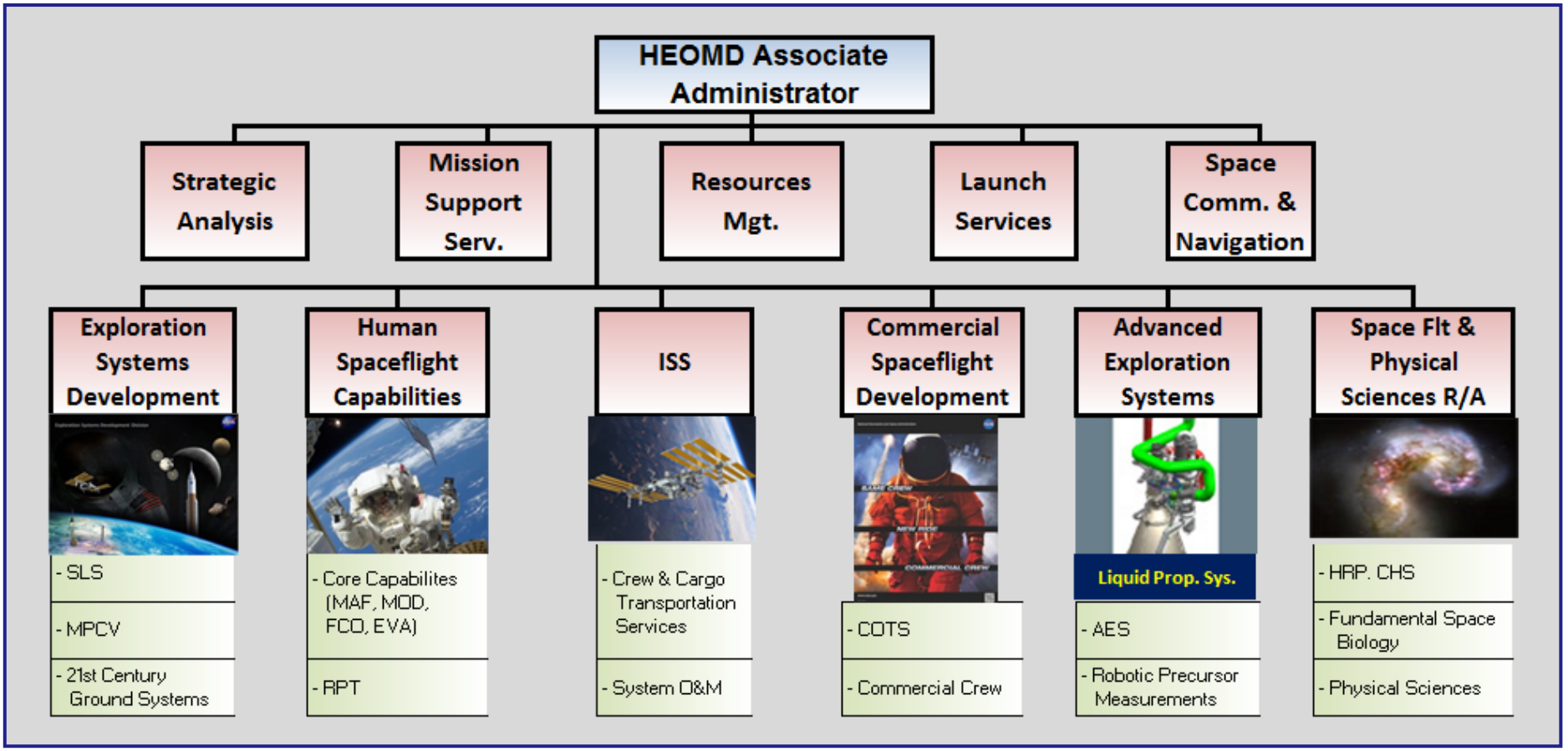
National Aeronautics and Space Administration



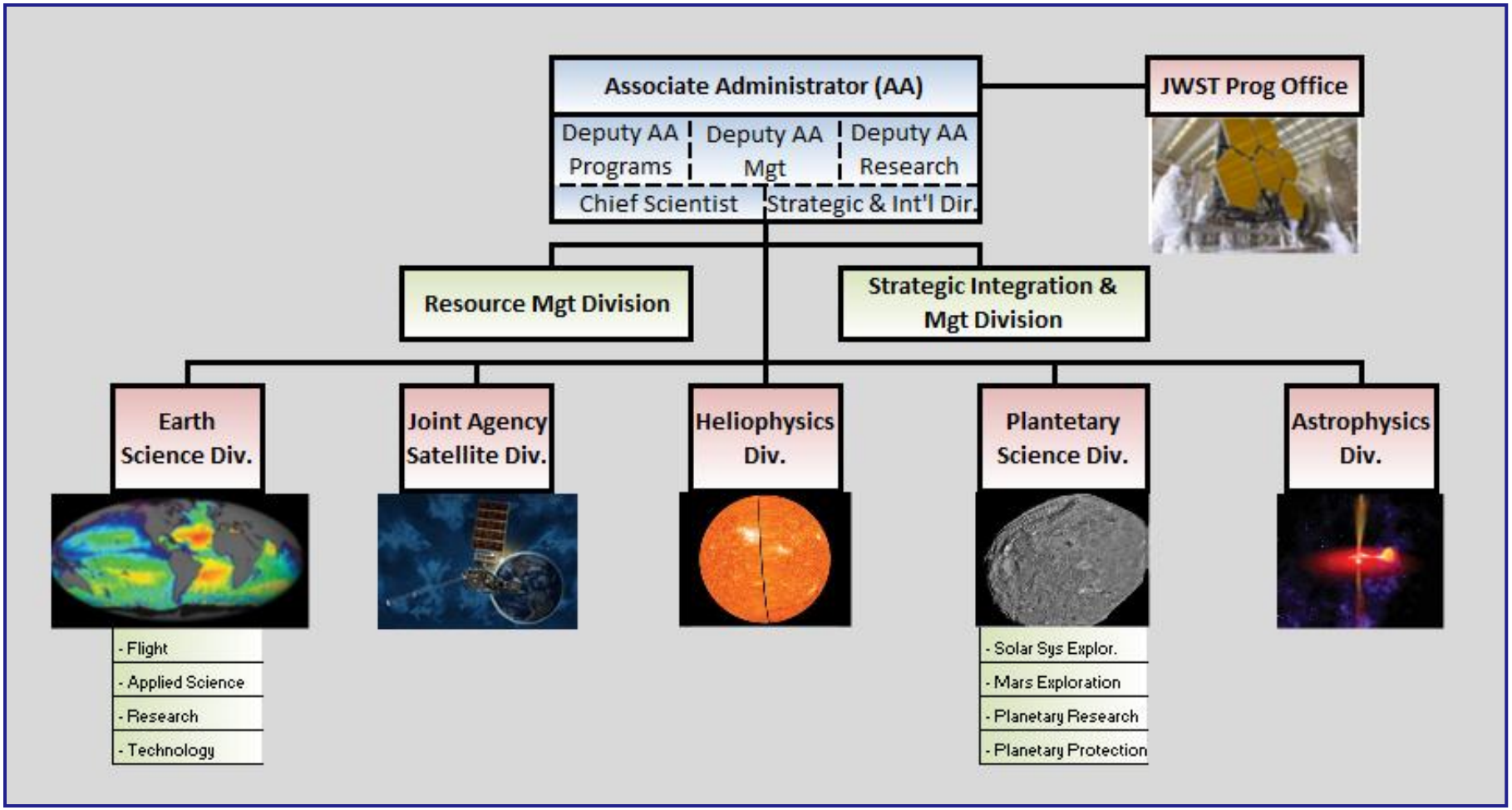
Note:

* Center functional office directors report to Agency functional AA. Deputy and below report to Center leadership.

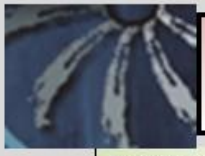
Human Exploration and Operations Mission Directorate (HEOMD) Organizational Structure



Science Mission Directorate (SMD) Organizational Structure



Aeronautics Research Mission Directorate (ARMD) Organizational Structure



Aeronautics Test Program (PM @ AMES Res. Center)

Portfolio of ground and flight test aeronautics research capabilities.

Associate Administrator (AA)

Strategy, Architecture, and Analysis Office

Aviation Safety Prog Off.

System-wide Safety Assurance Tech.

Vehicle Systems Safety Tech.

Atmos. Environment Safety Tech

Airspace Systems Prog. Off.

National Airspace Sys. Modernizartion Dev.

Resource Mgt Off.

Integrated Sys. Research Prog. Off.

Maturing and integrating NextGen Tech. into major vehicle/operational systems

Fundamental Aeronautics Prog. Off.

Advanced Technology for Future Air Vehicles

Integration & Mgt. Off.

Space Technology Mission Directorate (STMD) Projects

STMD Organization Structure similar to other Mission Directorates

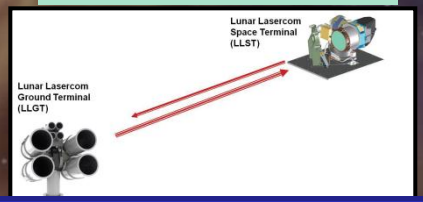
TA02 – In-Space Propulsion Sys.

Chemical Propulsion

TA04 – Robotics & Autonomous Sys.

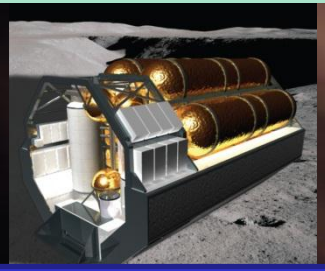
Robonaut 2 - ISS

TA05 – Communications & Navigation Sys.



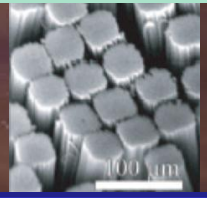
LADEE Optical Communications Sys.

TA07 – Human Exploration Destination



Stationary & Mobile Consumable Logistic Depot

TA10 – Nanotechnology



Carbon Nanotechnology – Gecko Foot Adhesive

TA12 – Materials, Structures, Mech. Sys & Manufacturing.

Non-autoclave Composite Infusion – Advanced Ceramics Fabrication

TA13 – Ground & Launch Systems Processing

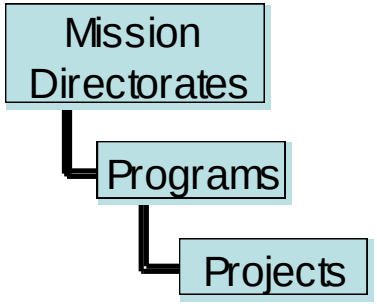
Ice Contamination on QD Sealing Surface

NASA Environment

- One of a kind design/build spacecraft
  - Some small runs (2-4), some use of commodity buses
  - Common to have <50% re-use between missions vs. >>90% for commercial systems such as communication satellites
- Technical quality and performance at a premium
  - Little/no ability to “fix” problems once launched
  - Once in a career science opportunities drive emphasis on technical success
  - Must be able to fly crewed systems at acceptable risk with very few system level test flights
- Wide range of costs, schedule and risk tolerance
  - Hundreds of thousands to many billions
  - Range from minimum reasonable risk for crewed missions and robotic flagships to much higher risk tolerance for rapid response tech developments and science pathfinders
  - Team sizes from a few tens to thousands
- Wide variety of organizational combinations and relationships
  - International partnerships, industry, academia and other government agencies may be engaged in almost any combination

NASA Agency Portfolio and Program/Project Performance Assessment

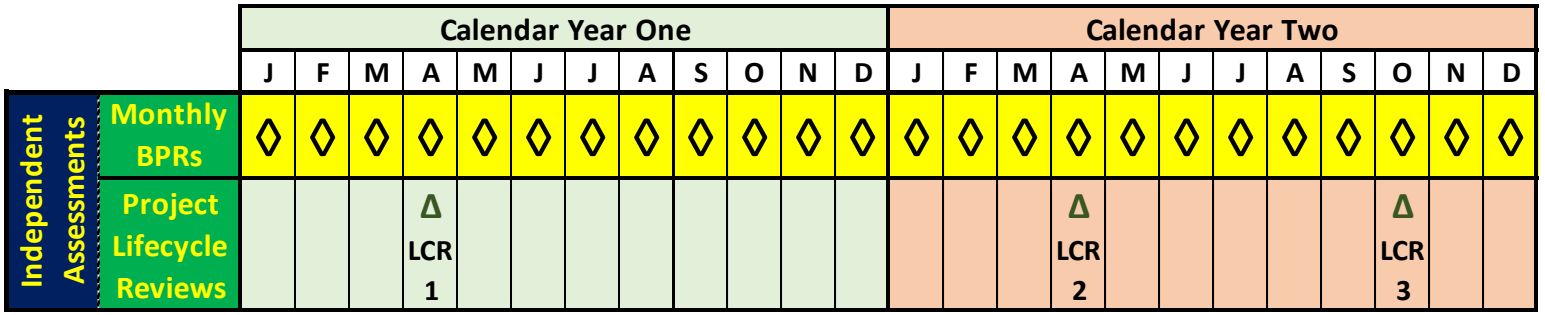
- The NASA Associate Administrator is responsible for oversight of all projects at the Agency and approval to proceed at Key Decision Points in the Life Cycle
  - Relies upon the Mission Directorates, Programs and Projects for planning and execution of its projects that is accurate, credible, and verifiable
  - Relies upon the Independent Program Assessment Office for independent assessments of programs and large projects (typically > $250M life cycle cost) at specific life-cycle events
  - Relies upon Centers, Tech Authorities (Chief Engineer , Chief Safety Officer and Chief Medical Officer) and Mission Support (OCE, OSMA, OCFO) to provide ongoing monthly assessments of project performance



- Mission Directorates, Programs and Projects are directly responsible for project performance throughout its life-cycle
  - A Formulation Agreement/Plan is required with metrics to be used throughout the life cycle
  - A key objective of the formulation phase is to develop the implementation plans for an executable baseline
- Centers are responsible for independent oversight of all projects at their center, both ongoing monthly reviews and at Life Cycle Events

NASA Agency Portfolio and Program/Project Performance Assessment

- At project life cycle reviews (LCR), decision processes are supported by an evaluation that planned work has been correctly executed to the appropriate level of detail and completeness
- Throughout the execution year the programs/ projects and institutional areas are assessed for their performance to technical, cost, schedule and programmatic activities. This assessment is:
  - Presented routinely in the Agency's monthly Baseline Performance Review.
  - Conducted by the Mission Directorate/ Center/ program organizations and independent assessors allowing the process to compare the assessments
  - Based on a common measurement framework to ensure comprehensive and consistent evaluation of projects across Mission Directorates



BPR - Baseline Performance Review
LCR - Life Cycle Review

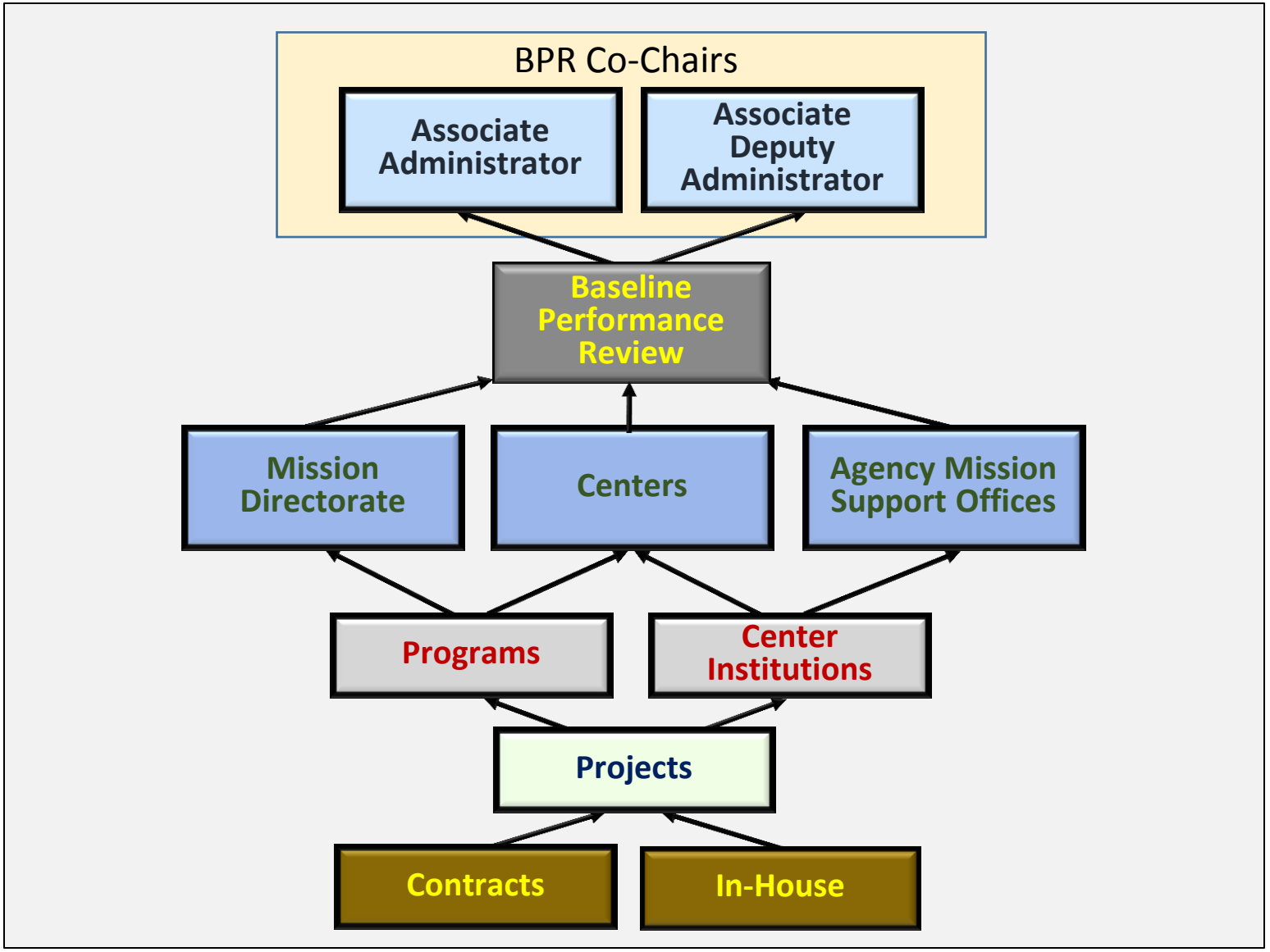
Baseline Performance Review Overview

- The BPR is NASA's monthly senior performance management review
  - Integrates Agency-wide communication of performance metrics, analysis, and independent assessment for mission and mission support programs, projects and activities.
  - Highlights interrelated issues that impact performance and affect risk
  - Enables senior management to quickly address issues.
- The BPR forum fosters communication across organizational boundaries to identify systemic issues and address mutual concerns and risks.
- The BPR is the culmination of all of the Agency's regular business rhythm performance monitoring activities, providing ongoing performance assessment between Key Decision Points.
  - Within the NASA Governance model, the BPR is distinct from the decision-making Strategic Management, Program Management, and Mission Support Councils
  - BPR is "action-oriented" to improve performance and inform Agency decision authorities of issues needing attention
- The BPR is also used to meet requirements for quarterly progress reviews contained in the Government Performance Reporting and Accountability Modernization Act of 2010 (GPRAMA) and OMB Circular A-11 Section 6 .

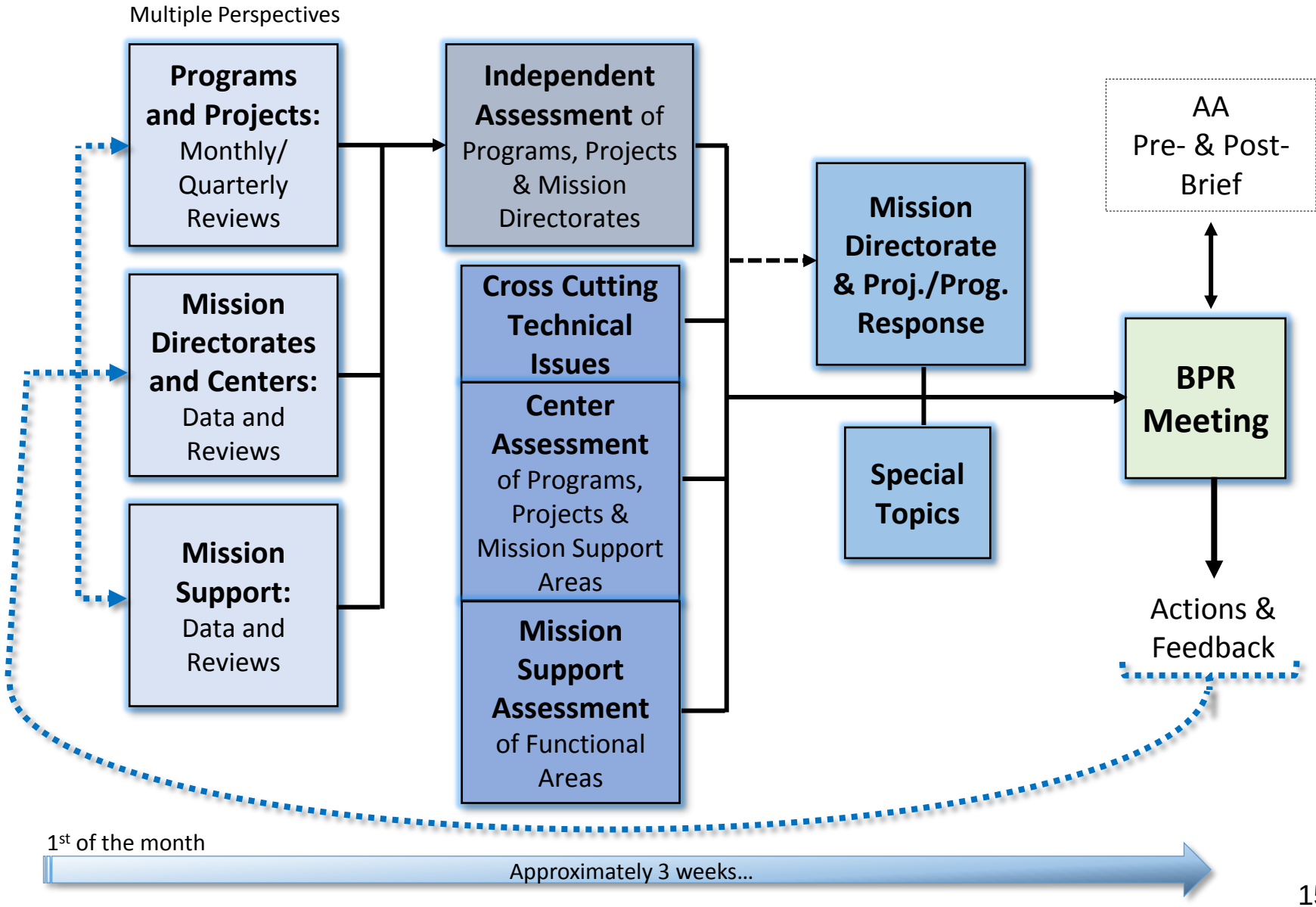
BPR Scope and Participants

- The BPR is co-chaired by the NASA Associate Administrator and the Associate Deputy Administrator
- Membership includes the heads of NASA Staff Offices, Mission Directorates, Mission Support Offices, and its ten Field Centers.
- Mission Support functions (e.g., finance, workforce, acquisition, infrastructure, IT, etc.) report quarterly.
- Program/project assessments occur each month. Each MD (covering all program areas) reports quarterly when they are the highlighted MD.
- The Office of the Chief Engineer (OCE) leads the program and project performance assessment process conducted by a team of independent assessors drawn from OCE, Office of the Chief Financial Officer (OCFO), and Office of Safety Mission Assurance (OSMA).

BPR Data Flow

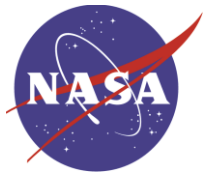


BPR Process


Multiple Perspectives
Programs and Projects: Monthly/ Quarterly Reviews
Mission Directorates and Centers: Data and Reviews
Mission Support: Data and Reviews
Independent Assessment of Programs, Projects & Mission Directorates
Cross Cutting Technical Issues
Center Assessment of Programs, Projects & Mission Support Areas
Mission Support Assessment of Functional Areas
Mission Directorate & Proj./Prog. Response
Special Topics
AA Pre- & Post-Brief
BPR Meeting
Actions & Feedback
1st of the month
Approximately 3 weeks…

BPR Assessments

Info Sources for Assessments	
Prog/Proj Documents	FAD, Formulation Agreement, PCAs, and Program and Project Plans
Reviews	Life-Cycle Reviews (KDPs, etc.)
	Monthly, quarterly, mid-year and end-of-year MD reviews
	Other special reviews (see Section 3.1.3)
	Program semi-annual peer reviews
	Monthly Center status reviews
Meetings	APMC (presentations and decision memorandums)
	MDPMC (presentations and decision memorandums)
	MD Staff Meeting
	Recurring staff/status meetings including project monthly status
	Program Control Board (meetings and weekly status reports)
	Biweekly tag-ups with the SMA TAs supporting and overseeing the program.
Reports	Annual Performance Goals (for programs)
	Reports from Agency assessment studies (CAD, IPAO, etc.)
	PPBE presentations
	Quarterly cost and schedule reports on major programs/projects delivered to OCFO
	Center summaries presentations at BPR
	Weekly MD report
	Weekly project reports
	Weekly reports from the NESC
	Monthly EVM data
	Project anomaly reports
	Center S&MA reports
	Technical Authority reports
Databases	N2 Budget Database
	SAP and BW financial databases
	OMB/Congressional cost/schedule data



BPR Presentation Examples

Sample BPR Agenda

10:00	Roll Call, and Building Safety Information	BPR Manager
10:05	Opening Remarks	Associate Administrator
10:10	Agenda and Actions Review	BPR Manager
10:15	Resource Management	Office of the Chief Financial Officer
10:30	Roll-up of Non-Highlighted MD Programs/Projects	Office of the Chief Engineer
11:00	Technical Cross Cutting	Office of the Chief Engineer
11:05	Highlighted Quarterly Mission Directorates: ARMD & STMD	
	• 11:05 ARMD Assessment	Office of the Chief Engineer
	• 11:20 ARMD Performance and Status	Aeronautics Research Mission Directorate, ARMD
	• 11:45 STMD Assessment	Office of the Chief Engineer
	• 12:15 STMD Performance and Status	Space Technology Mission Directorate, STMD
12:30	Lunch	
12:45	APG – *Agency-wide Tech Transfer*	Office of the Chief Technologist, OCT
12:55	Center Summaries – Programs/Projects	Center Representatives
1:25	External Reporting - Cost and Schedule	Office of the Chief Financial Officer
1:30	Mission Support Directorate (MSD)	MSD Presenters
2:45	Center Small Business Reports	NSSC, MSFC and JPL
3:00	Small Business Programs (OSBP)	Office of Small Business Programs
3:15	CAP Goals	Office of the Chief Financial Officer
3:25	Center Summaries – Mission Support/Institutional Issues	Center Representatives
3:55	Actions Summary	BPR Manager
4:00	Adjourn	Associate Administrator

BPR Assessment Criteria

- GREEN:
  - The Project is performing to plan with adequate margin to continue to the next key decision point. The Project in operations is meeting, and is expected to continue to meet, its specified mission objectives and requirements while performing to plan.
- YELLOW:
  - The Project is falling behind plan such that commitments for the current phase are at risk, but is actively working realistic opportunities within available margins.
  - Project may be using margin faster than planned or emergent issues/risks may indicate the need for more margin to go than planned.
  - The Project in operations is facing cost or schedule growth beyond its management agreement and/or its ability to fulfill specific mission objectives and requirements is threatened.
- RED:
  - The Project is not expected to meet one or more Agency commitments for the current phase; there is insufficient margin to recover.
  - The Project in operations is facing cost growth beyond the Agency commitment and/or it does not have the ability to fulfill one or more specific mission objectives and requirements.

Assessment Categories

Jan	Jul
G	G

Status: *"Performing to plan"*

G

Technical:

Analysis of the project's ability to safely meet the stated requirements of the mission and to design, fabricate, test, and operate hardware and software components that function correctly together to achieve mission objectives. Analysis of whether technical margins are sufficient to address current technical status and risks to go.

G

Schedule:

Analysis of schedule performance of the project, including assessment of any projected slips in key milestones (whether or not due to factors within the project's control), which would delay, or threaten the product delivery. Analysis of whether schedule margins are sufficient to address current status, any changes in the project work profile, or emergent issues or risks going forward.

G

Cost:

Analysis of the project's cost performance with respect to the most recent PMC-approved plan (whether or not due to factors within the project's control),. This includes analysis of whether the level and phasing of approved cost margins (UFE) to go remain sufficient to address current status, any changes in the project work profile, or emergent issues and risks going forward.

G

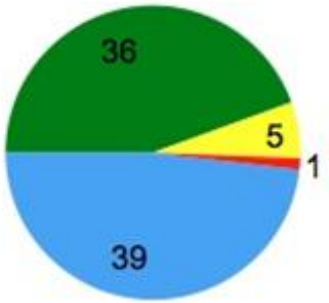
Programmatic:

Analysis of project management factors and external influences which can affect cost, schedule and technical performance, whether or not due to factors within the project's control. The consistency of the Agency's budget with the cost profile in the PMC-approved project plan and meeting the planned closure rate for RFAs (Request for Action) are reflected in this category.

Assessment Aggregate Rollup Example

Science Mission Directorate

# of projects per Divison	Last Month									This Month								
	Development			Operating Prime			Operating Extended			Development			Operating Prime			Operating Extended		
Division:	G	Y	R	G	Y	R	G	Y	R	G	Y	R	G	Y	R	G	Y	R
Astrophysics	5	0	1	6	0	0	9	0	0	5	0	1	5	0	0	10	0	0
Earth Science	5	3	0	1	0	0	12	0	0	6	2	0	1	0	0	12	0	0
Planetary Sci	5	1	0	6	0	0	3	0	0	5	1	0	7	0	0	3	0	0
Heliophysics	5	1	0	3	0	0	14	0	0	4	2	0	3	0	0	14	0	0
SMD Total:	20	5	1	16	0	0	38	0	0	20	5	1	16	0	0	39	0	0



Status:
- 1 project rated **Red** overall – SMD#1
- 26 missions in development; 5 are **Yellow** overall: AAA#1, BBB#2, CCC#1, QQR and Solar Flare (newly yellow)
- 55 operating missions in prime or extended.

Technical:
- Kepler loss of RWA#4 may result in loss of additional science. Options being assessed.
- Optocoupler failures.

Schedule:
- ZZI launch Jun 26th.
- Polar launch Sep 6th

Cost:
- Reimbursable funding challenges for AAA#1

Programmatic:
- External budget profile commitments lacking.
- Access to Space: New medium-class LV providers need certification.

Watch list Items:
- Potential fabrication issues impacting project performance.
- Memory chip delaminations on multiple boards.

SMD Prog/Proj Status Roll Up Example

PROGRAM / PROJECT 2013	*Planetary (Part 1 of 2)*				
Planetary:	Impl J J A	B J J A	C J J A	D J J A	
Discovery **(MSFC)**	G G G	Develop: Strofio	Ops: Aspera-3, Dawn, Epoxi, Grail, Messenger		
XYZ (JPL)		G G G			PDR was Aug 12th; KDP-C in October. **COST (Y):** ROM cost from prime contractor for phase C/D is above the range expected. **TECH WATCH**: Mass margin for EDL improved but added loading to parachute; dust-storm surface energy margin low. System completed TRL-6 testing. **PROG (Y):** LV procurement schedule does not support LRD.
Mars Exploration **(JPL)**	G G G	Form: MARS 2020, MOMA	Ops: Mars Express, Mars Odyssey, MER, MRO, MSL		Mars2020 completed MCR. **PROG WATCH:** Sequestration travel restrictions impact ability to honor international science commitments.
ABC (GSFC)				G G G	Observatory arrived at KSC on Aug 2nd. **SCHED/TECH WATCH:** 29 days of reserve vs. 22 day guideline. SC non-flight cap shows crack; suspect GSE issue, retesting underway. Residual risk of opto-couplers accepted. **COST WATCH:** HQ removed FY13 NOA to near zero project UFE.

Phase B
Manifest Date: TBD
Managing Center: JPL

Project XYZ Example

Jul	Aug
G	G

Development of Executable Baseline

FY13				FY14			
KDP-B	Feb	May	Aug	Nov	Feb	May	Aug
□	⇨	⇨	⇩	KDP-C			

	MA	Low Total (CL)	High Total (CL)
Phase B cost	$XX.XM	[redacted]	$XX.XM
Planned KDP-C Date	Oct '13	[redacted]	Oct '13
Cost target range	[redacted]	$XX.XM (50%)	$XX.X (70%)
Sch. Target range	[redacted]	Apr '16	Apr '16

Performance to Plan

G Technical:

TECH WATCH: Mass margin for EDL improved but added loading to parachute; dust-storm surface energy margin low. System completed TRL-6 testing

G Schedule:

Y Cost:

COST (Y): ROM cost from prime contractor for phase C/D is above the range expected.

Y Programmatic:

PDR was Aug 12th; KDP-C in October.
PROG (Y): LV procurement schedule does not support LRD.

Legend/Performance Change from Last Quarter:
□ No Challenge | m Moderate Challenge | s Significant Challenge | ⇨ Steady State | ⇧ Improving | ⇩ Declining

Center Summary Example

Programs/Projects

Summary Performance

HEOMD:

- **ESP**
- **LRO** – Supported LCROSS Lunar Impact, data being analyzed. Transition to SSMO will occur in December.

SMD:

- **HST**- SMOV activities complete.
- **CCC#1** – Working possible options to increase FY10 reserves. OTE CDR complete.
- **Flare -** Successful CMC and ESD re-baseline reviews conducted. LV actions being worked prior to DPMC.
- **BBA** – Re-planned road to KDP-C. Working toward Mission CDR planned for December 14-17th.
- **AAS -** Systemic issues with systems engineering and mission assurance escapes on IPO-provided instruments reduce confidence in Instrument life expectancy to be less than the 5-year design life.
- **ZZY** – S Band antenna height change complete. KTH ability to deliver Spin Plane Probe Electric Field Instruments.
- **SSN**–Schedule delays are being worked.
- **SDY –** LRD is 2/3/2014.
- **BZX** – Power Distribution Box is integrated onto the flight suite.
- **ZIP-1** – ITT performance on ABI.
- **Climate Sensors**

STMD:

- **AABI** – Continue to Work with BSS regarding requirements flow-down to subcontractors.
- **SIG** – RFP development activities continue.
- **BNCELC** – Successful SMSR October 23rd. Decks #1 and #2 were Launched November 16th.

Technical Authority/Mission Support/Institutional

Institutional Risk to Mission

Budget/Finance:

- Grants reconciliation and transition: The ORR for the Phase 2 transition is scheduled for Nov 30th; will complete Center transition activities.

Workforce:

- Early Career Hiring: FY13 - 66 on-board;

Acquisition:

- Contractor Support: Consolidated Agency contracting approach being pursued. “Authorization” to seek services on another contract granted but is not expected to save resources and requires unnecessary actions.
- XYZ contract protest activities continue. ZYX contract has been extended through Feb 2011. The delayed transition from ZYX to XYZ continues to impact the contractor’s ability to retain experienced employees to perform the work.
  - Agency-level protests denied on Aug 11th and the Corrective Action Plan (CAP) implementation was initiated on August 17th.
  - A protest was submitted on Aug 21st to GAO with regard to the XXX. XXX implementation permitted to continue. GAO decision NLT Nov 30th.
  - Congressional request for information with regard to the XXX was submitted Oct 22nd.

Key Tenants and Lessons learned

- The BPR follows a continuous improvement process
  - Leadership modifies content on an ‘as needed’ basis
  - On a two year cycle, stakeholders hold a face-to-face meeting to critique and optimize the BPR content and effectiveness
- Validated tenants through lessons learned
  - Demonstrated agency leadership participation is critical to ensure across the agency contributions and engagement.
    - Leadership transition planning is essential to ensure incoming leadership understands rational for the BPR
    - Knowledgeable and experienced people critical to implementing this type of process
  - Institutionalization occurred incrementally over a number of years and was usually tied to the stakeholder realization of the BPR to be a value-added process for:
    - Non-attribution of issue and problem resolution. A stated intent of the BPR is to support projects, not find “gotcha’s” or use the information to assess blame. This approach opens dialogue and lines of communication.
    - Supporting the streamlining and reduction of burden in regards to internal and external reporting (GPRAMA and A-11)
    - Efficient communications across the agency, both up and down.
  - An approach which includes multiple inputs leads to a comprehensive and integrated portfolio perspective. It takes commitment and energy to bring a matrix organization together in an integrated fashion -> to be more than the sum of the parts.