



Ensuring the Success of 5 NASA/JPL Projects Launched in 8 Months

2012 Project Management Challenge

Orlando, Florida

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Rod Zieger,

Manager JPL Project Support Office

Jet Propulsion Laboratory, California Institute of Technology

John Hunter,

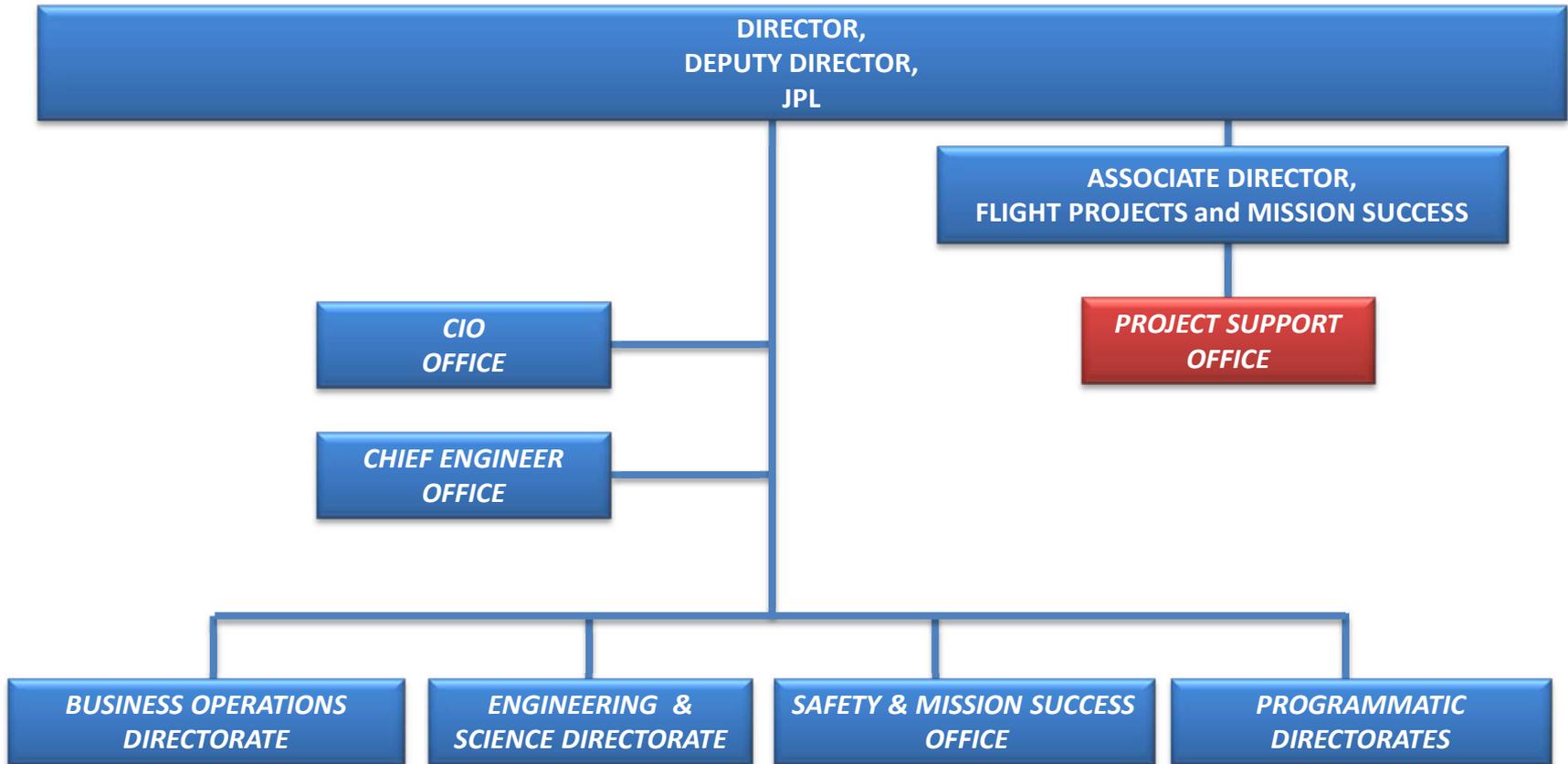
JPL Project Support Office

Jet Propulsion Laboratory, California Institute of Technology

Purpose:

- **This presentation will show the value of the JPL Project Support Office (PSO) to mission success during a period of intense mission activity.**
- **The focus is on contributing to the success of 5 mission launches in 2011 and 2012, while ensuring the success of all other JPL missions in implementation and operations.**

Integrated JPL Support to Projects



Project Support Office

PROJECT SUPPORT OFFICE

Topic of this presentation

COORDINATION and INTEGRATION

PROJECT PLANNING OFFICE

PROJECT ENGINEERING OFFICE

LAUNCH APPROVAL ENGINEERING, LAUNCH SERVICES & IMPORT/EXPORT CONTROL

- NPR 7120.5 Support & Traceability
- SRB Support
- Lifecycle Review Support
- PSR/QR Administration
- Planning Center
- Project WBS
- PM Training/Certification
- Planning Templates
- Project Lifecycle
- PSO Website
- Formulation, Implementation and Operations support
- ToR POC
- Formulation Agreement POC

- Flight Project Practices
- Technical Infrastructure
- Reviews
- Risk Management
- Contract Technical Requirements
- Project Gate Products
- Technical Facilities
- SFOS Operations Office

- Launch Approval Process
- LA HQ Interfaces
- Advanced Launch Services
- Cape Operations
- Import/Export Control

WELCOME TO JPL'S PROJECT SUPPORT WEBSITE

The Project Support Website assists project managers and team members by providing convenient access to information and support for projects, with a focus on project planning activities and developing lifecycle gate products. This includes document templates, tools, services and training information. Together with [The Frontline](#) Website, which focuses on strategic, conceptual, and early formulation activities, support is provided throughout a project's lifecycle.

PROJECT INFORMATION

Information, status and calendars for current projects.

Summary Information	▶
Projects' Key Contacts List	
Projects by Phase	▶
Monthly Report	▶
Quarterly Report	▶
Project Manager's Meeting	▶

PROJECT REQUIREMENTS

Institutional requirements, guidelines, templates and examples.

JPL Policies	▶
Flight Project Practices	▶
Design Principles	▶
Software Development Requirements	▶
Life Cycle	
Reviews	
Gate Products	▶
Examples & Templates	▶
Standard WBS	

TECH & MGMT SUPPORT

Information about institutional support available for projects.

The Frontline	
Proposal Development Support	▶
Help for New Projects	
Project Management	▶
Project Systems Engineering	▶
Software Engineering	
Safety & Mission Assurance	▶
Science & Technology	▶
Spacecraft System	▶
Mission Operations System	▶
Launch System	
Ground Data System	
Systems Integration & Test	
Education & Public Outreach	
Mission Design	
Training & Education	
Centers & Facilities	▶

NASA LINKS

Links to NASA information resources that are useful to JPL Projects.

POLARIS	
NASA Engineering Network (NEN)	
NPR 7120.5D (NODIS)	
NPR 7123.1A (NODIS)	
NASA Lessons Learned	
NASA Graphics Markings	▶

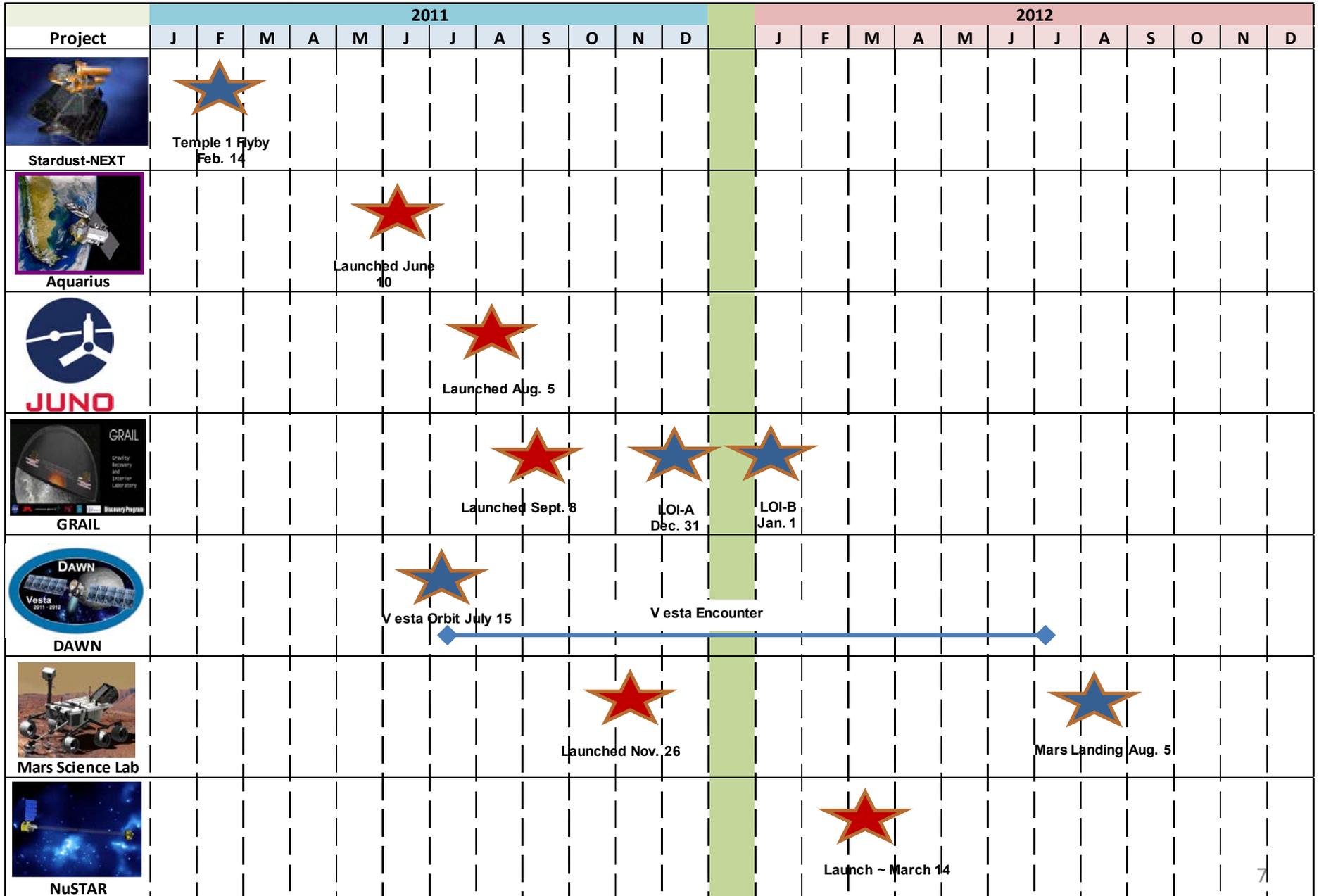
The PSO website provides a "one stop shop" for project information

The 2011 – 2012 Challenge:

- **5 launches, 2 Lunar orbit insertions, 1 Vesta orbit insertion, and 1 Temple 1 flyby, with:**
 - Many domestic and international partners
 - 4 I&T sites
 - 3 launch sites
 - > 150 planned significant reviews and events
 - Required attendance by high-level key staff from NASA, JPL, international and domestic partners

Ensure that they are all successful

Busy Years: 2011 and 2012:



Organizations and Critical Events:

Mission	Major Contributors	I & T Site	Launch Site	Critical Events in 8 Months
Aquarius	NASA, JPL, GSFC, CONAE, ASI, ESR	Brazil	Vandenberg	Launch June 10, 2011.
JUNO	NASA, JPL, LMSC, GSFC, ISA/INIA, SWRI, Malin SS,	LMSC	KSC	Launch August 5, 2011.
GRAIL	NASA, JPL, LMSC, MIT,	LMSC	KSC	Launch September 8, 2011. LOI Dec 31, 2011 & Jan 1, 2012.
MSL	NASA, JPL, GSFC, ARC, LANL, Malin SS, SWRI, Caltech	JPL	KSC	Launch November 26, 2011.
NuSTAR	NASA, JPL, GSFC, Caltech, Orbital, SSL, UCB, DTU	Orbital	Kwajalein	Launch Mar, 2012. (delayed from Dec 2011)
Stardust-Next	NASA, JPL, LMSC, Cornell	LMSC	KSC	Temple encounter, Feb 14, 2011.
Dawn	NASA, JPL, Orbital, UCLA	LMSC	KSC	Vesta orbit insertion, July 15, 2011.

The Requirement:

- **Coordinate all key people, reviews and critical events to:**
 - Enable required key people to plan attendance
 - Identify and resolve conflicts
 - Update plans continuously and keep everyone informed

Example of Typical 6 months to launch:

(this is planned events for one project, next chart shows five projects)

MONTH 1	MONTH 2	MONTH 3	MONTH 4	MONTH 5	MONTH 6
Quarterly Report	Monthly Report	Monthly Report	Quarterly Report	Monthly Report	Monthly Report
Center Directors Reports, Peer Reviews, etc.					

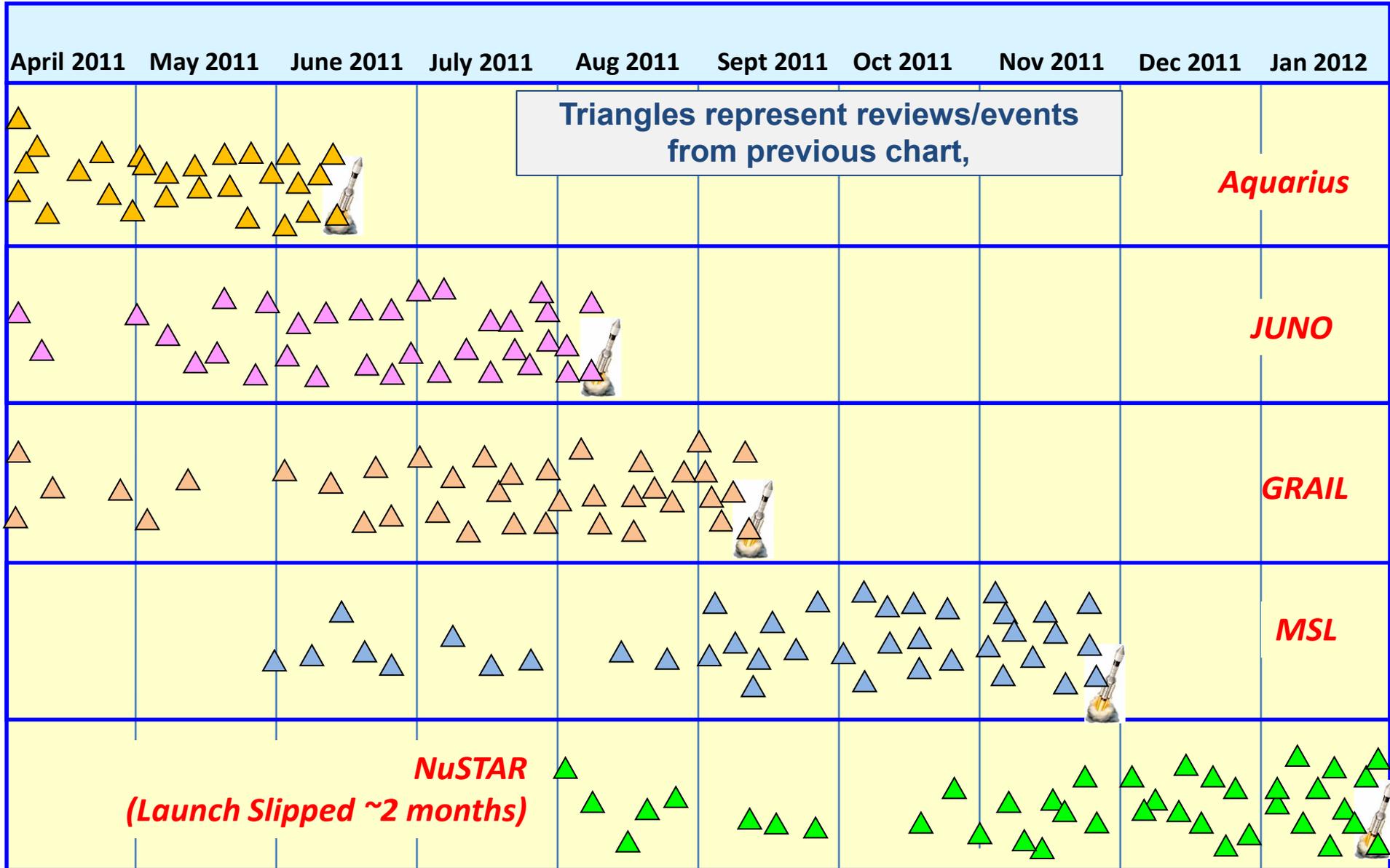


Flurry of activity around the end of integration and test, and preparation to ship

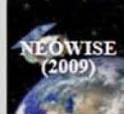
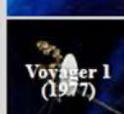
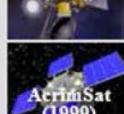
Big flurry of activity around launch



Reviews and events for 5 launches in 2011 - 2012



Don't forget the rest of the portfolio

Selected Pre-Phase A Studies			Formulation (5)			Implementation (3)			Operations (21)		
Click mission icons for details			Click mission icons for details			Click mission icons for details			Click mission icons for details		
Planetary/Mars	Astrophysics	Earth Science	Planetary/Mars	Astrophysics	Earth Science	Planetary/Mars	Astrophysics	Earth Science	Planetary/Mars	Astrophysics	Earth Science
											
											
											
											
											
											
											
											
											

All the other projects have critical events too

Everything interacts with everything else

Changing plans from
**5 projects for
many planned
and unplanned
events leading
to launch**

Changing
plans from
**other active
projects**

Changing
plans from
**JPL key
people**

Changing
plans from
**NASA HQ key
people**

Changing
plans from
**partners,
facilities and
launch sites**

***Integrate, coordinate,
fix errors, resolve conflicts,***

**Everybody knows where they
have to be and when**

How it's done: The Process

Top Level Advocacy (Director's Office)

- *Institutional Buy-in*

- *High priority for "everybody" to keep up-to-date*

Many sources
of inputs

Individual Key Staff Calendars

- NASA HQ
- Centers
- JPL Directorates
- Projects
- Partners
- Facilities

Project Support Office Actions:

One person responsible for:

- Discipline
- "Nag" for Updates
- Quality Control
- Conflict Resolution
- Management Approval

Integrated Community Calendar

- Updated Weekly

Output Formats For:

- E-Mail (Spreadsheet & PDF)
- Web Browsers
- Center & HQ Calendar tools
- Smart Phones, Pads
- Wall Posters

Output Example: Waterfall Chart

Source	OCE	DIR	Project	Review/Milestone/Other	LOC	Sep	Oct	Nov	Dec	Conflict
NuSTAR	X	7X	NuSTAR	Launch Sequence	Orbital		5			
MSL	X	6X	MSL	ORR	JPL		10-11			Attendees
SMAP	X	8X	SMAP	PDR	JPL		10-14			Attendees
4X Calendar	X	4X	GRAIL	PLAR	LMD		11			
Cross		8X	SMAP	Applications Workshop	DC		12-13			
MSL	X	6X	MSL	RAR-2 & CoFR #3	JPL		12-13			Attendees
HQ		SMD	DPMC	Blackout Date	HQ		12-13			
4X Calendar	X	4X	JUNO	CMC - Post PLAR	JPL		14			
DSN		6X	MSL	MERR (DSN)	JPL		17			
5X	X	7X	NuSTAR	CoFR #3	JPL		17			
8X Calendar	X	8X	Aquarius	PLAR with CONAE	Cordoba		18			
Baez		65FC	NPP	FRR	VAFB		18			
4X Calendar	X	4X	JUNO	SMD PMC - Post PLAR	HQ		20			
HQ		1X	See Agenda	Baseline Performance Review	HQ		20			
HQ		6X	Trace Gas Orbiter	DPMC - KDP-B	HQ		21			
HQ		SMD	DPMC	Blackout Date	HQ		21			
Baez		65FC	NPP	LRR	VAFB		23			
Baez	X	65FC	NPP	Launch 2:48:01 AM PDT	VAFB		25			
MSL	X	6X	MSL	MRR S/C	KSC		26			
4X Calendar	X	4X	GRAIL	Post Launch Risk	JPL		27			
HQ		1X	SMD	Monthly Meeting	HQ		28			
PSO		See Agenda	See Agenda	Quarterly Report	JPL		31	1-3		
OCO-2	X	8X	OCO-2	Instrument PER	JPL			1		
Aquarius	X	8X	Aquarius	PLAR (Tentative)	JPL			1		
Jason-3	X	8X	Jason-3	CDR	TBD			0		
4X Calendar	X	4X	GRAIL	CoCER	JPL			2		
MSL	X	EC	MSL	CMC - Post MRR	JPL			2		
SMAP	X	EC	SMAP	CMC - Post PDR	JPL			3		
HQ		SMD	DPMC	Blackout Date	HQ			3		
Thomas	X	6X	MSL	SMSR	KSC			7		
4X Calendar	X	4X	JUNO	Agency PMC - Post PLAR	HQ			8		
MSL	X	6X	MSL	MRB/DPMC - Post MRR	HQ			9		
Cross	X	8X	GRACE Follow-On	CMC - Post MCR	JPL			0		
Aquarius	X	EC	Aquarius	CMC- Post PLAR - TBD	JPL			0		
8X Calendar	X	8X	Aquarius	DPMC- Post PLAR (Tentative)	HQ			10		
SMAP	X	8X	SMAP	DPMC - Post PDR	HQ			16		
HQ		SMD	DPMC	Blackout Date	HQ			16		
4X Calendar	X	4X	GRAIL	CERR	JPL			17		
HQ		1X	See Agenda	Baseline Performance Review	HQ			17		
MSL	X	6X	MSL	LV FRR	KSC			18		
Baez	X	6X	MSL	LMCM & DR	KSC			21		
4X Calendar	X	4X	GRAIL	MERR (DSN)	JPL			22		
MSL	X	6X	MSL	LRR (LV) (L-3)	KSC			22		
Rules		ALL	None	Holiday	JPL			24-25		
MSL	X	6X	MSL	Launch 10:21 AM EST	KSC			25		
MSL	X	6X	MSL	Launch Window	KSC			25-30	1-18	

Change from last version

Elachi/Tattini/Jones Calendars
 (Before changing a GREEN highlighted date, email PSO at Charlayne.Fliege@jpl.nasa.gov)

To Be Determined

Holiday

Phase or Encounter

Output Example: Sort By Project

Project	Review/Milestone/Other	LOC	July	August	September	October	November	December
Aquarius	PLAR (Tentative)	JPL			14			
Aquarius	CMC - Post PLAR (TBD)	JPL			0			
Aquarius	DPMC - Post PLAR (TBD)	HQ			0			
DAWN	Delta Mission Readiness Review (MRR)	JPL	28					
DAWN	Arrival Press Conference	JPL		1				
DAWN	Start of Vesta Science Mission	JPL		10				
Trace Gas Orbiter	CMC - Pre-KDP-B	JPL			1			
Trace Gas Orbiter	KDP-B	HQ			0			
GRAIL	DSN MERR	JPL		4				
GRAIL	MRR - S/C	KSC		9				
GRAIL	CoFR #8	JPL		11				
GRAIL	S/C Mate Technical Readiness (was LSRR)	KSC		15				
GRAIL	CMC - Post MRR	JPL		18				
GRAIL	Briefing to DPO/DPS (Post MRR)	Telecon		19				
GRAIL	SMSR	Telecon		22				
GRAIL	System Certification Review	KSC		24				
GRAIL	MRB/DPMC - Post MRR	HQ		24				
GRAIL	Press Conference #1	HQ		25				
GRAIL	LV FRR	KSC		26				
GRAIL	LMCM/MDR	KSC			1			
GRAIL	LRR (LV) (L-1)	KSC			6			
GRAIL	45th Space Wing	KSC			6			
GRAIL	Launch 8:37:06 AM EDT	KSC			8			
GRAIL	PLAR	LMD				11		
GRAIL	Post Launch Risk	JPL				27		
GRAIL	CoCER	JPL					2	
GRAIL	CERR	JPL					17	
GRAIL	MERR (DSN)	JPL					22	
GRAIL	CMC - Post CERR	JPL					30	
GRAIL	DPMC (Post CERR)	HQ						12
GRAIL	Briefing to DPO - NASA PSD (Post CERR)	HQ						12
GRAIL	LOI - A	TBD						31

Example: Fact Sheets

- **Visual format that provides current, factual information about projects**
 - **Provide executives with current summary for quick responses to questions**
 - **Provide consistent summaries for Monthly and Quarterly reporting**
 - **Provide information in easy to understand form for public**



JUNO

Mission Directorate: Science Mission Directorate (SMD)
Division: Planetary Science Division (PSD)
Program: New Frontiers - MSFC Program Office
Category 1; Risk Class B Mission
NASA Project Number: 804068

Science:

To improve our understanding of the origin of our solar system by understanding the origin and evolution of Jupiter, Juno will:

- ✓ Determine the global O/H ratio (water abundance) in Jupiter's atmosphere;
- ✓ Measure latitudinal variations in Jupiter's deep atmosphere (composition, temperature, cloud opacity, and dynamics);
- ✓ Map Jupiter's magnetic and gravitational fields;
- ✓ Characterize Jupiter's polar magnetosphere and aurorae.

Technical Capabilities:

- ✓ First solar-powered mission to the outer planets.
- ✓ Eight instrument payload to conduct gravity, magnetic and atmospheric investigations plus an E/PO camera.
- ✓ Polar orbiter spacecraft launches in August 2011:
 - ✓ 5 year cruise to Jupiter, JOI in July 2016
 - ✓ 1 year operations, EOM via de-orbit into Jupiter in 2017
- ✓ Elliptical 11 day orbit swings below radiation belts to minimize radiation exposure.

NASA HQ

- Program Director: Jim Adams (PSD)
jim.adams@nasa.gov
- Program Scientist: Mary Mellott (HQ)
mary.m.mellott@nasa.gov
- Program Executive: Adriana Ocampo
adriana.c.ocampo@nasa.gov
- Program Manager: Allen Bacskay (GSFC)
allen.bacskay@nasa.gov
- Principal Investigator: Scott Bolton
scott.bolton@swri.org
- Website: <http://www.nasa.gov/juno>
- Fact Sheet:
http://www.nasa.gov/pdf/316306main_JunoFactSheet_2009sm.pdf

JPL

- Directorate: Firouz Naderi
Firouz.Naderi@jpl.nasa.gov
- Project Manager: Jan Chodas
Janis.L.Chodas@jpl.nasa.gov
- Engineering Technical Authority: Doug Bernard
Doug.Bernard@jpl.nasa.gov
- Project Scientist: Steve Levin
Steven.M.Levin@jpl.nasa.gov
- Mission Assurance: Larry Bryant
Larry.Bryant@jpl.nasa.gov
- Business Manager: Suzanne Oyama
Suzanne.M.Oyama@jpl.nasa.gov
- Library: <https://alpha-lib.jpl.nasa.gov/docushare/dsweb/View/Library-93>
- Website:
<http://www.jpl.nasa.gov/missions/missiondetails.cfm?mission=Juno>

PROJECT LIFECYCLE REVIEWS & MILESTONES

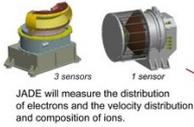
Phase Pre-A/ A	Phase B	Phase C	Phase D	Phase E
<ul style="list-style-type: none"> ❖ 5.12.2005 - Step 2 Site Visit ❖ 11.28.2005 - Phase B ATP 	<ul style="list-style-type: none"> ❖ 05.21.2007 - Preliminary Mission System Review ❖ 05.12.2008 - Preliminary Design Review ❖ 08.31.2008 - End of Phase B 	<ul style="list-style-type: none"> ❖ 04.20.2009 - Critical Design Review ❖ 03.01.2010 - System Integration Review 	<ul style="list-style-type: none"> ❖ 03.22-23.2011 - Pre-Ship Review ❖ 06.06 - 07.2011 - Operational Readiness Review ❖ 07.07.2011 - Mission Readiness Review ❖ 07.15.2011 - Safety & Mission Success Review ❖ 07.20.2011 - Mission Readiness Briefing & Directorate Program Management Council ❖ 08.05.2011 - Launch from KSC on Atlas V-551 	<ul style="list-style-type: none"> ❖ 10.04.2011 - Post Launch Assessment Review ❖ 08.30.2012 and 09.03.12 - Deep Space Maneuver ❖ 10.9.2013 - Earth Flyby ❖ 07.05.2016 - Jupiter Orbit Insertion ❖ 12.01.2017 - End of Mission ❖ 03.29.2019 - End of Project



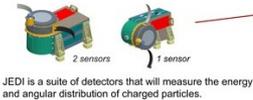
National Aeronautics and Space Administration
Jet Propulsion Laboratory
 California Institute of Technology



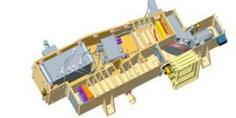
Jovian Auroral Distributions Experiment (JADE)



Jupiter Energetic-particle Detector Instrument (JEDI)



Ultraviolet Spectrograph (UVS)



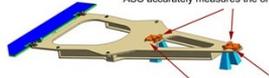
Gravity Science (GS)

The Juno Gravity Science Investigation will probe the mass properties of Jupiter by using the communication subsystem to perform Doppler tracking.

Magnetometer (MAG)

Advanced Stellar Compass (ASC)

ASC accurately measures the orientation of the magnetometers.



Fluxgate Magnetometer (FGM)

The two fluxgate sensors will measure the magnitude and direction of the magnetic field in Jupiter's environment.

Microwave Radiometer (MWR)

MWR is designed to sound deep into the atmosphere and measure thermal emission over a range of altitudes.

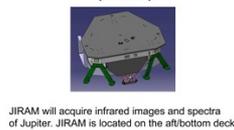


Plasma Waves Instrument (Waves)

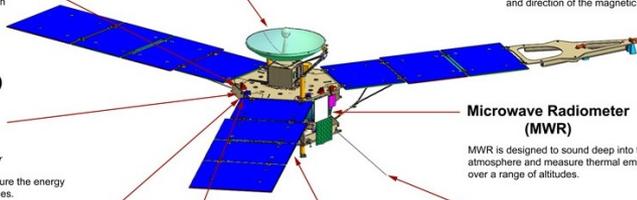
Waves will measure plasma waves and radio waves in Jupiter's magnetosphere.



Jovian Infrared Auroral Mapper (JIRAM)



JunoCam will provide visible-color images of the Jovian cloud tops.



Primary Lead Organizations



- Southwest Research Institute:
 - Principal Investigator
 - Science Operations & Data Center
 - JADE & UVS Instruments



- Jet Propulsion Laboratory:
 - Project Management
 - Project Scientist
 - Project Engineering
 - Mission Assurance
 - Payload Management
 - Mission System
 - Microwave Radiometer Instrument
 - Telecommunications Subsystem



- Lockheed Martin:
 - Flight System Management
 - Spacecraft Development
 - Payload Integration
 - ATLO Management including Cape Operations

Additional Providers

Goddard Space Flight Center (GSFC)



✓ Magnetometer

University of Iowa (U of Iowa)



✓ WAVES Instrument

Malin Space Science Systems (MSSS)



✓ JunoCam

Applied Physics Lab (APL)

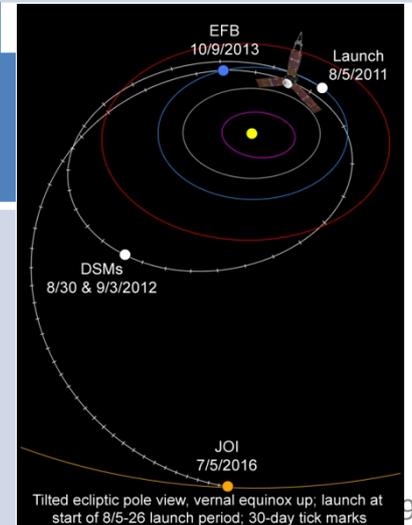


✓ JEDI

Agencia Spaziale Italiana (ASI)



- ✓ JIRAM (Selex Galileo)
- ✓ Ka-Band Translator (Thales Alenia Space Italia)

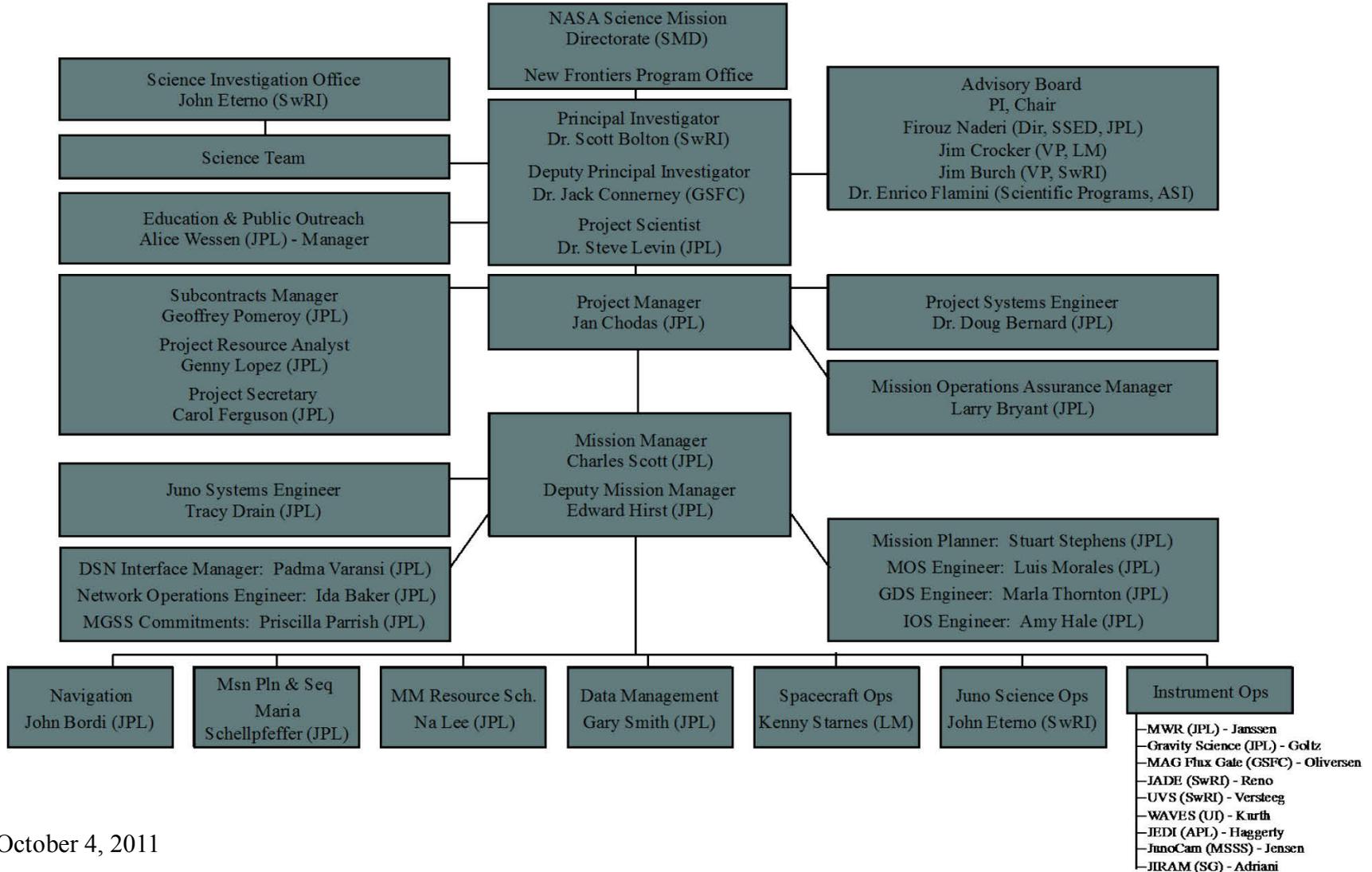




JPL		
TASK ORDER	UPN / NSM	JPL PROJECT
NMO710962	804068	103204
NMO710962	804068	103845



Juno Project Organization (Operations)



October 4, 2011

Results:

- Enabled complete coverage of 150+ critical events
- Coordinated many constantly changing plans
- Integrated project and other activities and schedules
- Identified and resolved conflicts
- Avoided surprises
- Coordinated travel
- Reduced frustration
- Kept everyone informed

What Was Learned

- **Top level advocacy is required**
 - Institutional buy-in
 - Updating calendars is last on the projects to do list
- **It takes a dedicated person to “nag” for updates and resolve conflicts**
- **Continuous updates and quality control are required**
 - Project’s and key people’s calendars change relentlessly
 - Key people are unforgiving of wrong information, no matter what the cause
- **IT support is critical**
 - Integrated databases
 - User-requested output formats and easy access
 - Including ability to see charts on smart phones

Summary

- Recognized the need to coordinate many people and events
- Developed an organization and process that works
 - Users ended up liking it and supporting it
 - We plan to continue using it even when there are not 5 launches in 8 months!
- Utilized current information technology infrastructure to meet many diverse needs
- Required similar dedication and attention to detail as any flight project

Recommend that any organization with periods of intense project activity consider a PSO-like organization