A Framework for the JPL Strategic Plan

Dr. Firouz Naderi
Director

June 13, 2002

6th Briefing for INDUSTRY
Business Opportunities with the Jet Propulsion Laboratory

Structure of the JPL Strategic Plan

JPL's Mission

As part of the NASA team, we enable the nation to explore space for the benefit of humanity. We will:

1. Explore our own and neighboring planetary systems;
2. Seek life elsewhere in the Universe;
3. Further understanding of the laws that govern of the Universe;
4. Understand our home planet and help protect its environment;
5. Use our unique capabilities to solve problems of national significance; and,
6. Share the adventure with the public, and inspire the next generation of explorers.

Strategic Objectives

1. Maintain at JPL an institutional environment in which world-class science, engineering, and technology are integrated to give rise to exceptional missions.

2. Enrich JPL's end-to-end engineering capability to enable us to successfully execute missions.

3. Develop business management into an institutional strength.

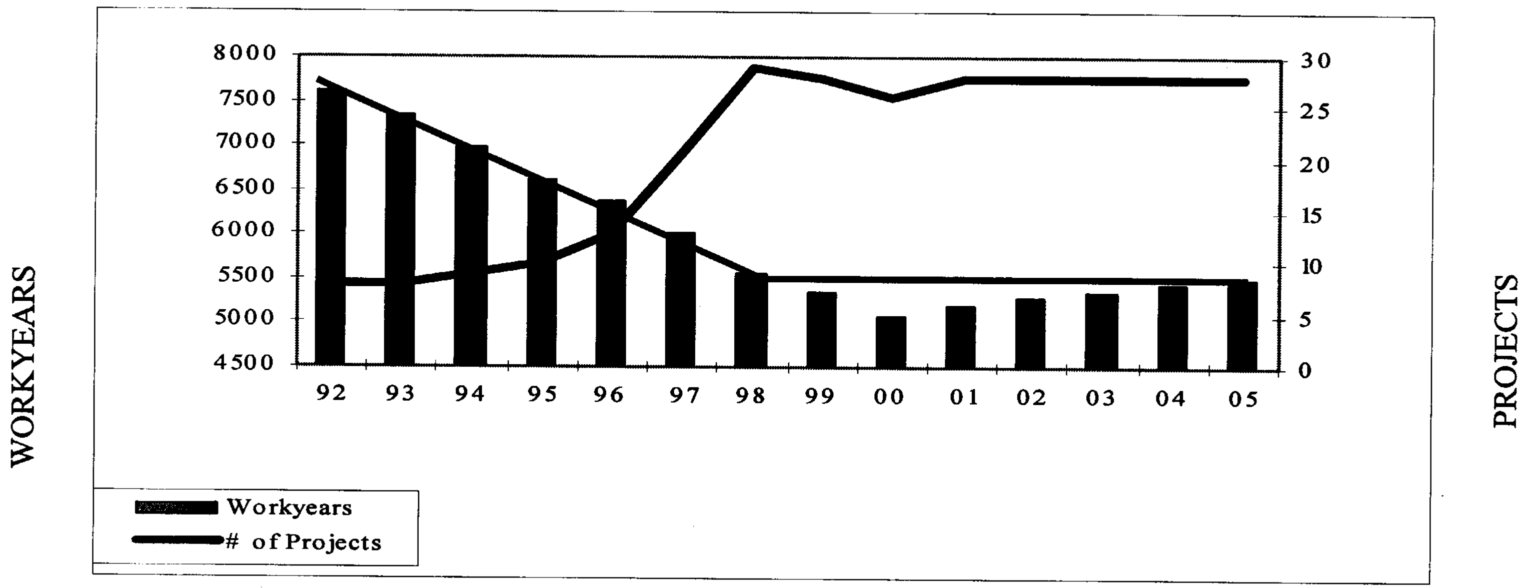
→ Build strong relationships with partners, stakeholders, and customers.

5. Engage the public in our quests, and use space exploration to inspire and educate the nation's youth.

Doing More with Less

Project Management as a Core Capability

- Since 10 years ago the number of JPL projects has more than tripled
  - Smaller but more frequent
- At the same time, JPL workforce is reduced by 1/3



- To manage this large number of projects, JPL will recruit, train and retain the best system engineers and project managers AND work increasingly with outside organizations

Balanced Portfolio

- In implementing missions, create a balanced portfolio of in-house & contracted activities
  - Retain hands-on end-to-end implementation capability and be a smart buyer
    - To maintain critical skills. JPL's goal is to have at least one in-house project in Phase A/B, in Phase C/D, and one in Phase E
  - Partner/contract with industry and universities for majority of the missions and/or mission elements
- Building on the successes of the past few years, evolve JPL into an institution that excels in a competitive environment
  - Partnerships between JPL, PIs and industry

Implementation of the Missions

Space Science Enterprise *Earth Science Enterprise* *Flight Projects*	*Launch Date*	In-House S/C	Industry Implementation S/C	International Partnership
Jason I	***2001***			X
Genesis (PI)	***2001***		X	
GRACE (PI)	***2001***			X
GALEX (PI)	***2002***		X	
SIRTF	***2002***		X	
Mars Exploration Rovers	***2003***	X		
Deep Impact (PI)	***2004***		X	
Cloudsat (PI)	***2004***		X	
Mars 2005 Orbiter	***2005***		X	
StarLight (ST-3)	***2005***		X	
OSTM (Ocean Surface Topography Mission)	***2006***			X
OVWM (Ocean Vector Winds Mission)	***2007***			X
Mars French Orbiter	***2007***			X
Mars Telesat	***2007/09(?)***		X(?)	X (?)
Hershel	***2007***			X
Planck	***2007***			X
Mars Smart Lander	***2009***	X	X	
SIM	***2009***		X	
LISA	***2010***		X	
Mars Sample Return	***TBD***		X	
TPF	***TBD***			
Future Discovery (PI)	***TBD***		X	
Future Mars Scouts (PI)	***TBD***	X?	X?	
Future ESSP (PI)	***TBD***		X?	X?
Future MIDEX (PI)	***TBD***		X	

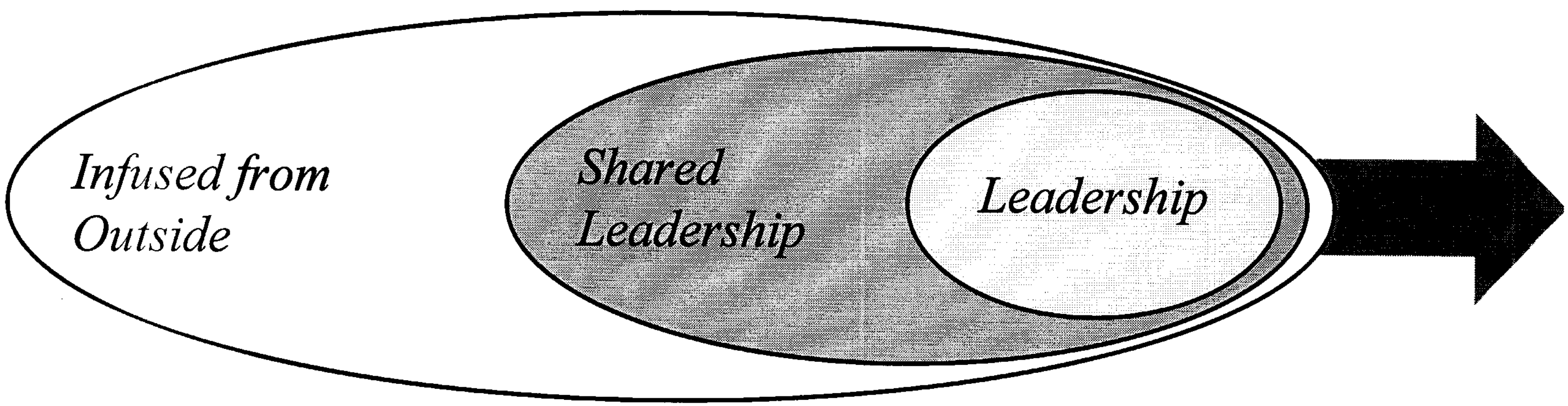
Depth in Selected Areas, Partnering in Others

- JPL mission queue is unpredictable
  - Large time gap between Mars Exploration Rover and Mars Smart Lander
  - NASA trending away from "directed" missions
- JPL's strength is in its people
  - JPL is about half way between civil service and industry
  - We must provide a stable environment to maintain core capabilities
- **Strategy required to maintain adequate depth in capability**
  - **Maintain significant depth in core engineering disciplines (e.g. system level design)**
  - **Maintain lesser depth in engineering disciplines easily staffed by contractors (e.g. detailed design)**
- JPL Strategic Plan will provide focus required to determine future engineering capabilities/skill-mix needs

Binning the Technology

Technology Leadership

- There are many technology disciplines that enable JPL and NASA missions
  - In some technology disciplines, JPL's applications are so unique that JPL must be the intellectual leader for the community – JPL's "Leadership Technologies"
  - In other areas, JPL is an important participant in disciplines that also have intellectual leaders elsewhere
  - In still other disciplines, JPL must be able to infuse technology from others with little JPL in-house development



Technology moving JPL into the future

Technology Leadership
JPL Leadership Technology

Key Technologies	*Solar System & Mars*	*Astronomy & Physics*	*Earth Science*
• Autonomous regional mobility (surface and atmosphere) and safe landing	●		
• Deep space communications and interplanetary network	●		
• Deep space navigation and highly stable clocks	●	●	
• Extreme precision formation flying for science observations and rendezvous	●	●	●
• High precision space-borne systems in optical to sub millimeter domain including interferometry		●	●
• Specialized active sensors for mapping and positioning (SAR, altimeters, GPS…)	●		●

Technology Leadership
Shared Technical Leadership

Key Technologies	*Solar System & Mars*	*Astronomy & Physics*	*Earth Science*
Advanced coolers and thermal design		●	
Advanced in-space propulsion & aerocapture	●		●
Advanced remote sensing instruments	●		
Advanced tools for mission design	●	●	●
Autonomy	●	●	●
Electronics for extreme environments	●		
Fault tolerant computing and sensing for extreme environment	●		
High performance on-board computing		●	
Low mass advanced spacecraft systems including nano systems	●		
Low temperature batteries	●		
Miniaturized in-situ laboratories	●		

Briefing to INDUSTRY
Business Opportunities with the Jet Propulsion Laboratory

Technology Leadership
Shared Technical Leadership (cont.)

Key Technologies	*Solar System & Mars*	*Astronomy & Physics*	*Earth Science*
• Non-Earth centric life detection	●		
• Ocean and solid Earth modeling			●
• Planetary protection	●		
• Quantum- and background-limited detectors and sensors		●	●
• Rendezvous and sample capture	●		
• Reusable fault tolerant, object-oriented flight/ground software	●	●	●
• Spacecraft system modeling		●	●
• Sub-millimeter, thermal infrared, and THz sensors		●	●
• Subsurface access	●		
• Virtual presence	●		●

Technology: Infused from the Outside

Technologies Infused from Outside

Key Technologies	*Solar System & Mars*	*Astronomy & Physics*	*Earth Science*
• Advanced computing (ground systems and algorithms)	●	●	●
• Advanced data visualization techniques	●	●	●
• Chemical Propulsion	●	●	●
• Data archiving, retrieval and processing	●	●	●
• Guided entry vehicle	●		
• Inflatable structures	●	●	
• Integrated active systems	●	●	●
• Large lightweight apertures		●	●
• Long-life space power systems including radioisotope power	●		
• Planetary ascent vehicles	●		
• Precision structure			●