



# My office? Wherever I Am

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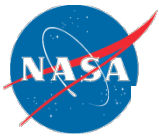
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Second Life: TomS Soderstrom

**“Plan for what is difficult while it is easy,  
do what is great while it is small” - Sun Tzu**



# Jet Propulsion Laboratory is part of NASA and Caltech

- Federally Funded Research and Development Center (FFRDC) Managed by Caltech for NASA
- NASA's lead center for robotic exploration of the solar system
- \$1.7B contract per year, ~ 5,000 employees; 177 acre facility located in Pasadena, CA, with 670K sq.ft of office space and 900K sq.ft. of labs



- Manages worldwide Deep Space Network
  - 3 Locations - Goldstone CA, Madrid Spain, Canberra Australia
  - Spacecraft Command & Control - Recording scientific data
- 50+ years experience in spacecraft design, production and operation
- JPL spacecraft have visited all planets in our solar system except Pluto!



# JPL – August 29, 2009

**JPL**  
Jet Propulsion Laboratory  
California Institute of Technology





# JPL – The next day (Aug. 30, 2009)

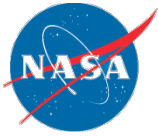
**JPL**  
Jet Propulsion Laboratory  
California Institute of Technology





# Learning from current Teleworker initiatives

- Learning from the unexpected “Fire Drill” on Aug. 31, 2009
- Mining experiences from frequent travelers
- “Working from anywhere with anyone” pilot at JPL testing with individuals and projects
- The “Great California Shakeout” in 2008 and on Oct. 15, 2009
- The NASA “working from home” drill during Fall 2009 responding to OMB
- Learning from new breed of remote facilitation experts



# Natural remote access ingredients

## 1. Provide easy access

- Make it easy: when in doubt, call 4HELP as always
- Provide laptops with standard build (Mac, PC, Linux) with cameras & MS Office for home
- Make much better use of the PDAs (e.g. texting, Skype on iPhone, rich mobile applications, contact lists, etc.)
- Home DSL/Cable and on-the-road Internet connectivity via USB Broadband cards and hubs or Verizon MiFi to small groups (negotiating with AT&T to use their WiFi hotspots)
- Secure tunnel via Cisco VPN or Juniper NetConnect; via secure intranet from others' computers; built-in encryption
- Make all critical applications web-enabled
- Provide backup email and IM accounts in the Cloud
- Exploring VDI, Terminal Server, Citrix



# Natural remote access ingredients (cont)

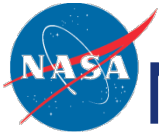


## 2. Make it easy to talk to each other

- Call forwarding and much more via VoIP
- Toll free MeetingPlace and Meet-Me Conference lines
- Instant messaging via OCS, Jabber, Skype

## 3. Make it easy to see each other

- HD video conferencing - inexpensive HD video systems help with quality meetings and to maintain relationships
- Laptop video conferencing – Seamless and quick face-to-face connectivity via OCS, Skype, LifeSize Desktop, Polycom, ... (no final solution yet)
- 3D virtual worlds – collaborating at the Virtual JPL in 3D (“Explorer Island” in Second Life)



# Natural remote access ingredients (cont.)

## 3. Make it easy to share documents in real time

- Share data and collaborate in real time via Web conferencing (MeetingPlace, WebEx, Adobe Connect)

## 4. Make it easy to share documents over time

- Share documents and collaborate via Web-based collaboration sites (Sharepoint; also exploring backup Cloud solutions)

## 5. Maintain relationships

- Especially during long term telework (video conferencing, 3D virtual worlds, phone conferences)



# Lessons Learned and Next Steps



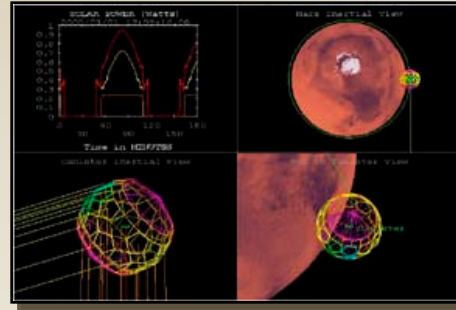
- **“Teleworker” - working from home is not enough**
  - “Working from anywhere with anyone” is the solution
  - Handle short term (e.g. fire) and long-term (e.g. pandemic)
  - Consider that Internet stays up (9/11, earthquakes, fire)
- **Make it easy and natural to work from remote**
  - Practice makes perfect (culture, functions, load testing)
  - Make it natural but build in security
- **Provide choices**
  - Enable participants to connect in any way they need
  - Provide backup email, IM, document processing, etc.
- **Look at startups and remote facilitation experts**
  - They already work efficiently from remote
  - We need to amend our processes and policies

Green + Quality of life + Competitive advantage → Telework

# End-to-End Capabilities Needed to Implement Missions



Project Formulation - Team X



Mission Design



Mars Rovers

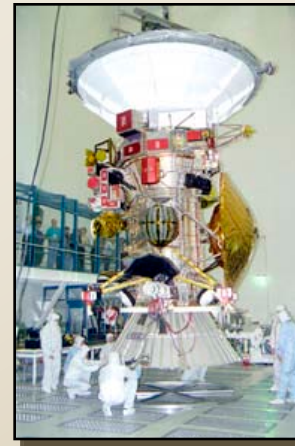


Large Structures - SRTM



Ion Engines

Ion Engine (DS-1)



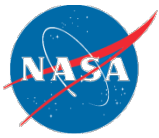
Integration and Test



Environmental Test

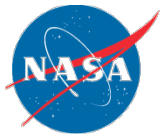


Mission Operations



# JPL operates nineteen spacecraft and seven instruments across the solar system... and beyond





# We take a futuristic and long view of exploration and IT-enabled collaboration ...



On star power

On Planets (Mars)

On the Moon

In orbit

Across the Globe

In Person

1990's

2000's

2010's

2020's

2030's

2100s

... while operating 30 year old technology