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# Lunar Lander Project

# Initial Implementation

May 10, 2007

CONSTELLATION

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# Background

- The Constellation Program is standing up a new project office, the Lunar Lander Project Office
- Initial project implementation will consist of an in-house design team
- The project will periodically post status updates to the following website. www.exploration.nasa.gov

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# Goals for in-house design team

- **Two main goals for in-house design team:**
  - Get smart on design and be able to produce and validate a good set of requirements
    - Provide integration with other projects to ensure architecture closes
    - Increased confidence in design, cost and schedule estimates
    - May allow us to pull long term development schedule to left
  - Try out a different approach for early project development that will hopefully allow a more streamlined Phase A/B

- **Long Term Vision:**
  - By the time we let a major Lander contract
    - have a government design team that is smart enough to know what is needed
    - to have written excellent requirements for it
    - to get there in as streamlined a manner as possible

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# Overview of Approach for In-house Design Team

- **Using a Smart Buyer approach**
  - Take 6-9 months to develop a preliminary government design
- **Coming out of initial design effort, have independent, agency-wide review**
- **Iterate on design following independent review**
- **Using knowledge gained from in-house design effort, create draft vehicle design requirements**
- **Get out to industry for comment/input**
- **Continue to refine design & requirements based on industry input**
- **In FY09 have a vehicle requirements review, and baseline requirements**
- **Between 2009 – 2011, build hardware/test beds to mature confidence in path for forward design (lower risk of unknown surprises)**
- **Continue to mature design in-house until PDR timeframe**

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# Lander Design Team Integration Roadmap – 40 months

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NASA

FY07 → FY08 → FY09

9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11

## Infrastructure

- Assemble Team
- Build WBS
- Co-Locate in Houston

## Design

- NASA In-house Design Effort
- Independent Review (NESC/IPAO/PAE)
- Incorporate mods and update baseline design
- Continue to refine design

## Industry Input

- Develop draft SRD
- Release SRD to industry for comment
- Review industry comments, revise SRD
- SRD Reviews Completed

## Milestones

- Steering Committee Outbrief

2/12 Assemble Team

2/12 Build WBS

4/30 Co-Locate in Houston

4/02/07- 9/28/07
NASA In-House Design Effort

10/01/07 – 11/15/07
Independent Review
NESC / IPAO / PAE

10/30/07-2/15/07
Incorporate Mods
Update baseline design

4/07/07-10/31/08 Continue to refine design

12/03/07-4/07/08
Develop draft SRD

4/07/08
Solicit Industry Input

4/08/08-5/30/08
Review industry comments and revise SRD

5/01/08-5/30/08
SRD Reviews Completed

**Steering Comm Outbrief 2/01/07**

**Steering Comm Outbrief 5/31/07**

**Steering Comm Outbrief 9/17/07**

**Steering Comm Outbrief 12/03/07**

**Steering Comm Outbrief 3/03/08**

*ALL DATES UNDER REVIEW*
*Version 5/11/07*

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# Approach (cont.)

- **Team started with ground rules & constraints imposed by overall CxPO transportation architecture and current LAT-2 for surface systems**
  - Many physical constraints imposed by architecture (mass, delta V, etc.)
  - Surface systems architecture less mature. However, Lander and LAT-2 agreed on a packaging configuration and initial scenarios
- **Examined what's been done to date, but opened up all the design trades to the extent the architecture allows**
- **Maturing design effort – drawings, CAD models, performance analyses, etc.**
- **Keep process overhead to the minimum required**
  - Recognizing that a small, dynamic team doesn't need all of the process overhead that a much larger one does
  - But…. It still needs the basics

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# Lander Design Team Initial Team Structure

**PP&C**
- Cost Support
- Scheduling
- Procurement

**Lunar Lander Project Office**
Lauri Hansen, Project Manager
Clinton Dorris, Deputy PM (JSC)
Dan Schumacher, Deputy PM (MSFC)

**VE&I**
John Connolly, Lead
- Vehicle Integration
- Mass Properties
- CAD/models
- MEL
- Power bookkeeping
- Data bookkeeping

**Prog/Proj Integration**
Lee Graham, Lead

**Technology Integration**
Julie Bassler, (Acting)

**Ops Integration**
Brent Jett, (Detailee)

## Matrix Support

**Vehicle Subsystem Leads**

- Avionics
  - GN&C
  - C & T
  - C&DH
- ECLSS
- Active Thermal
- Power
- Structures & Mechanics
- Passive Thermal
- Propulsion
  - Main Propulsion
  - RCS

**Additional SE&I Support**

- Environments
- Flight Mechanics
- Habitability/Human Factors

**Project/Project Integration**

- ARES V/EDS
- Orion
- EVA
- Ground Ops

**Crew**

**Safety**

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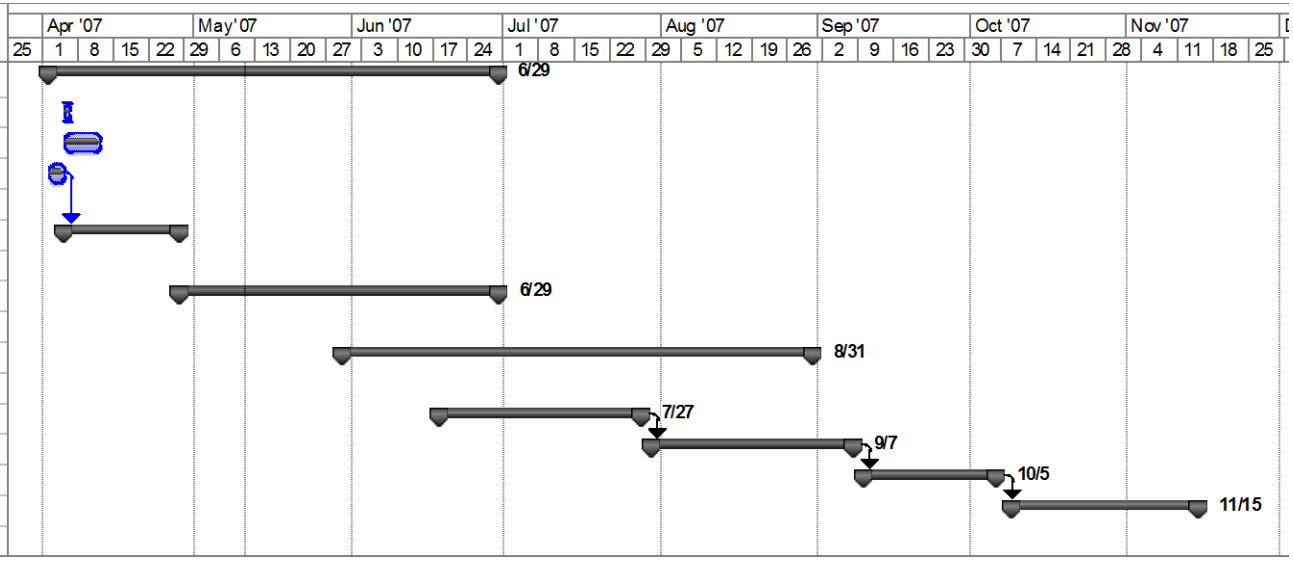
# Lunar Design Analysis Cycle Schedule – 6 months

| ID | Task Name |
|---|---|
| 1 | **Lander Starworks** |
| 2 | Pre LDAC-1 |
| 3 | Mission Timelines |
| 4 | Kickoff Meeting |
| 5 | |
| 6 | **Pre LDAC-1 Homework** |
| 37 | |
| 38 | **LDAC-1 (Colocation)** |
| 231 | |
| 232 | **LAT Support** |
| 238 | |
| 239 | **LDAC-1 Delta** |
| 247 | **LDAC-2** |
| 249 | **LDAC-3** |
| 251 | **Independent Reviews** |
| 254 | |



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# Forward Work

- **Need to flesh out implementation after initial set of design iterations**
- **Several significant drivers:**
  - How far does NASA want to take the in-house design? PDR? CDR?
    - Changes the nature of the baselined requirements
  - How long does the project stay in initial operating mode, and what does the transition look like
    - Initial team is made of designers, analysts, integrators. Not necessarily the same skill set as requirement and RFP writers
  - How much money will be available in 2009 -2011 timeframe to build hardware and test beds to
    - Buy down risk
    - Finalize design trades
  - Even if NASA extends the design in-house, need industry engagement/interest & help

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# Current Status

- **Current Project Status**
  - Completed initial meeting with Steering Committee & received go-ahead for implementation
  - Completed staffing of Acency-wide team
  - Initial kick-off week was 4/2 in Houston
  - Team co-location occurred 4/30 in Houston
  - LDAC1 underway