Status of the Landsat Data Continuity Mission

presented by

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at the

Landsat Science Team Meeting

Rochester Institute of Technology

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Topics

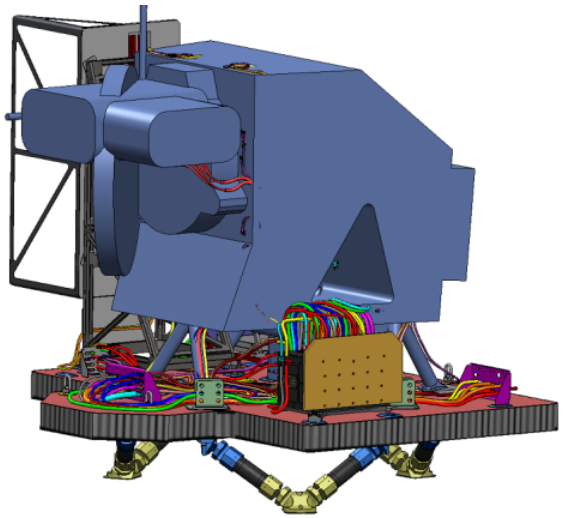
- **Mission Status**
  - **OLI**
  - **TIRS**
  - **S/C**
  - **Mission Operations Element & Operations**
- **Programmatic Status**
  - **Schedule**
  - **Mission PDR**
    - **What is it**
    - **Preparations**
  - **Road to Confirmation**
- **Conclusion**

Operational Land Imager (OLI)

OLI Development Status
Ball Aerospace and Technologies Corporation

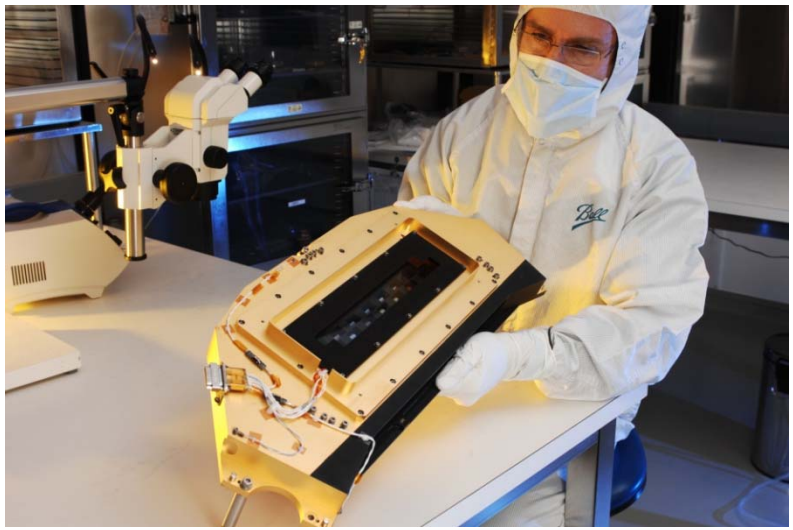
LDCM

- **Focal Plane Array**
  - Engineering Development Unit (EDU) FPA completed and under test
  - Flight Focal Plane Modules in development
    - Detectors for visible bands redesigned to eliminate noise issue caused by surface leakage
    - Development of redesigned detectors is proceeding on schedule
  - All flight filter assemblies completed



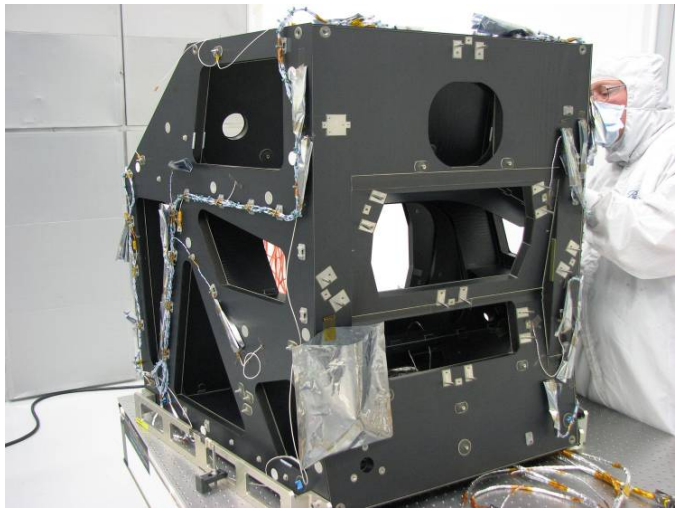
- **Telescope**
  - Optical bench complete
  - Mirrors complete /installed in optical bench
  - Telescope alignment in progress
- **Electronics**
  - EDU Focal Plane Electronics complete
  - EDU Instrument Support Electronics complete
  - Flight Instrument Support Electronics boards in development
- **Calibration Subassembly**
  - Flight solar calibration port and nadir port baffles assembled
  - Flight stimulation lamp assemblies complete
  - Flight dark shutter and diffuser shutter structures in development

OLI Development Status



EDU Focal Plane Assembly

Flight Mirrors

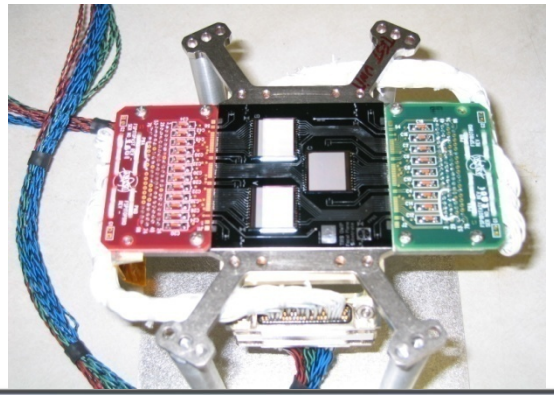


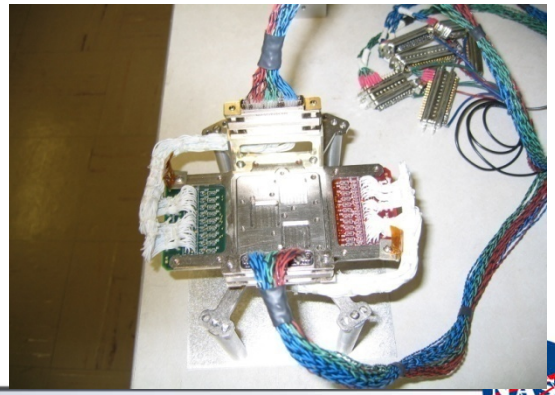
Optical Bench w/flight cables and ground wires

Thermal Infrared Sensor (TIRS)

TIRS Development Status
GSFC In-House Build

- **Focal Plane Array**
  - **Focal Plane Array is beyond the PDR level**
  - **Parallel paths have been initiated to fabricate QWIP detectors**
    - **In-House and Out-of-House**
  - **Multiple QWIP detectors have been fabricated**
    - **Test results demonstrate performance that will meet the TIRS instrument noise requirements.**
  - **Pathfinder unit is assembled**
    - **All QWIP detectors have been attached.**
  - **A TRL 6 Assessment Review was conducted prior to the TIRS PDR**
    - **TIRS FPA is expected to reach TRL 6 by September, 2009**
    - **Considered low risk to reach TRL 6 and deliver on schedule to TIRS instrument.**





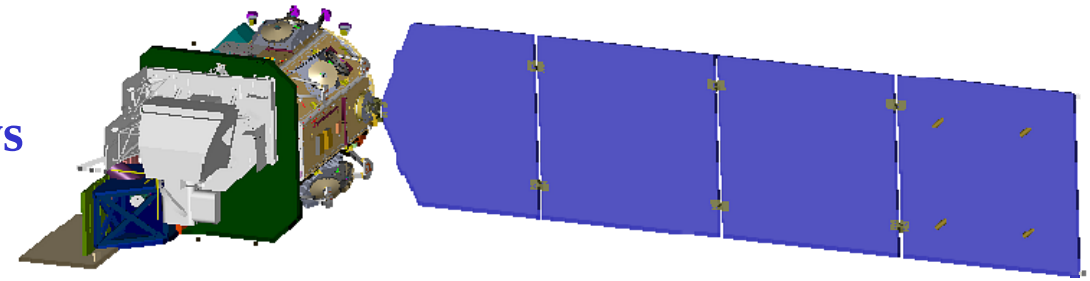
TIRS Development Status

- **Telescope**
  - 4 lens telescope system designed and preliminary analysis completed
  - Engineering Lenses and filters procured and delivered in July for assembly into Engineering Model telescope
- **Mechanisms**
  - Aperture Cover and EarthShield deployment mechanisms preliminary design complete
  - Scene Select Mechanism preliminary design and analysis complete
    - Long Lead 23 bit encoder procurement awarded.
  - Breadboard of Mechanisms Control Electronics under development
- **Electronics**
  - Preliminary Design and analyses nearly completed
    - Schematic reviews planned for end of June
  - Long lead items such as diodes and FPGAs on order
- **Cryocooler**
  - Awarded to BATC on June 15th

LDCM Spacecraft

Spacecraft Development Status
General Dynamics Advanced Information Systems

- 95% of subcontracts definitized
- Commercial Item Design Reviews
  - PDRs completed
  - CDRs underway



- FSW builds underway (C&DH and ACS)
- Engineering Model Electronics Board Fabrication underway
- Instrument Deck on order
  - Mechanical accommodations defined accommodating both OLI and TIRS

Mission Operations Element (MOE) and Operations

MOE and Operations Development Status

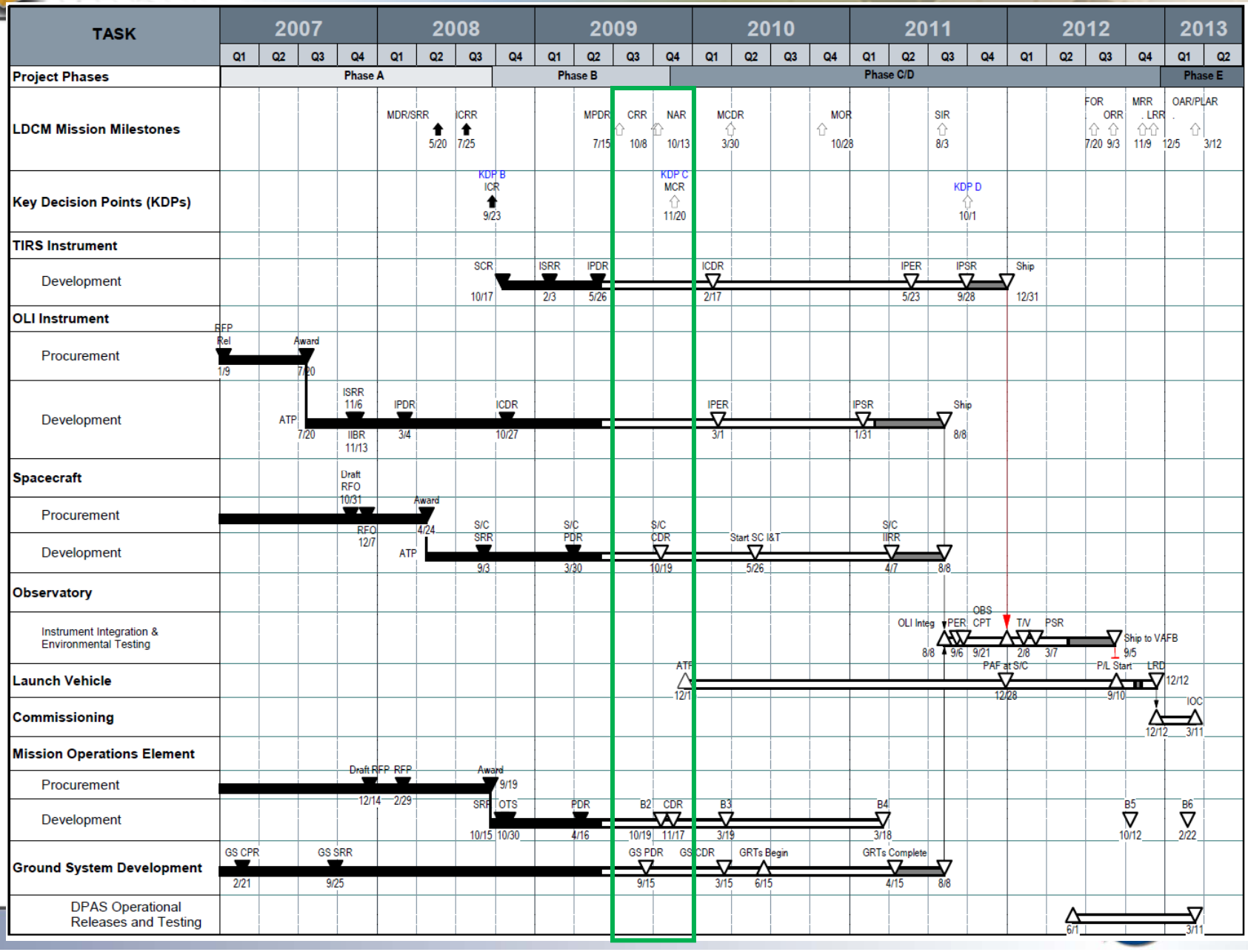
- **Mission Operations Element (MOE), The Hammer's Company**
  - **PDR completed in April**
    - **"Overall, the LDCM MOE PDR was excellent. Much of the PDR technical materials presented were at a CDR level…." – excerpt form review panel summary report.**
  - **Build 2 release scheduled for Oct.**
    - **90% of MOE capability**

- **Mission Ops Center**
  - **Keeping Mission Operations Center at GSFC after completion of on-orbit verification**
    - **Original plan to move MOC to USGS/EROS in Sioux Falls after on-orbit verification**
  - **Established development lab to host early releases of MOE and database**
  - **Transitioning to MOC area July-August, 2009**

- **Flight Operations Team (FOT)**
  - **USGS canceled Flight Operations Team solicitation**
    - **Requested NASA to procure FOT as a reimbursable**
  - **Task order awarded May 1, 2009**
    - **2 of initial 6 full time FOT on staff**

Programmatic Status

Preliminary Master Schedule



Mission PDR

- **LDCM Mission Preliminary Design Review**
  - **Scheduled for July 14-17, 2009**

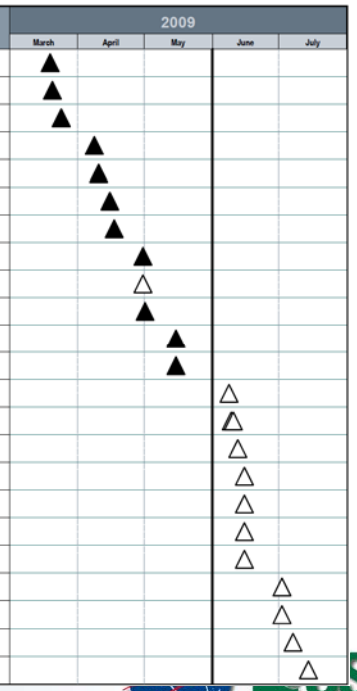
- **What Is Mission PDR**
  - **The PDR demonstrates that the overall program preliminary design meets all requirements with acceptable risk and within the cost and schedule constraints and establishes the basis for proceeding with detailed design. It shows that the correct design options have been selected, interfaces have been identified, and verification methods have been described. Full baseline cost and schedules, as well as all risk assessment, management systems, and metrics are presented.**
    (NASA Space Flight Program and Project Management Requirements (7120.5D)

- **Chaired by Standing Review Board**

Mission PDR

- **Preparations for Mission PDR**
  - **Element PDRs (except for ground system) completed**
    - **GS PDR planned for September**
  - **Terms of Reference for PDR success criteria and PDR Agenda established with Standing Review Board**
  - **Deliverable documents submitted to SRB by July 2**
    - **Approximately 23 documents must be updated and baselined**
  - **Chart "Flip-Thru" June 9-10**
  - **Dry Run June 15-18**

	TASK	Start Date	End Date
1	JCL Kickoff with HQ CAD/PA&E	3/19/09	3/19/09
2	Level 1 Requirements revisions sent to HQ for Approval	3/20/09	3/20/09
3	Mission PDR Kickoff Meeting	3/24/09	3/24/09
4	Initiate JCL working meetings w/ CAD/PA&E	4/8/09	4/8/09
5	Draft ToR Sent to Project from SRB	4/10/09	4/10/09
6	Updates to Mission PDR Agenda due from Element Leads	4/15/09	4/15/09
7	Draft version of new 7120.5 Docs due to internal circulation	4/17/09	4/17/09
8	Send revised ToR back to SRB	4/30/09	4/30/09
9	Checkpoint Review of Level 1 Requirements Status/Content	4/30/09	4/30/09
10	Mission PDR/NAR Agenda finalized internally and sent to SRB	5/1/09	5/1/09
11	CCR's due for all LDCM documents required for PDR	5/15/09	5/15/09
12	ToR Signed by SRB Chair and submitted for approval	5/15/09	5/15/09
13	Preliminary mission PDR Dry Run Charts due	6/8/09	6/8/09
14	Mission PDR Chart Flip Thru (2-days)	6/9/09	6/10/09
15	CCR's approved by CCB for all required documents for PDR	6/12/09	6/12/09
16	Mission CADRE input due to HQ	6/15/09	6/15/09
17	Begin Upload of Final Documents to SRB as they are approved by	6/15/09	6/15/09
18	Final Dry Run Charts Due	6/15/09	6/15/09
19	Mission PDR Dry Run (2 1/2 day review)	6/15/09	6/15/09
20	Complete Upload of Final LDCM documents to SRB	7/2/09	7/2/09
21	Final Mission PDR Charts due	7/2/09	7/2/09
22	Upload of Final Mission PDR charts to SRB	7/7/09	7/7/09
23	Mission PDR (4 day review)	7/14/09	7/14/09



Road To Confirmation

- **Mission Confirmation**
  - **NASA commits to Congress cost and schedule**
  - **Proceed into Project Life Cycle Phase C**

- **Confirmation process begins in earnest with Mission PDR and concludes with Key Decision Point–C meeting with Agency Program Management Council**

- **Part of confirmation process is the Non-Advocate Review**
  - **NAR provides Agency management with an independent assessment of the readiness of the project to proceed to implementation.**
  - **LDCM NAR will be conducted separate from Mission PDR (10/13-14)**

- **As part of the NAR preparations Project must generate a Joint Confidence Level Estimate**

Road To Confirmation
Joint Confidence Level Estimate

- **New policy from acting administrator Chris Scolese:**
  - **All space flight and information technology programs shall develop a joint cost and schedule probabilistic analysis and be baselined or rebaselined and budgeted such that there is a 70% probability of achieving the stated life cycle cost and launch schedule**
- **LDCM among first projects to proceed with implementing JCL process in the Agency**
- **Goal of JCL process is for NASA to uphold it's stated obligations to its stakeholders**
- **JCL is submitted to SRB for review**
  - **SRB reviews risks and associated impacts**
    - **Could recommend additional risks or adjustments to impacts**
    - **SRB will have its own independent estimate as a check, but could choose not to use it**
- **At Agency PMC, only one 70% confidence estimate will be presented based on JCL (unlike the 5 independent estimates at Initial Confirmation)**

Basic Premise – Evaluate Schedule And Budget Impacts By Assessing Risks Against A Resource Loaded Schedule

Road To Confirmation

• LDCM PDR	July 13-17, 2009
• One- Pager to AA	July 21, 2009
• SRB Risk List Inputs	July 27, 2009
• Cost & Schedule JCL Meeting w/Project	August 24, 2009
• Initial JCL Models	August 24, 2009
• Final Project cost est., schedule risk assessment, and JCL	Sept. 15, 2009
• SRB Assessment of Project JCL	Sept.- Oct, 2009
• Final Project JCL Validation w/ SRB	October 5, 2009
• SRB- NAR Site Visit	October 13-14, 2009
• Programmatic Analysis Out-Brief to SRB	October 15, 2009
• Project/SRB Discussion & Out-brief	October 15, 2009
• Briefing to GSFC CMC	November 3, 2009
• Briefing to SMD PMC	November 13, 2009
• Submit briefing package to APMC	November 17, 200
• Briefing to APMC- KDP- C	November 20, 2009

Conclusion

By End Of November

LDCM will be confirmed

Project officially in Phase C

Mission CDR scheduled for March 2010