

Landsat Data Continuity Mission

January 9, 2007

Bill Ochs

LDCM Project Manager

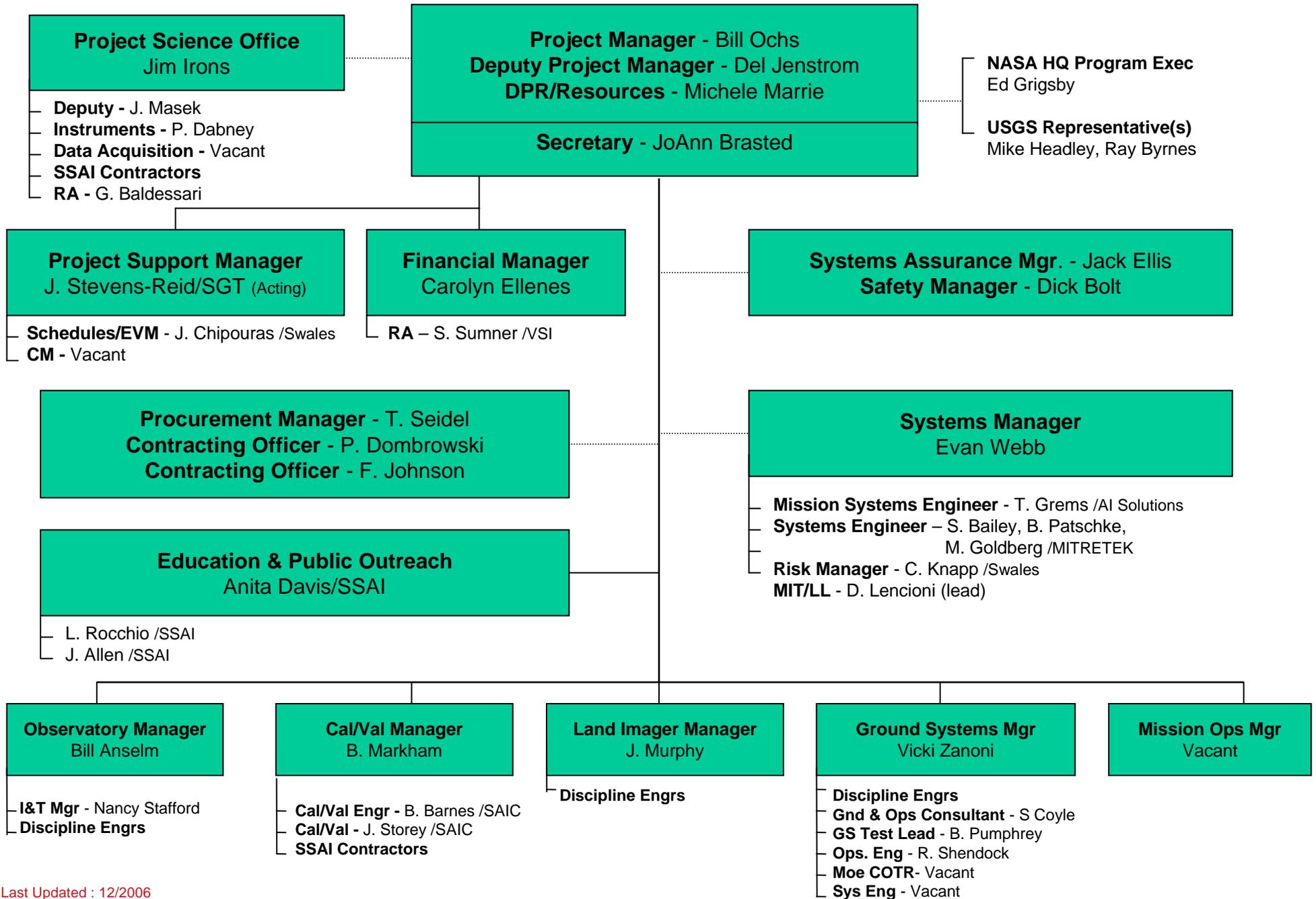


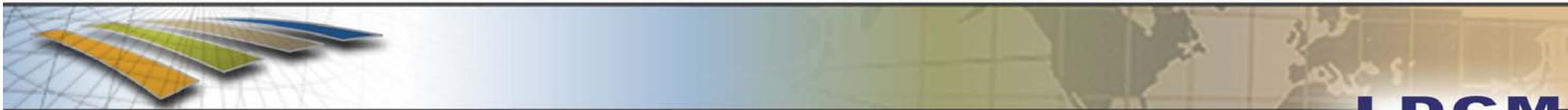
Topics

LDCM

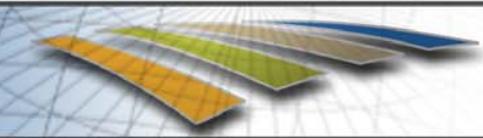
- **NASA LDCM Organization**
- **LDCM History**
- **LDCM Observatory Overview, Operations Concept, Requirements**
- **Operational Land Imager Procurement**
- **Spacecraft and Mission Operations Element Procurements**
- **NASA/USGS Partnership**
- **LDCM Launch Readiness Date**

LANDSAT DATA CONTINUITY MISSION - CODE 427



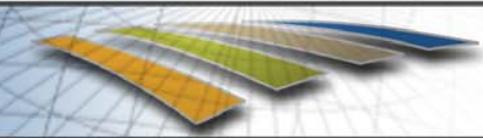


LDCM History

Landsat History

LDCM

- **Landsat 7 launch on April 15, 1999**
- **Release of LDCM Data Buy RFI - June, 1999**
- **Earth Observing-1 satellite launch - Nov. 21, 2000**
 - **Advanced Land Imager (ALI) aboard**
- **Release of Data Buy Implementation Phase RFP on Jan. 06, 2003**
- **In Sept. 2003, LDCM Data Buy solicitation cancelled**
 - **Vendor failed to take an equity stake required to offer a true public-private partnership**
 - **Gov't accepted all the risk**
- **In December 2003, EOP established the Landsat/NextView Interagency Working Group (IWG) to study:**
 - **Combining LDCM and National Geospatial-Intelligence Agency (NGA) NextView requirements**
 - **USG owned/operated LDCM system**
 - **Public/Private partnership for LDCM system**
 - **Hosted LDCM payload on USG/Commercial satellites**

LDCM History

LDCM

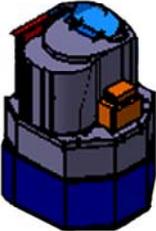
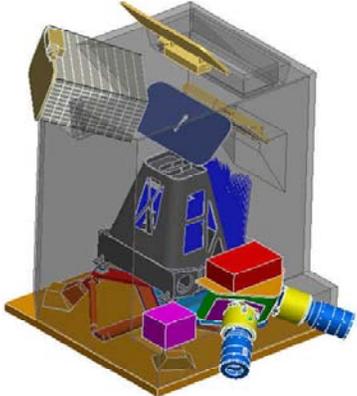
- **Memorandum from EOP/OSTP issued on Aug. 13, 2004 on Landsat Data Continuity Strategy**
 - Summarizes outcome of interagency discussions on continuity of Landsat data
 - Departments of Defense, the Interior, Commerce, and NASA have agreed to:
 - Transition Landsat measurements to an operational environment on NPOESS
 - Plan to incorporate a Landsat imager on the first NPOESS spacecraft
 - Further assess options to mitigate the risks to data continuity prior to the first NPOESS-Landsat mission, including a “bridge mission”

- **Meeting with EOP/OSTP on Nov. 22-23, 2004 to provide LDCM Status Update**
 - Departments of Defense, the Interior, Commerce, and NASA directed to incorporate OLI onto NPOESS 2130 S/C
 - No longer continue to pursue “bridge mission”

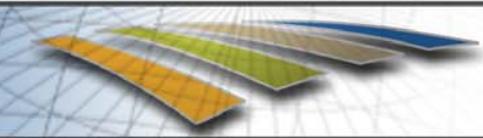
- **OLI NPOESS accommodation study conducted between January and May of 2005**
 - Included GSFC, IPO, NGST, USGS

LDCM History

LDCM

	Free Flyer Concept	NPOESS 04/04 Concept	NPOESS 01/05 Concept
			
Mass	170Kg	250Kg	400Kg
Volume	1.3m ³	1.9m ³	4.3m ³
Power	400 W	450 W	425 W
Data Rate	1.8 terabytes per day	1.8 terabytes per day	2.0 terabytes per day
Orbit	705km	828km	828km
Technical			
Cost			
Schedule			

* Includes Solid State Recorder and all accommodation hardware where required.

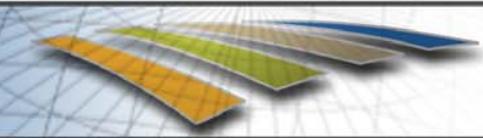
LDCM History

LDCM

- **July 2005, NASA HQ met with EOP/OSTP to explain complexities of flying on NPOESS**

- **Dec. 2005, EOP/OSTP issued memorandum on Landsat Data Continuity Strategy Adjustment**
 - Landsat instrument no longer on NPOESS
 - NASA to acquire single Landsat mission and deliver data to USGS
 - USGS will operate Landsat and collect, process, distribute, and archive Landsat data

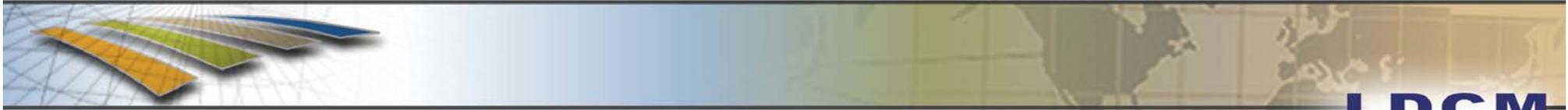
- **Jan. 2006, Memorandum from NASA HQ on LDCM Procurement Strategy**
 - **Procure a free-flyer spacecraft (Firm Fixed Price)**
 - Single prime mission contractor responsible for:
 - Spacecraft
 - Instrument
 - Observatory I&T/Launch Site Support
 - Mission Operations Element
 - On-Orbit Sustaining Engineering

Landsat satellite imagery showing a grid of colored swatches (yellow, green, blue) over a globe.

LDCM History

LDCM

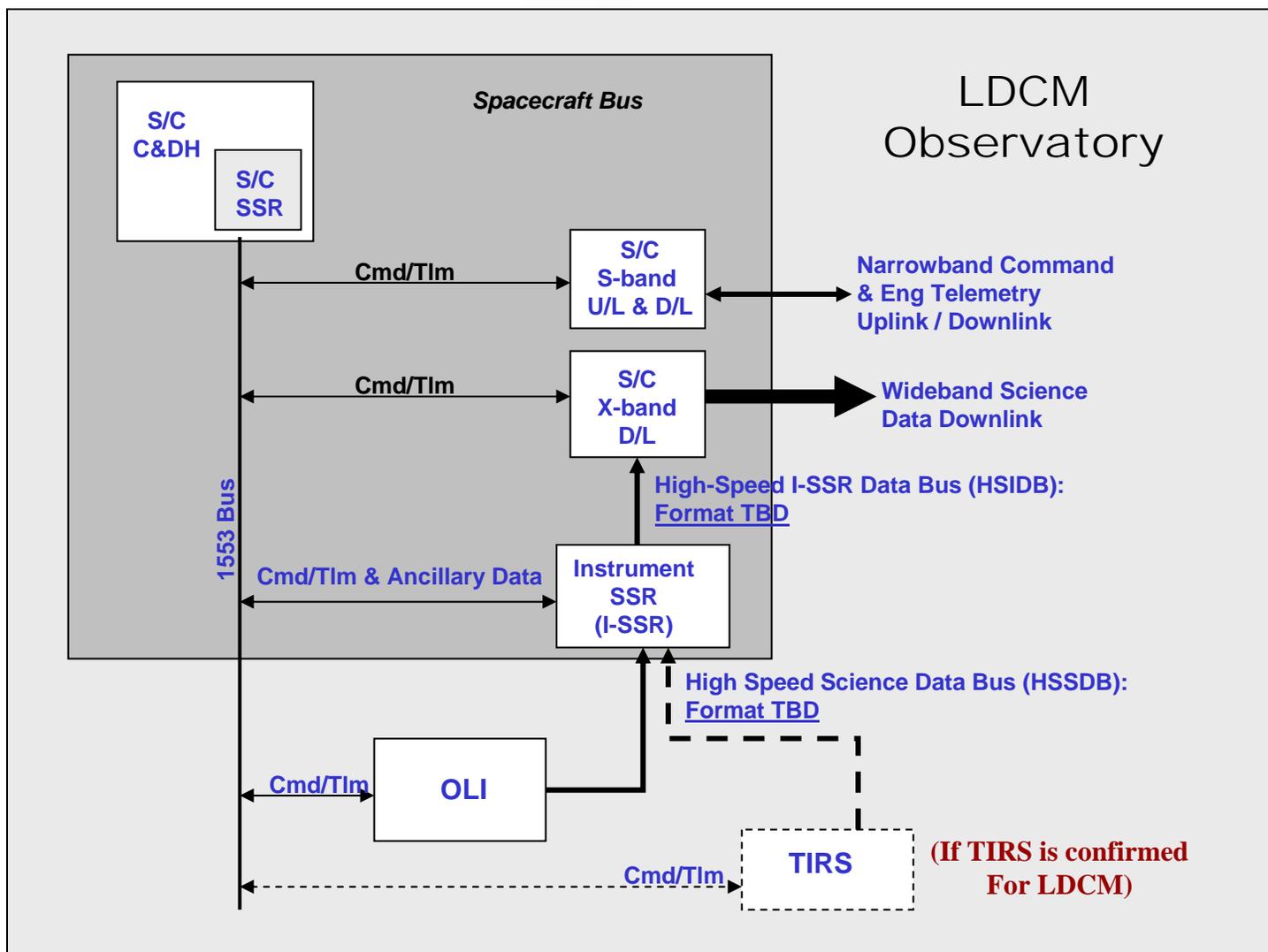
- **Sept. 2006, LDCM Procurement Strategy Change**
 - **Multiple contracts**
 - Operational Land Imager (OLI)
 - Multi-spectral, moderate resolution (circa 30m), visible and near-infrared sensor capable of providing on average 400 Landsat scenes (177km x 170km) per day to US archive
 - Spacecraft using Rapid Spacecraft Development Office (RSDO) catalog contract
 - RSDO issued an “On-Ramp” to the RSDO Rapid II catalog in fall of 2006 to maximize competition for the LDCM spacecraft procurement
 - Mission Operations Element (MOE).
 - Mission scheduling (not to include long-term and daily image collection planning and prioritization)
 - Command and control
 - Long-term trending and analysis
 - Flight dynamics capabilities



LDCM Observatory Overview, Operations Concept, and Requirements

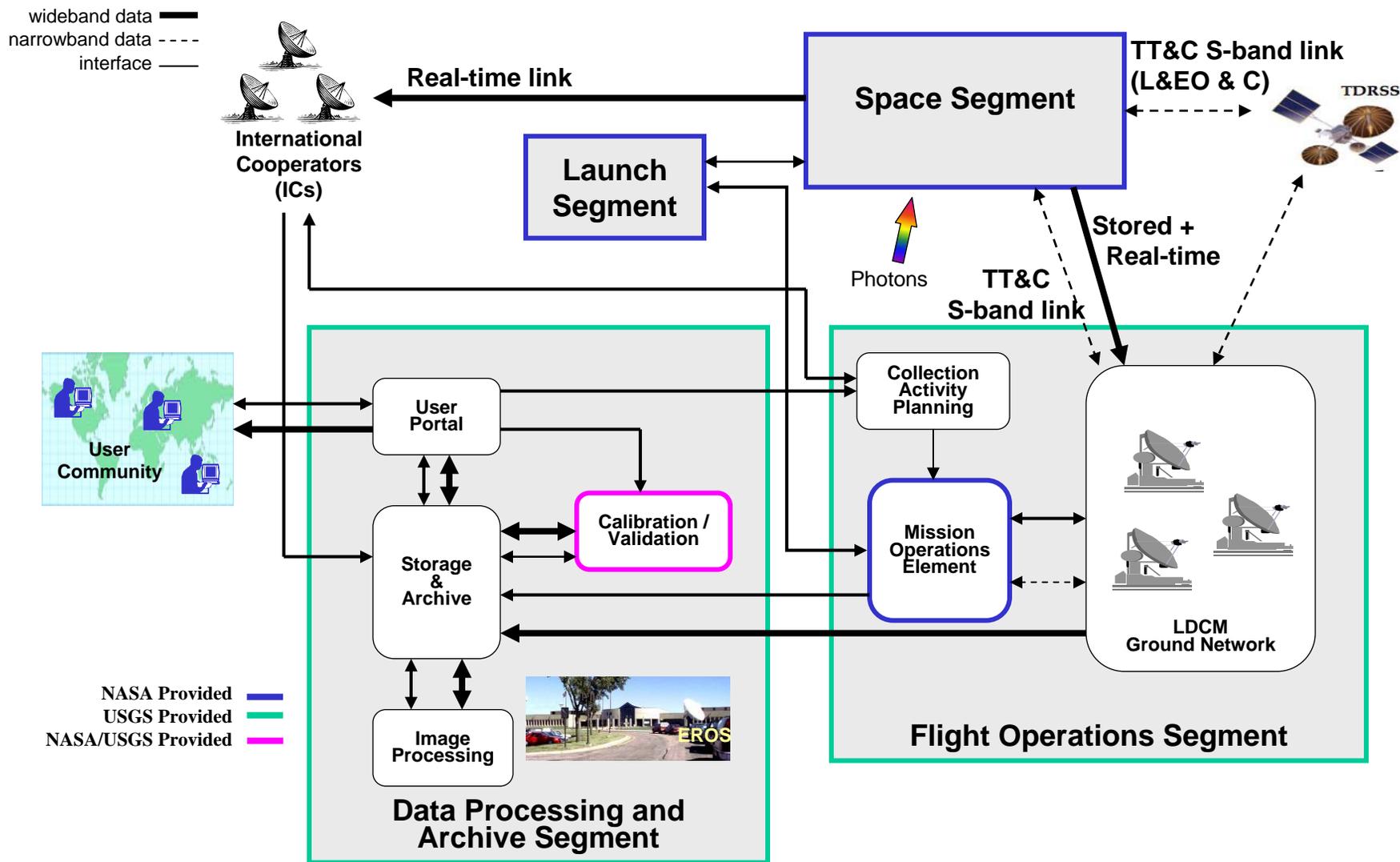
LDCM Observatory Overview

LDCM



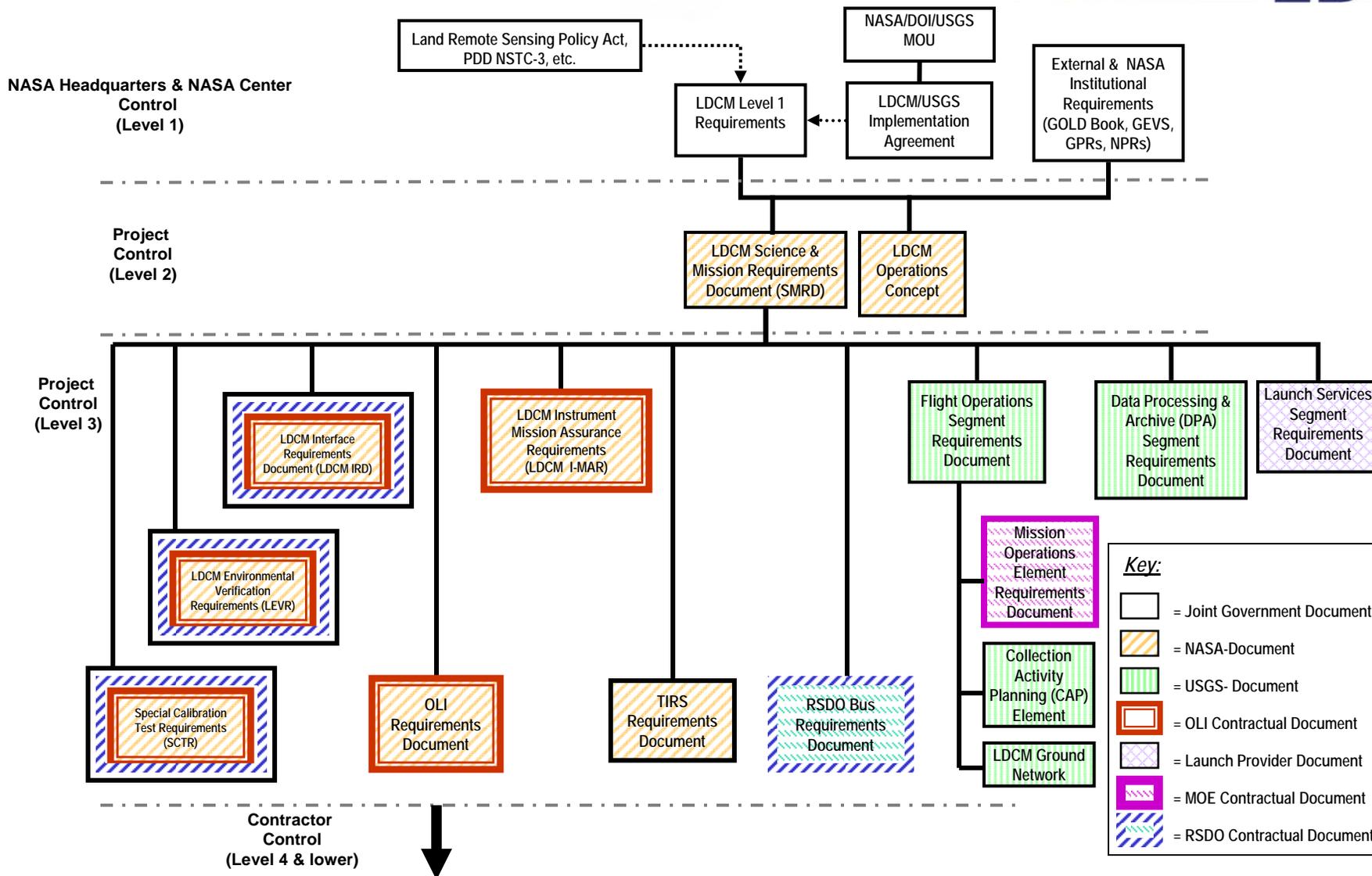
LDCM Operations Concept

LDCM



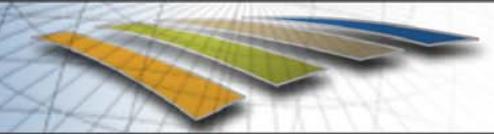
LDCM Requirements Hierarchy

LDCM





Operational Land Imager Procurement



OLI Requirements

LDCM

- **OLI is a multi-spectral, moderate resolution (30m GSD), visible and near-infrared sensor capable of providing on average 400 Landsat scenes (185km x 180km) per day to US archive**
 - **4 visible bands (costal/aerosol, red, green, blue)**
 - **1 near-infrared (IR) band**
 - **2 shortwave IR bands**
 - **1 cirrus cloud detection band**
 - **1 panchromatic band at higher resolution (15m) for image sharpening**
- **OLI requirements are based on original LDCM data specification, therefore the sensor should be capable of providing data with the quality of previous Landsat VNIR/SWIR data**

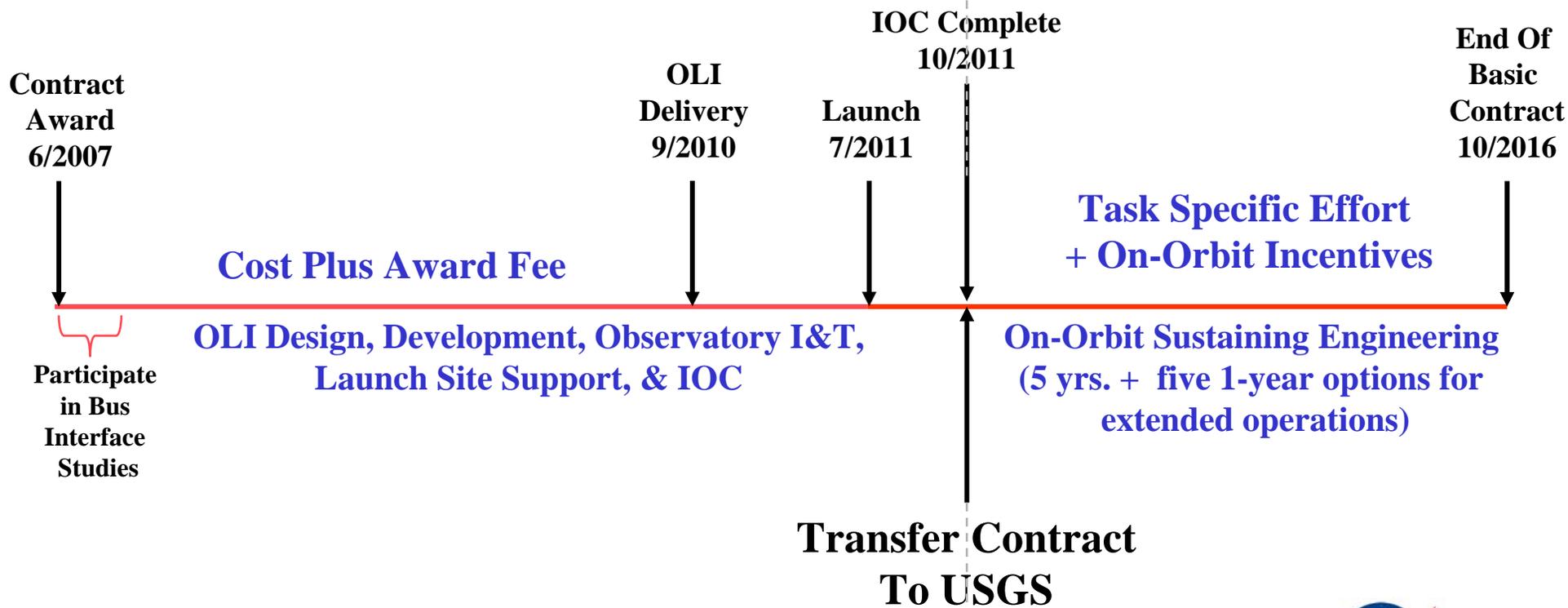
OLI Contract Overview

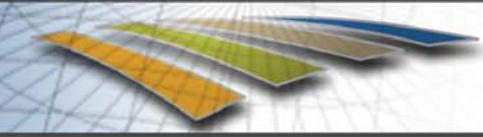
LDCM

OLI Contract Instrument, Observatory I&T/Launch Site Support, & On-Orbit Sustaining Engineering

Mission Responsibility - NASA

Mission Responsibility - USGS

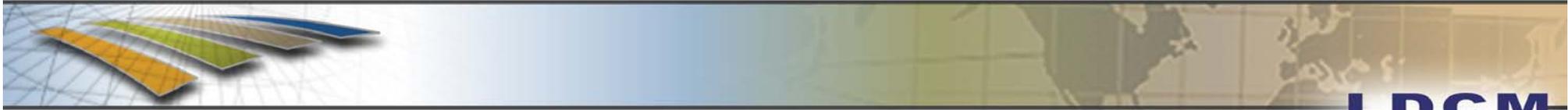




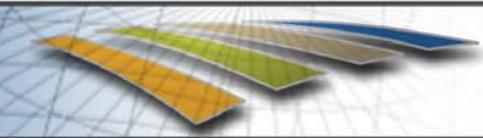
OLI Procurement Timeline

LDCM

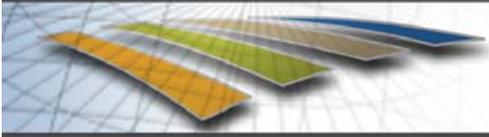
Procurement Activity	Completion Date
Industry Day	12/11/06
RFP Release	1/8/07
Proposals Due	2/22/07 (45 days after RFP release)
Initial Evaluation, Discussions, Request For Final Proposals, Final Evaluation	6/1/07
Award	6/11/07



Spacecraft and MOE Procurements

 **LDCM Spacecraft****LDCM****• RSDO S/C**

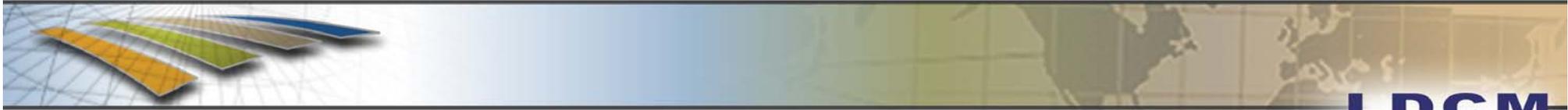
- **“On-Ramp” to Rapid II Catalog to permit all qualified spacecraft vendors to be added to the current RSDO catalog – On-Ramp Closed Dec. 15th**
 - New Rapid II catalog available – March 2007
- **Multiple vendors will be selected for 4 month study – May 2007**
 - Study topics include communications architecture, instrument interface, mission operation element interface, I&T planning, MAR/”Golden Rules”/LDCM Environmental Verification Requirements, etc.
- **Final Request For Offer release and selection after study phase**
 - Contract includes:
 - Spacecraft
 - Observatory I&T
 - Launch Site Activities
 - On-Orbit Sustaining Engineering
 - 5 1-year options for additional On-Orbit Sustaining Engineering
- **Spacecraft under contract – Nov. 2007**



Mission Operations Element (MOE)

LDCM

- **Contract includes:**
 - **Command & Control, Mission Scheduling, Long-Term Trending and Analysis, and Flight Dynamics capabilities**
 - **Support for Observatory I&T/Launch Site**
 - **On-Orbit Sustaining Engineering**
 - **5 1-year options for additional On-Orbit Sustaining Engineering**
- **RFI was issued on Nov. 22nd**
 - **Requested info included:**
 - Reference architecture, use of COTS, approaches to I&T with spacecraft and ops team, etc.
 - **Responses received Dec. 14th**
- **RFP released in early summer**
 - **Detailed schedule is still under review**
- **MOE under contract – Dec. 2007**
 - **Detailed schedule is still under review**



NASA/USGS Partnership

NASA/USGS Partnership

LDCM

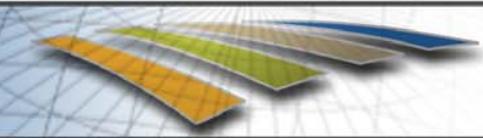
- **NASA and DOI USGS are identified as the Landsat Program Management team under authority of U.S. Code Title 15, Chapter 82, “Land Remote Sensing Policy” and Presidential Decision Directive NSTC-3, “Land Remote Sensing Strategy,”**

- **NASA Responsibilities**
 - **Development of**
 - Space Segment, Launch Segment, and the Mission Operations Element (MOE)
 - **Serve as the system integrator for the entire LDCM and lead the missions systems engineering effort**
 - **Lead Mission Operations through the completion of the on-orbit checkout period**

- **USGS Responsibilities**
 - **Development of**
 - Ground System (comprised of the Flight Operations and Data Processing and Archive Segments), excluding procurement of the MOE
 - **LDCM mission operations, after the completion of the on-orbit checkout period**
 - **Accept and execute all responsibilities associated with the transfer of the LDCM Operational Land Imager (OLI) instrument, spacecraft bus and Mission Operations Element contracts from NASA following on-orbit acceptance of the LDCM system including assuming contract management**



Launch Readiness Date

 Launch Readiness Date LDCM

- **Targeted Launch Readiness Date**
 - **July 2011**

- **Critical Path to Launch**
 - **Instrument Delivery**
 - 39 mos. after Contract Award (9/2010)
 - **Challenge**
 - Enable an instrument in delivery in 39 months but still meeting all the technical and programmatic requirements defined in the RFP package
 - Schedule is only attainable through a strong partnership between industry and NASA