LAND SATELLITES DATA SYSTEM (LSDS) 
PROGRAM WORK BREAKDOWN STRUCTURE 
(PGWBS)

Version 2.0 
July 2014
Executive Summary

This document describes the Program Work Breakdown Structure (PgWBS) for the Land Satellites Data System (LSDS) responsibilities appointed to the United States Geological Survey (USGS) by the U.S. Office of Science and Technology Policy (OSTP). The PgWBS is intended to structurally illustrate a clear understanding of the Projects and Tasks within the Program.

This document is controlled by the LSDS Configuration Control Board (CCB). Please submit changes to this document, as well as supportive material justifying the proposed changes, via Change Request (CR) to the Process and Change Management Tool.
## Document History

<table>
<thead>
<tr>
<th>Document Number</th>
<th>Document Version</th>
<th>Publication Date</th>
<th>Change Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>LDS-477</td>
<td>Version 1.0</td>
<td>May 2013</td>
<td>DCR9560</td>
</tr>
<tr>
<td>LDS-477</td>
<td>Version 2.0</td>
<td>July 2014</td>
<td>CR11307</td>
</tr>
</tbody>
</table>
Contents

Section 1  PgWBS Definition ................................................................. 1
  1.1 Graphical PgWBS ........................................................................ 1
  1.2 PgWBS Outline ........................................................................... 1

Section 2  Land Satellites Data System (LSDS) ..................................... 3
  2.1 LSDS Program Office (LPO) Project ........................................... 3
    2.1.1 LSDS Programmatic Management ....................................... 3
    2.1.2 LSDS IT Investment Management ....................................... 3
    2.1.3 LSDS Process and Tools ..................................................... 3
    2.1.4 LSDS Strategic Initiatives .................................................. 3
    2.1.5 LSDS International Partnerships ......................................... 4
  2.2 LSDS Science Research and Development (LSRD) Project .......... 4
    2.2.1 LSRD Science Office (LSO) ................................................. 4
    2.2.2 LSRD Science Technology Investigations ........................... 4
    2.2.3 LSRD Science Application/Product Research ....................... 5
    2.2.4 LSRD Education & Outreach .............................................. 5
  2.3 LSDS Flight and Ground Operations Project ................................ 5
    2.3.1 Flight and Ground Operations PM ....................................... 5
    2.3.2 Flight Operations ............................................................. 5
    2.3.3 Ground Operations .......................................................... 6
  2.4 Flight and Ground Sustaining Engineering Project ...................... 6
    2.4.1 Sustaining Engineering Project Management ........................ 6
    2.4.2 Flight and Ground Mission Operations Center Sustaining .... 6
    2.4.3 Landsat Ground Networks Sustaining ................................... 7
    2.4.4 Landsat Data Production Sustaining Engineering ................... 7
    2.4.5 Calibration / Validation .................................................... 7
  2.5 LSDS Archive / Access Operations and Maintenance Project ....... 8
    2.5.1 LSDS Archive / Access Operations and Maintenance Management .. 8
    2.5.2 LSDS Archive / Access Operations and Maintenance Operations... 8
    2.5.3 LSDS Archive / Access Operations and Maintenance Technical Investigations .................................................. 8

References ............................................................................................ 9
List of Figures

Figure 1-1. Graphical LSDS PgWBS .......................................................... 1

List of Tables

Table 1-1. LSDS PgWBS Outline ............................................................... 2
Section 1  PgWBS Definition

1.1 Graphical PgWBS
The graphical Program Work Breakdown Structure (PgWBS) is a deliverable-oriented hierarchical decomposition of the work to be executed by the program team to accomplish the project objectives.

![Graphical LSDS PgWBS](image)

Figure 1-1. Graphical LSDS PgWBS

1.2 PgWBS Outline
The following is the PgWBS by level:
- Level 1 = Program = Land Satellites Data System (LSDS)
- Level 2 = Project
- Level 3 = Task

<table>
<thead>
<tr>
<th>Level 1 (Program)</th>
<th>Level 2 (Project)</th>
<th>Level 3 (Task)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED00 - Land Satellites Data System (LSDS)</td>
<td>EDM - LSDS Program Office (LPO) Project</td>
<td>1 LSDS Programmatic Management</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 LSDS IT Investment Management</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 LSDS Process and Tools</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 LSDS Strategic Initiatives</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 LSDS International Partnerships</td>
</tr>
<tr>
<td></td>
<td>EDK - LSDS Science Research and Development (LSRD) Project</td>
<td>1 LSRD Science Office (LSO)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 LSRD Science Technology Investigations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 LSRD Science Application/Product Research</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 LSRD Education &amp; Outreach</td>
</tr>
<tr>
<td></td>
<td>EDG - LSDS Operations and Maintenance (O&amp;M) Project</td>
<td>1 Flight and Ground Operations PM Task</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 Flight Operations Task</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 Ground Operations Task</td>
</tr>
<tr>
<td></td>
<td>FMQ - LSDS Flight and Ground Sustaining Engineering Project</td>
<td>1 Sustaining Engineering Project Management Task</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 Flight and Ground Mission Operations Center Sustaining Task</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 Landsat Ground Networks Sustaining Task</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 Landsat Data Production Sustaining Engineering Task</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 Calibration / Validation</td>
</tr>
<tr>
<td></td>
<td>FMY - LSDS Archive / Access Operations and Maintenance Project</td>
<td>1 LSDS Archive / Access Operations and Maintenance Management</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 LSDS Archive / Access Operations and Maintenance Operations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 LSDS Archive / Access Operations and Maintenance Management Technical Investigations</td>
</tr>
</tbody>
</table>

Table 1-1. LSDS PgWBS Outline
2.1 LSDS Program Office (LPO) Project

The LSDS Program Office (LPO) Project defines and implements best practices across the LSDS Program. Projects receive assistance and shared support to facilitate communication and effective common practices wherever possible. External contracts are used where special short-term expertise is required, as in several Capital Planning and Investment Control (CPIC) artifacts and related processes. Maturity and effectiveness of practices is evaluated and improvements identified for potential implementation. Future mission planning and development necessary to prepare for Authorization To Proceed (ATP) is provided in LPO Program Management & Planning.

2.1.1 LSDS Programmatic Management

LSDS Programmatic Management contains the work to execute the policies, procedures, and systems used to plan, schedule, budget, and measure performance of the LSDS Program and the LPO. This includes program and portfolio activities at the LSDS program level and project management activities at the LPO project level.

2.1.2 LSDS IT Investment Management

The LSDS IT Investment Management Task involves managing the scope of the LSDS IT Investment based on the USGS IT Investment Framework which includes DOI Capital Planning and Investment Control (CPIC) processes as well as IT Security processes.

2.1.3 LSDS Process and Tools

LSDS Process and Tools contains the work to develop and maintain the policies, procedures, and systems used to plan, schedule, budget, and measure performance of the LSDS Program and LSDS Projects based on industry standards such as the Project Management Institute, Inc. (PMI) Standard for Program Management and Project Management Body of Knowledge (PMBOK), as well as the Department of the Interior (DOI) Project Planning Standards.

2.1.4 LSDS Strategic Initiatives
2.1.5 LDS International Partnerships

The LDS International Partnerships task includes the efforts to partner with a constantly evolving group of International Cooperators (IC’s) who downlink and archive Landsat data as well as who form an alliance for reciprocal strategic benefits. This partnership requires regular coordination and collaboration to fully realize these benefits. Many times these activities necessitate the development and maintenance of agreements requiring coordination across multiple government departments and agencies, such as the U.S. State Department and foreign organizations.

2.2 LDS Science Research and Development (LSRD) Project

The Land Satellites Data System (LDS) Science Research & Development (LSRD) Project provides science consultation and support across the formulation, development, and operations phases of the Landsat missions. The scope of activities executed by this project includes support of the Landsat Science Team (LST), undertaking research and development in support of ground systems development, conducting and evaluating technology investigations related to new sensor and science data processing capabilities, performing algorithm development and validation for the generation of advanced science data products to enable monitoring of land surface change, the purchase of equipment in support of developing advanced science data products and conducting education and public outreach to communicate mission objectives, capabilities, and accomplishments.

2.2.1 LSRD Science Office (LSO)

LSRD Science Office provides technical administration services to the Landsat Science Team (LST). The LSRD function works in close coordination with the LDS Development and the LDS Operations & Maintenance and Sustaining Engineering projects to ensure that the LDS ground systems are successful in the collection, archive, production, and distribution of high quality science data to the broadest possible user community to enable monitoring and quantifying changes to the Earth’s land surface. This requires continuous dialog with the science data user community in order to understand and satisfy their evolving needs for timely, high quality data.

2.2.2 LSRD Science Technology Investigations

LSRD Science Technology Investigations conducts research and investigations to address specific science questions, technical challenges, or issues identified by the
data user community and/or the instruments and ground system Operations & Maintenance staff. The technical approach to these investigations includes hypothesis formulation and testing, algorithm development, generation of prototype products, demonstrations of the use of algorithms and products in applied research, and publication of results at conferences, symposia, and in peer reviewed journals.

2.2.3 LSRD Science Application/Product Research

LSRD Science Application/Product Research conducts science applications and product research to advance the development of information products for scientific research and land management applications.

2.2.4 LSRD Education & Outreach

LSRD Education & Outreach activities serve as mechanisms by which to increase awareness of data and information availability and to demonstrate their contributions to societal benefits.

2.3 LSDS Flight and Ground Operations Project

The LSDS Flight and Ground Operations Project is responsible for operating and maintaining the active Landsat satellite missions; routinely receiving data from these missions; and archiving, processing, and distributing data from the current as well as historical Landsat missions. This responsibility includes daily management and long-term sustainment of all operations, maintenance, and engineering for the Landsat spacecraft systems, Flight Operations located in Maryland, and Landsat Ground Segment (LGS) Operations, located at the USGS EROS in Sioux Falls, SD.

2.3.1 Flight and Ground Operations PM

Flight and Ground Operations Project Management includes activities required for overall project management and coordination of Landsat flight operations; data collection and processing support activities; development and maintenance of an EROS Landsat Operations Concept promoting Landsat data availability; managing the Landsat business model; ensuring implementation of the Landsat data policy; ensuring periodic review of contractor performance, project expenses, project risk, and analysis of operations.

2.3.2 Flight Operations

Flight Operations
Landsat Flight Operations includes management of daily Landsat flight operations, which are critical to the health and safety of the satellites; sustaining engineering services for Mission Operations Center systems maintenance; coordination with other NASA missions and flight operations; coordination of acquisition requests from and data delivery to approved international cooperators; and monitoring planning for and execution of the Landsat global mapping strategy.

2.3.3 Ground Operations

Landsat Ground Operations includes Operations staff, which provide U.S. ground station support for command uplinks and downlinks, image downlinks and coordination with the Mission Operation Centers for daily operations of the Landsat missions, archival, processing, and distribution of all active Landsat mission data, which includes Landsat 8 OLI/TIRS, Landsat 7 ETM+, Landsat 4 and 5 TM, and Landsat 1-5 MSS. Maintenance staff provide U.S. ground systems support for systems associated with the ground station, archival, processing, and distribution. This task is also responsible for the general Landsat Project support activities such as data calibration and validation, configuration management, documentation, security, system administration, database administration, software engineering, and systems engineering.

2.4 Flight and Ground Sustaining Engineering Project

The scope of the LSDS Flight and Ground Sustaining Engineering Project is to sustain and enhance the LSDS flight and ground systems. This project includes these activities for the mission operations centers (MOCs), ground networks, data production, and calibration & validation. It also includes the management and engineering activities necessary across these areas.

2.4.1 Sustaining Engineering Project Management

This Project management task is established for broad scope of project management (scope, schedule, and cost) work across the project and the systems engineering activities that matrix across the Mission Operations Center Sustaining Engineering, Landsat Ground Networks sustaining and Landsat Data Production sustaining tasks.

2.4.2 Flight and Ground Mission Operations Center Sustaining

The mission operations center (MOC) sustaining task is established for the scope of work necessary to sustain and enhance the mission operations centers. It involves all activities necessary to manage and sustain the mission operations center systems including mission operations software support and collection activity planning software.
support. Nominally these activities are performed for active missions (currently Landsat 7 and 8).

This task does not include vendor maintenance as it resides within the operations task.

2.4.3 Landsat Ground Networks Sustaining

ED00.FMQ.3

The Landsat Ground Networks (LGN) sustaining task includes all scope necessary to sustain custom code modifications and enhancements to the ground network systems. It also includes future research activities such as optimization of the ground network to research the use of lower cost stations. These activities are nominally performed for active missions (currently Landsat 7 and 8).

For clarification purposes this task does not include replacement of operational hardware. Significant improvements to operational systems are included; for example, new custom features for a demodulator.

2.4.4 Landsat Data Production Sustaining Engineering

ED00.FMQ.4

Landsat data production includes all activities necessary to ingest, inventory, archive, produce, and distribute Landsat data for all missions (active and non-active, currently Landsat 1-8 data). The specific work in this work element includes sustaining the custom software necessary to perform these activities including:

- Ingest data (from raw or L0Ra)
- Subset data
- Full inventory of data
- Process data (to Level 1)
- Calibration / validation functions
- Metrics system
- Mission centric web access

NOTE: The Archive and distribution sustaining functions are allocated to the Archive and Distribution Sustaining Engineering Project. These functions include sustaining the searchable inventory, archive (lowest level data storage), data distribution systems, and user portal / Landsat web site.

2.4.5 Calibration / Validation

ED00.FMQ.5

Includes the scope of work for data calibration and validation, collaborative agreements and grants necessary to calibrate and validate Landsat data.
2.5 LSDS Archive / Access Operations and Maintenance Project

The LSDS Archive/Access Operations and Maintenance Project is responsible for providing archive and access services for the LSDS collections. This includes all labor, management, software, and hardware required for user interfaces, data distribution, and long term data retention. Also included are technical investigations required to drive technologic advancement and ensure that the best-practices are being implemented for efficiencies and risk mitigation.

2.5.1 LSDS Archive / Access Operations and Maintenance Management

This task includes the government oversight for the project.

2.5.2 LSDS Archive / Access Operations and Maintenance Operations

This task includes all operations and maintenance activities required to support the ingest, inventory, management, delivery, and archive of data acquisitions. It also includes all the operations and maintenance activities required to continue the support of external users.

2.5.3 LSDS Archive / Access Operations and Maintenance Technical Investigations

This task includes investigative activities required to promote architecture innovation. This includes design elements which support ingest, archive, and data management. It also includes investigative activities required to promote innovation towards the support of external users.
References

Please see http://landsat.usgs.gov/tools_acronyms_ALL.php for a list of acronyms.