Vera C. Rubin Observatory
Data Management

LVV-P117: LDM-503-19a (All P1a DM requirements verified) Test Plan and Report

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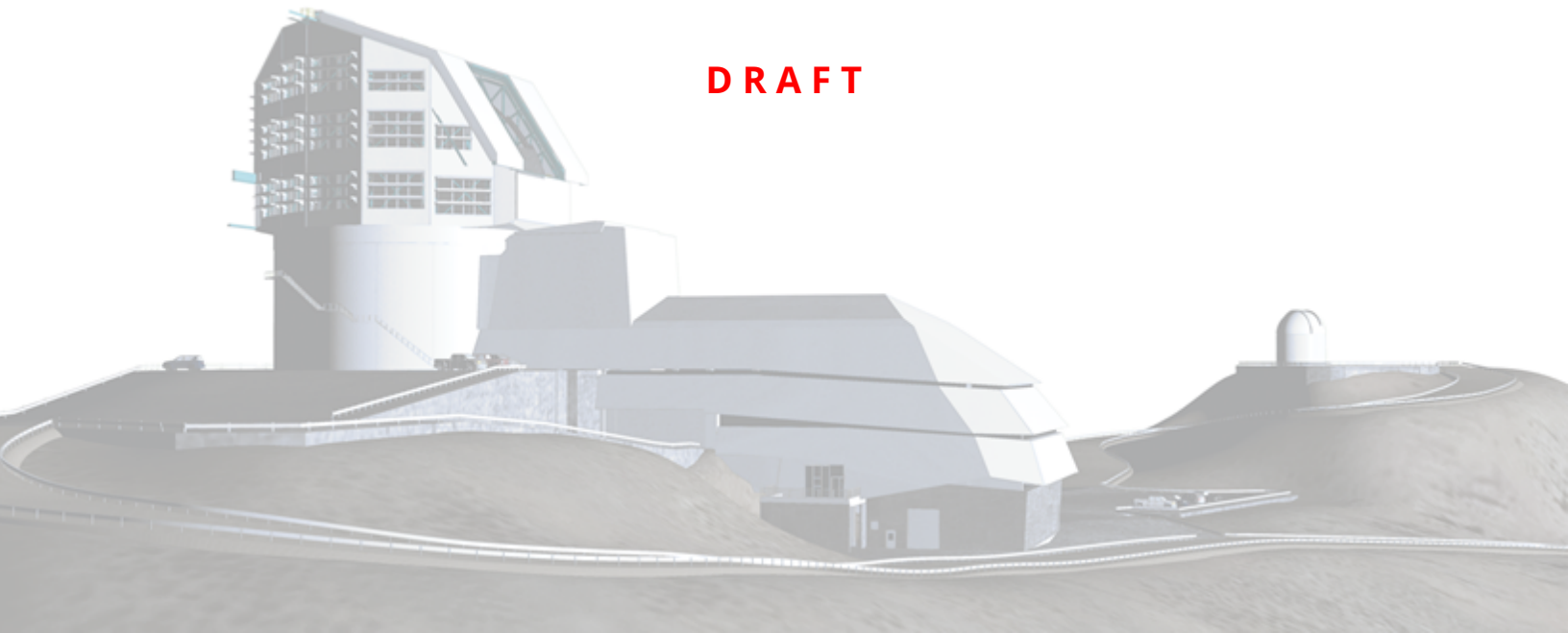
DMTR-412

Latest Revision: 2024-08-28

DRAFT



Abstract

This is the test plan and report for **LDM-503-19a (All P1a DM requirements verified)**, an LSST milestone pertaining to the Data Management Subsystem.
This document is based on content automatically extracted from the Jira test database on 2024-08-28 . The most recent change to the document repository was on 2024-08-28.

Change Record

Version	Date	Description	Owner name
	2023-08-18	First draft	Leanne Guy

Document curator: Leanne Guy
Document source location: `https://github.com/lsst-dm/DMTR-412`
Version from source repository: 0500ed5

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1 Introduction

1.1 Objectives

This DM acceptance test campaign will verify all DM priority 1a requirements that have not been verified as part of prior testing and milestones.

1.2 System Overview

This test campaign is intended to verify that the DM system satisfies all of the priority 1a requirements outlined in the Data Management System Requirements (DMSR; LSE-61), ensuring that we are progressing toward readiness for LSSTCam on-sky observing. Additional DMSR requirements (priorities 1b, 2, and 3) will be verified in later Acceptance Test Campaigns.

Applicable Documents:
LSE-61: Data Management System (DMS) Requirements
LDM-503 Data Management Test Plan
LDM-639: Data Management Acceptance Test Specification

Tests in this campaign will use data products and artifacts from Data Preview 0.2, which consists of DESC Data Challenge 2 (DC2) simulated data reprocessed using the LSST Science Pipelines, on-sky data from auxTel imaging campaigns, precursor data from Subaru+HyperSuprime-Cam (HSC), and camera test-stand data, when appropriate.

1.3 Document Overview

This document was generated from Jira, obtaining the relevant information from the LVV-P117 Jira Test Plan and related Test Cycles (LVV-C275).

Section 1 provides an overview of the test campaign, the system under test (Acceptance), the applicable documentation, and explains how this document is organized. Section 2 provides

additional information about the test plan, like for example the configuration used for this test or related documentation. Section 3 describes the necessary roles and lists the individuals assigned to them.

Section 4 provides a summary of the test results, including an overview in Table 2, an overall assessment statement and suggestions for possible improvements. Section 5 provides detailed results for each step in each test case.

The current status of test plan LVV-P117 in Jira is **Draft** .

1.4 References

[1] **[DMTN-140]**, Comoretto, G., 2021, Documentation Automation for the Verification and Validation of Rubin Observatory Software, URL https://dmtn-140.lsst.io/, Vera C. Rubin Observatory Data Management Technical Note DMTN-140

[2] **[DMTN-178]**, Comoretto, G., 2021, Docsteady Usecases for Rubin Observatory Constructions, URL https://dmtn-178.lsst.io/, Vera C. Rubin Observatory Data Management Technical Note DMTN-178

[3] **[LSE-61]**, Dubois-Felsmann, G., Jenness, T., 2019, Data Management System (DMS) Requirements, URL https://lse-61.lsst.io/, Vera C. Rubin Observatory LSE-61

[4] **[LDM-639]**, Guy, L., Wood-Vasey, W., Bellm, E., et al., 2022, LSST Data Management Acceptance Test Specification, URL https://ldm-639.lsst.io/, Vera C. Rubin Observatory Data Management Controlled Document LDM-639

[5] **[LDM-142]**, Kantor, J., 2017, Network Sizing Model, URL https://ls.st/LDM-142, Vera C. Rubin Observatory LDM-142

[6] **[LDM-503]**, O'Mullane, W., Swinbank, J., Juric, M., et al., 2023, Data Management Test Plan, URL https://ldm-503.lsst.io/, Vera C. Rubin Observatory Data Management Controlled Document LDM-503

[7] **[LSE-160]**, Selvy, B., 2013, Verification and Validation Process, URL https://ls.st/LSE-160, Vera C. Rubin Observatory LSE-160

2 Test Plan Details

2.1 Data Collection

Observing is not required for this test campaign.

2.2 Verification Environment

Most testing will be performed using the Rubin Science Platform (RSP) and the development cluster at the USDF. All tests will use the most recent available version of the Pipelines.

2.3 Related Documentation

No additional documentation provided.

2.4 PMCS Activity

Primavera milestones related to the test campaign:

- None

3 Personnel

The personnel involved in the test campaign is shown in the following table.

	T. Plan LVV-P117 owner:	**Jeffrey Carlin**	
	T. Cycle LVV-C275 owner:	**Jeffrey Carlin**	
Test Cases	**Assigned to**	**Executed by**	**Additional Test Personnel**
LVV-T1612	Jeff Kantor		Ron Lambert (LSST), Greg Thayer (SLAC)
LVV-T1168	Jeff Kantor		Ron Lambert (LSST), Albert Astudillo (REUNA), Mauricio Rojas (CTIO/CISS), Raylex, Coriant, Telefonica contractors
LVV-T1097	Jeff Kantor		Ron Lambert (Rubin Observatory), Kian-Tat Lim (Rubin Observatory), Matt Kollross (NCSA), Tony Johnson (SLAC), Gregg Thayer (SLAC)
LVV-T83	Jim Bosch		
LVV-T85	Robert Lupton		
LVV-T2303	Leanne Guy		
LVV-T33	Kian-Tat Lim		
LVV-T38	Eric Bellm		
LVV-T103	Kian-Tat Lim		
LVV-T45	Eric Bellm		
LVV-T47	Eric Bellm		
LVV-T153	Robert Gruendl		
LVV-T88	Eli Rykoff		
LVV-T89	Eli Rykoff		
LVV-T148	Colin Slater		
LVV-T189	Leanne Guy		
LVV-T197	Robert Gruendl		
LVV-T198	Robert Gruendl		
LVV-T34	Kian-Tat Lim		
LVV-T48	Jim Bosch		
LVV-T1862	Jeffrey Carlin		
LVV-T115	Kian-Tat Lim		
LVV-T1935	Robert Gruendl		
LVV-T1987	Leanne Guy		
LVV-T98	Kian-Tat Lim		

LVV-T1986	Jeffrey Carlin
LVV-T2693	Jeffrey Carlin
LVV-T2699	Jeffrey Carlin
LVV-T154	Colin Slater
LVV-T191	Leanne Guy
LVV-T1250	Jeffrey Carlin
LVV-T1251	Jeffrey Carlin
LVV-T1847	Jeffrey Carlin
LVV-T377	Leanne Guy
LVV-T1846	Jeffrey Carlin
LVV-T1843	Jeffrey Carlin
LVV-T1757	Jeffrey Carlin
LVV-T1842	Jeffrey Carlin
LVV-T1841	Jeffrey Carlin
LVV-T1840	Jeffrey Carlin
LVV-T1839	Jeffrey Carlin
LVV-T1838	Jeffrey Carlin
LVV-T1837	Jeffrey Carlin
LVV-T1836	Jeffrey Carlin
LVV-T2202	Leanne Guy
LVV-T1746	Jeffrey Carlin
LVV-T1749	Jeffrey Carlin
LVV-T1750	Jeffrey Carlin
LVV-T1751	Jeffrey Carlin
LVV-T1752	Jeffrey Carlin
LVV-T1753	Jeffrey Carlin
LVV-T1831	Jeffrey Carlin
LVV-T2329	Leanne Guy
LVV-T129	Jeffrey Carlin
LVV-T30	Kian-Tat Lim
LVV-T29	Kian-Tat Lim
LVV-T2297	Leanne Guy

4 Test Campaign Overview

4.1 Summary

T. Plan LVV-P117:	**LDM-503-19a (All P1a DM requirements verified)**			Draft
T. Cycle LVV-C275:	**LDM-503-19a (All P1a DM requirements verified)**			Not Executed
Test Cases	**Ver.**	**Status**	**Comment**	**Issues**
LVV-T1612	1			
Execution	LVV-E3647	Not Executed		
LVV-T1168	1			
Execution	LVV-E3648	Not Executed		
LVV-T1097	1			
Execution	LVV-E3649	Not Executed		
LVV-T83	1			
Execution	LVV-E3502	Not Executed		
LVV-T85	1			
Execution	LVV-E3503	Not Executed		
LVV-T2303	1			
Execution	LVV-E3504	Not Executed		
LVV-T33	1			
Execution	LVV-E3505	Not Executed		
LVV-T38	1			
Execution	LVV-E3506	Not Executed		
LVV-T103	1			
Execution	LVV-E3507	Not Executed		
LVV-T45	1			
Execution	LVV-E3508	Not Executed		
LVV-T47	1			
Execution	LVV-E3509	Not Executed		
LVV-T153	1			
Execution	LVV-E3510	Not Executed		
LVV-T88	1			
Execution	LVV-E3511	Not Executed		
LVV-T89	1			
Execution	LVV-E3512	Not Executed		
LVV-T148	1			
Execution	LVV-E3514	Not Executed		
LVV-T189	1			
Execution	LVV-E3519	Not Executed		

LVV-T197	1	
Execution	LVV-E3520	Not Executed
LVV-T198	1	
Execution	LVV-E3521	Not Executed
LVV-T34	1	
Execution	LVV-E3522	Not Executed
LVV-T48	1	
Execution	LVV-E3523	Not Executed
LVV-T1862	1	
Execution	LVV-E3524	Not Executed
LVV-T115	1	
Execution	LVV-E3525	Not Executed
LVV-T1935	1	
Execution	LVV-E3526	Not Executed
LVV-T1987	1	
Execution	LVV-E3527	Not Executed
LVV-T98	1	
Execution	LVV-E3528	Not Executed
LVV-T1986	1	
Execution	LVV-E3529	Not Executed
LVV-T2693	1	
Execution	LVV-E3530	Not Executed
LVV-T2699	1	
Execution	LVV-E3531	Not Executed
LVV-T154	1	
Execution	LVV-E3532	Not Executed
LVV-T191	1	
Execution	LVV-E3534	Not Executed
LVV-T1250	1	
Execution	LVV-E3535	Not Executed
LVV-T1251	1	
Execution	LVV-E3536	Not Executed
LVV-T1847	1	
Execution	LVV-E3537	Not Executed
LVV-T377	1	
Execution	LVV-E3538	Not Executed
LVV-T1846	1	
Execution	LVV-E3539	Not Executed
LVV-T1843	1	

	Execution	LVV-E3540	Not Executed
LVV-T1757	1		
	Execution	LVV-E3541	Not Executed
LVV-T1842	1		
	Execution	LVV-E3542	Not Executed
LVV-T1841	1		
	Execution	LVV-E3543	Not Executed
LVV-T1840	1		
	Execution	LVV-E3544	Not Executed
LVV-T1839	1		
	Execution	LVV-E3545	Not Executed
LVV-T1838	1		
	Execution	LVV-E3546	Not Executed
LVV-T1837	1		
	Execution	LVV-E3547	Not Executed
LVV-T1836	1		
	Execution	LVV-E3548	Not Executed
LVV-T2202	1		
	Execution	LVV-E3549	Not Executed
LVV-T1746	1		
	Execution	LVV-E3550	Not Executed
LVV-T1749	1		
	Execution	LVV-E3551	Not Executed
LVV-T1750	1		
	Execution	LVV-E3552	Not Executed
LVV-T1751	1		
	Execution	LVV-E3553	Not Executed
LVV-T1752	1		
	Execution	LVV-E3554	Not Executed
LVV-T1753	1		
	Execution	LVV-E3555	Not Executed
LVV-T1831	1		
	Execution	LVV-E3556	Not Executed
LVV-T2329	1		
	Execution	LVV-E3557	Not Executed
LVV-T129	1		
	Execution	LVV-E3558	Not Executed
LVV-T30	1		
	Execution	LVV-E3559	Not Executed
LVV-T29	1		

Execution	LVV-E3560	Not Executed
LVV-T2297	1	
Execution	LVV-E3561	Not Executed

Table 2: Test Campaign Summary

4.2 Overall Assessment

Not yet available.

4.3 Recommended Improvements

Not yet available.

5 Detailed Test Results

5.1 Test Cycle LVV-C275

Open test cycle *LDM-503-19a (All P1a DM requirements verified)* in Jira.

Test Cycle name: LDM-503-19a (All P1a DM requirements verified)
Status: Not Executed

Test campaign supporting milestone LDM-503-19a -- all P1a requirements verified.

5.1.1 Software Version/Baseline

Not provided.

5.1.2 Configuration

Not provided.

5.1.3 Test Cases in LVV-C275 Test Cycle

5.1.3.1 LVV-T1612 - Verify Summit - Base Network Integration (System Level)

Version **1**. Status **Draft**. Open *LVV-T1612* test case in Jira.

Verify ISO Layer 3 full (22 x 10 Gbps ethernet ports on DAQ side with test data from DAQ test stand, AURA, Camera DAQ team do test). Demonstrate transfer of data at or exceeding rates specified in LDM-142.

Preconditions:

1. PMCS DMTC-7400-2400 COMPLETE

2. LVV-T1168 Passed
3. EITHER: Full Camera DAQ installed on summit and loaded with data OR: high-quality DAQ application-level simulators that match the form, volume, file paths, compressibility, and cadence of the expected instrument data, running on end node computers that are the production hardware or equivalent to it. Scientific validity of the data content is not essential.
4. Archiver/forwarders installed at Base running on end node computers that are the production hardware or equivalent to it.
5. As-built documentation for all of the above is available.

NOTE: This test will be repeated at increasing data volumes as additional observatory capabilities (e.g. ComCAM, FullCam) become available. Final verification will be tested at full operational volume.After the initial test, the corresponding verification elements will be flagged as "Requires Monitoring" such that those requirements will be closed out as having been verified but will continue to be monitored throughout commissioning to ensure they do not drop out of compliance. This will also be monitored for end to end Summit - Data Facility transfers during Commissioning.

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T1612 LVV-E3647-4042:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.2 LVV-T1168 - Verify Summit - Base Network Integration

Version **1**. Status **Approved**. Open *LVV-T1168* test case in Jira.

Verify the integration of the summit to base network by demonstrating a sustained and uninterrupted transfer of data between summit and base over 1 day period at or exceeding rates specified in LDM-142. Done in 3 phases in collaboration with equipment/installation vendors

(see test procedure).

Preconditions:
PMCS DMTC-7400-2330 COMPLETE
By phase:

1. Posts from Cerro Pachon to AURA Gatehouse repaired/improved. Fiber installed on posts from Cerro Pachon to AURA Gatehouse. Fiber installed from AURA Gatehouse to AURA compound in La Serena. OTDR purchased.
2. AURA DWDM installed in caseta on Cerro Pachon and in existing computer room in La Serena. DTN installed in La Serena. DTN loaded with software and test data staged.
3. Base Data Center (BDC) ready for installation of LSST DWDM. Fiber connecting existing computer room to BDC. LSST DWDM equipment installed in Summit Computer Room and BDC.

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T1168 LVV-E3648-4043:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.3 LVV-T1097 - Verify Summit Facility Network Implementation

Version **1**. Status **Draft**. Open *LVV-T1097* test case in Jira.

Verify that data acquired by a AuxTel DAQ can be transferred to Summit DWDM and loaded in the EFD without problems.

Preconditions:

1. Summit Control Network and Camera Data Backbone installed and operating properly.
2. Summit - Base Network installed and operating properly.
3. EITHER: AuxTel hardware and control systems are functional with LATISS. AuxTel TCS, AuxTel EFD, AuxTel CCS, AuxTel DAQ are connected via Control Network on Summit to Rubin Observatory DWDM (with at least 2 x 10 Gbps ethernet port client cards) OR: high-quality DAQ application-level simulators that match the form, volume, file paths, compressibility, and cadence of the expected instrument data, running on end node computers that are the production hardware or equivalent to it. Scientific validity of the data content is not essential.
4. AuxTel Archiver/forwarders installed in Summit and operating properly running on end node computers that are the production hardware or equivalent to it.
5. As-built documentation for all of the above is available.

NOTE: This test will be repeated at increasing data volumes as additional observatory capabilities (e.g. ComCAM, LSSTCam) become available. Final verification will be tested at full operational volume. After the initial test, the corresponding verification elements will be flagged as "Requires Monitoring" such that those requirements will be closed out as having been verified but will continue to be monitored throughout commissioning to ensure they do not drop out of compliance. This will also be monitored for end to end Summit - Data Facility transfers during Commissioning.

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T1097 LVV-E3649-4044:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.4 LVV-T83 - Verify implementation of Bad Pixel Map

Version **1**. Status **Defined**. Open *LVV-T83* test case in Jira.

Verify that the DMS can produce a map of detector pixels that suffer from pathologies, and that these pathologies are encoded in at least 32-bit values.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T83 LVV-E3502-3897:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.5 LVV-T85 - Verify implementation of Crosstalk Correction Matrix

Version **1**. Status **Defined**. Open *LVV-T85* test case in Jira.

Verify that the DMS can generate a cross-talk correction matrix from appropriate calibration data.
Verify that the DMS can measure the effectiveness of the cross-talk correction matrix.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T85 LVV-E3503-3898:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.6 LVV-T2303 - Verify Image Archive

Version **1**. Status **Draft**. Open *LVV-T2303* test case in Jira.

Verify that all image Data Products produced by the DMS (Processed Science Exposures, Calibration Exposures, Coadded Exposures) are either archived, or be capable of being recreated on-demand from inputs and processing provenance.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T2303 LVV-E3504-3899:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.7 LVV-T33 - Verify implementation of Raw Science Image Metadata

Version **1**. Status **Approved**. Open *LVV-T33* test case in Jira.

Verify successful ingestion of raw data and that image metadata is present and queryable.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T33 LVV-E3505-3900:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.8 LVV-T38 - Verify implementation of Processed Visit Images

Version **1**. Status **Approved**. Open *LVV-T38* test case in Jira.

Verify that the DMS
1. Successfully produces Processed Visit Images, where the instrument signature has been removed.
2. Successfully combines images obtained during a standard visit.

The verification should include confirming that the images have been trimmed of the over-scan, and that correction of the instrumental signature (including crosstalk) has been applied properly.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T38 LVV-E3506-3901:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.9 LVV-T103 - Verify implementation of Generate Data Quality Report Within Specified Time

Version **1**. Status **Defined**. Open *LVV-T103* test case in Jira.

Verify that the DMS can generate a nightly L1 Data Quality Report within **dqReportComplTime = 4[hour]**, in both human- and machine-readable formats.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T103 LVV-E3507-3902:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.10 LVV-T45 - Verify implementation of Prompt Processing Data Quality Report Definition

Version **1**. Status **Defined**. Open *LVV-T45* test case in Jira.

Verify that the DMS produces a Prompt Processing Data Quality Report. Specifically check absolute value and temporal variation of
1. Photometric zeropoint
2. Sky brightness
3. Seeing
4. PSF
5. Detection efficiency

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T45 LVV-E3508-3903:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.11 LVV-T47 - Verify implementation of Prompt Processing Calibration Report Definition

Version **1**. Status **Defined**. Open *LVV-T47* test case in Jira.

Verify that the DMS produces a Prompt Processing Calibration Report. Specifically check that this report is capable of identifying when aspects of the telescope or camera are changing with time.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T47 LVV-E3509-3904:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.12 LVV-T153 - Verify implementation of Provide Engineering and Facility Database Archive

Version **1**. Status **Defined**. Open *LVV-T153* test case in Jira.

Demonstrate Engineering and Facilities Data (images, associated metadata, and observatory environment and control data) are archived and available for public access within **L1PublicT (24 hours)**.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T153 LVV-E3510-3905:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.13 LVV-T88 - Verify implementation of Calibration Data Products

Version **1**. Status **Defined**. Open *LVV-T88* test case in Jira.

Verify that the DMS can produce and archive the required Calibration Data Products: cross talk correction, bias, dark, monochromatic dome flats, broad-band flats, fringe correction, and illumination corrections.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T88 LVV-E3511-3906:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.14 LVV-T89 - Verify implementation of Calibration Image Provenance

Version **1**. Status **Defined**. Open *LVV-T89* test case in Jira.

Verify that the DMS records the required provenance information for the Calibration Data Products.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T89 LVV-E3512-3907:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.15 LVV-T148 - Verify implementation of Unique Processing Coverage

Version **1**. Status **Draft**. Open *LVV-T148* test case in Jira.

Verify that a user-specified criterion can be used to process each record in a table exactly once.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T148 LVV-E3514-3909:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.16 LVV-T189 - Verify implementation of Base Facility Infrastructure

Version **1**. Status **Draft**. Open *LVV-T189* test case in Jira.

Verify that the (a) planned infrastructure and (b) as-built infrastructure for the Base Facility satisfies the needs for data transfer and buffering, a copy of the Archive Facility, and support for Commissioning.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T189 LVV-E3519-3914:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.17 LVV-T197 - Verify implementation of Archive Center

Version **1**. Status **Draft**. Open *LVV-T197* test case in Jira.

Verify that the Archive Center is sufficiently provisioned to support prompt processing, DRP,

and data access needs.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T197 LVV-E3520-3915:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.18 LVV-T198 - Verify implementation of Archive Center Disaster Recovery

Version **1**. Status **Draft**. Open *LVV-T198* test case in Jira.

Verify disaster recovery plan for Archive Center.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T198 LVV-E3521-3916:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.19 LVV-T34 - Verify implementation of Guider Calibration Data Acquisition

Version **1**. Status **Defined**. Open *LVV-T34* test case in Jira.

Verify successful
1. Ingestion of calibration frames from L1 Test Stand DAQ
2. Execution of CPP payloads
3. Availability of observed guider calibration products

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T34 LVV-E3522-3917:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.20 LVV-T48 - Verify implementation of Exposure Catalog

Version **1**. Status **Defined**. Open *LVV-T48* test case in Jira.

Verify that the DMS creates an Exposure Catalog that includes
1. Observation datetime, exposure time
2. Filter
3. Dome, telescope orientation and status
4. Calibration status
5. Airmass and zenith
6. Environmental information
7. Per-sensor information

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T48 LVV-E3523-3918:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.21 LVV-T1862 - Verify determining effectiveness of dark current frame

Version **1**. Status **Draft**. Open *LVV-T1862* test case in Jira.

Verify that the DMS can determine the effectiveness of a dark correction and determine how often it should be updated.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T1862 LVV-E3524-3919:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.22 LVV-T115 - Verify implementation of Calibration Production Processing

Version **1**. Status **Approved**. Open *LVV-T115* test case in Jira.

Execute CPP on a variety of representative cadences, and verify that the calibration pipeline correctly produces necessary calibration products.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T115 LVV-E3525-3920:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.23 LVV-T1935 - Demonstrate ComCam Data Processing Capability

Version **1**. Status **Approved**. Open *LVV-T1935* test case in Jira.

To process raw ComCam data and demonstrate that the results are available either in the shared DM development environment/repository or in the RSP.

Preconditions:
ComCam data acquisition and ingest are nominal. (LVV-T1934)

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T1935 LVV-E3526-3921:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.24 LVV-T1987 - Run Calibration Products Processing (CPP)

Version **1**. Status **Approved**. Open *LVV-T1987* test case in Jira.

Demonstrate that basic calibration processing from Gen2 era has been enabled within Gen3 environment. This test is not concerned with large scales but merely demonstrates that Gen3 capability to generate calibration products (i.e. they are no longer required to be generated in Gen2 and then migrated to Gen3).

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T1987 LVV-E3527-3922:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.25 LVV-T98 - Verify implementation of Selection of Datasets

Version **1**. Status **Defined**. Open *LVV-T98* test case in Jira.

Verify that the DMS can identify and retrieve datasets consisting of logical groupings of Exposures, metadata, provenance, etc., or other groupings that are processed or produced as a logical unit.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T98 LVV-E3528-3923:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.26 LVV-T1986 - Mini DC2 processing capability

Version **1**. Status **Approved**. Open *LVV-T1986* test case in Jira.

Demonstrate that a typical 3-tract DC2 data processing is possible using the Gen3 system and the nascent Batch Production Service (BPS). This test is meant to extend LVV-T1983 (Mini RC2 processing capability) by demonstrating Gen3 + BPS systems are capable of supporting future Data Previews (which have been specified to use the DC2 image sim data rather than HSC data).

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T1986 LVV-E3529-3924:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.27 LVV-T2693 - Verify implementation of Image Provenance Access

Version **1**. Status **Draft**. Open *LVV-T2693* test case in Jira.

Verify that available image data products' provenance information can be listed and retrieved.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T2693 LVV-E3530-3925:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.28 LVV-T2699 - Verify implementation of Catalog Provenance Access

Version **1**. Status **Draft**. Open *LVV-T2699* test case in Jira.

Verify that available catalog data products' provenance can be listed and retrieved.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T2699 LVV-E3531-3926:

Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.29 LVV-T154 - Verify implementation of Raw Data Archiving Reliability

Version **1**. Status **Draft**. Open *LVV-T154* test case in Jira.

Verify that raw images are reliably archived.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T154 LVV-E3532-3927:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.30 LVV-T191 - Verify implementation of Commissioning Cluster

Version **1**. Status **Draft**. Open *LVV-T191* test case in Jira.

Verify that the Commissioning Cluster has sufficient Compute/Storage/LAN at the Base Facility to support Commissioning.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T191 LVV-E3534-3929:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.31 LVV-T1250 - Verify implementation of minimum number of simultaneous DM EFD query users

Version **1**. Status **Draft**. Open *LVV-T1250* test case in Jira.

Verify that the DM EFD can support **dmEfdQueryUsers = 5** simultaneous queries. The additional requirement that each query must last no more than **dmEfdQueryTime = 10 seconds** will be verified separately in LVV-T1251, but these must be satisfied together.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T1250 LVV-E3535-3930:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.32 LVV-T1251 - Verify implementation of maximum time to retrieve DM EFD query results

Version **1**. Status **Draft**. Open *LVV-T1251* test case in Jira.

Verify that the DM EFD can support **dmEfdQueryUsers = 5** simultaneous queries, with each query must executing in no more than **dmEfdQueryTime = 10 seconds.** The requirement on at least 5 simultaneous queries will be verified separately in LVV-T1250, but these must be satisfied together.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T1251 LVV-E3536-3931:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.33 LVV-T1847 - Verify calculation of sensor fraction with unusable pixels

Version **1**. Status **Draft**. Open *LVV-T1847* test case in Jira.

Verify that the DM system provides software to assess whether the maximum allowable fraction of sensors with **PixFrac > 1** percent scientifically unusable pixels is less than **SensorFraction = 15 percent.**

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T1847 LVV-E3537-3932:

Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.34 LVV-T377 - Verify Calculation of Photometric Performance Metrics

Version **1**. Status **Approved**. Open *LVV-T377* test case in Jira.

Verify that the DMS system provides software to calculate photometric performance metrics, and that the algorithms are properly calculating the desired quantities. Note that because the DMS requirement is that the software shall be provided (and not on the actual measured values of the metrics), we verify all of the requirements via a single test case.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T377 LVV-E3538-3933:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.35 LVV-T1846 - Verify calculation of band-to-band color zero-point accuracy including u-band

Version **1**. Status **Draft**. Open *LVV-T1846* test case in Jira.

Verify that the DM system provides software to assess whether the accuracy of absolute band-to-band color zero-points for all colors constructed from any filter pair, including the u-band, is less than **PA5u = 10 millimagnitudes**.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T1846 LVV-E3539-3934:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.36 LVV-T1843 - Verify calculation of significance of imperfect crosstalk corrections

Version **1**. Status **Draft**. Open *LVV-T1843* test case in Jira.

Verify that the DM system provides software to assess whether the maximum local significance integrated over the PSF of imperfect crosstalk corrections is less than **Xtalk = 3 sigma**.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T1843 LVV-E3540-3935:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.37 LVV-T1757 - Verify calculation of photometric repeatability in gri filters

Version **1**. Status **Approved**. Open *LVV-T1757* test case in Jira.

Verify that the DM system has provided the code to calculate the RMS photometric repeatability of bright non-saturated unresolved point sources in the g, r, and i filters, and assess whether it meets the requirement that it shall be less than **PA1gri = 5.0 millimagnitudes**.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T1757 LVV-E3541-3936:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.38 LVV-T1842 - Verify calculation of zeropoint error fraction exceeding the outlier limit

Version **1**. Status **Draft**. Open *LVV-T1842* test case in Jira.

Verify that the DM system provides software to calculate the fraction of zeropoint errors that exceed the zero point error outlier limit, and confirm that it is less than **PF2 = 10 percent.**

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T1842 LVV-E3542-3937:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.39 LVV-T1841 - Verify calculation of scientifically unusable pixel fraction

Version **1**. Status **Draft**. Open *LVV-T1841* test case in Jira.

Verify that the DM system provides software to assess whether the maximum fraction of pixels scientifically unusable per sensor out of the total allowable fraction of sensors meeting this performance is less than **PixFrac = 1 percent**.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T1841 LVV-E3543-3938:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.40 LVV-T1840 - Verify calculation of sky brightness precision

Version **1**. Status **Draft**. Open *LVV-T1840* test case in Jira.

Verify that the DM system provides software to assess whether the maximum error in the

precision of the sky brightness determination is less than **SBPrec = 1 percent.**

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T1840 LVV-E3544-3939:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.41 LVV-T1839 - Verify calculation of RMS width of photometric zeropoint

Version **1**. Status **Draft**. Open *LVV-T1839* test case in Jira.

Verify that the DM system provides code to assess whether the RMS width of the internal photometric zero-point (precision of system uniformity across the sky) for all bands except u-band is less than **PA3 = 10 millimagnitudes**.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T1839 LVV-E3545-3940:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.42 LVV-T1838 - Verify calculation of image fraction affected by ghosts

Version **1**. Status **Draft**. Open *LVV-T1838* test case in Jira.

Verify that the DM system provides code to assess whether the percentage of image area that has ghosts with surface brightness gradient amplitude of more than 1/3 of the sky noise over 1 arcsec is less than **GhostAF = 1 percent**.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T1838 LVV-E3546-3941:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.43 LVV-T1837 - Verify calculation of band-to-band color zero-point accuracy

Version **1**. Status **Draft**. Open *LVV-T1837* test case in Jira.

Verify that the DM system provides code to assess whether the accuracy of absolute band-to-band color zero-points for all colors constructed from any filter pair, excluding the u-band, is less than **PA5 = 5 millimagnitudes**.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T1837 LVV-E3547-3942:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.44 LVV-T1836 - Verify calculation of resolved-to-unresolved flux ratio errors

Version **1**. Status **Draft**. Open *LVV-T1836* test case in Jira.

Verify that the DM system has provided code to assess whether the maximum RMS of the ratio of the error in integrated flux measurement between bright, isolated, resolved sources less than 10 arcsec in diameter and bright, isolated unresolved point sources is less than **ResSource = 2**.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T1836 LVV-E3548-3943:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.45 LVV-T2202 - Verify that the of zero-point error outlier limit threshold (PA4) can be applied.

Version **1**. Status **Approved**. Open *LVV-T2202* test case in Jira.

Verify that the DMS has provided the code to apply the zero-point error outlier limit threshold (PA4) to computed values of metrics.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T2202 LVV-E3549-3944:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.46 LVV-T1746 - Verify calculation of fraction of relative astrometric measurement error on 5 arcminute scales exceeding outlier limit

Version **1**. Status **Approved**. Open *LVV-T1746* test case in Jira.

Verify that the DM system has provided the code to calculate the maximum fraction of relative astrometric measurements on 5 arcminute scales that exceed the 5 arcminute outlier limit **AD1 = 20 milliarcseconds**, and assess whether it meets the requirement that it shall be less than **AF1 = 10 percent.**

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T1746 LVV-E3550-3945:

Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.47 LVV-T1749 - Verify calculation of fraction of relative astrometric measurement error on 20 arcminute scales exceeding outlier limit

Version **1**. Status **Approved**. Open *LVV-T1749* test case in Jira.

Verify that the DM system has provided the code to calculate the maximum fraction of relative astrometric measurements on 20 arcminute scales that exceed the 20 arcminute outlier limit **AD2 = 20 milliarcseconds**, and assess whether it meets the requirement that it shall be less than **AF2 = 10 percent.**

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T1749 LVV-E3551-3946:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.48 LVV-T1750 - Verify calculation of separations relative to r-band exceeding color difference outlier limit

Version **1**. Status **Approved**. Open *LVV-T1750* test case in Jira.

Verify that the DM system has provided the code to calculate the separations measured relative to the r-band that exceed the color difference outlier limit **AB2 = 20 milliarcseconds**, and

assess whether it meets the requirement that it shall be less than **ABF1 = 10 percent.**

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T1750 LVV-E3552-3947:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.49 LVV-T1751 - Verify calculation of median relative astrometric measurement error on 200 arcminute scales

Version **1**. Status **Approved**. Open *LVV-T1751* test case in Jira.

Verify that the DM system has provided the code to calculate the median relative astrometric measurement error on 200 arcminute scales and assess whether it meets the requirement that it shall be no more than AM3 = 15 milliarcseconds.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T1751 LVV-E3553-3948:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.50 LVV-T1752 - Verify calculation of fraction of relative astrometric measurement error on 200 arcminute scales exceeding outlier limit

Version **1**. Status **Approved**. Open *LVV-T1752* test case in Jira.

Verify that the DM system has provided the code to calculate the maximum fraction of relative astrometric measurements on 200 arcminute scales that exceed the 200 arcminute outlier limit **AD3 = 30 milliarcseconds**, and assess whether it meets the requirement that it shall be less than **AF3 = 10 percent.**

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T1752 LVV-E3554-3949:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.51 LVV-T1753 - Verify calculation of RMS difference of separations relative to r-band

Version **1**. Status **Approved**. Open *LVV-T1753* test case in Jira.

Verify that the DM system has provided the code to calculate the separations measured relative to the r-band, and assess whether it meets the requirement that it shall be less than **AB1 = 10 milliarcseconds.**

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T1753 LVV-E3555-3950:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.52 LVV-T1831 - Verify Implementation of Data Management Nightly Reporting

Version **1**. Status **Draft**. Open *LVV-T1831* test case in Jira.

Verify that the LSST Data Management subsystem produces a searchable - interactive nightly report(s), from information published in the EFD by each subsystem, summarizing performance and behavior over a user defined period of time (e.g. the previous 24 hours).

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T1831 LVV-E3556-3951:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.53 LVV-T2329 - Verify the archiving of ancilliary data

Version **1**. Status **Draft**. Open *LVV-T2329* test case in Jira.

Verufy that the Science Data Archive contains all necessary engineering and calibration data for the full understanding of the performance and operation of the Observatory.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T2329 LVV-E3557-3952:
Note: Steps ”Not Executed” and with No Result are not shown in this report.

5.1.3.54 LVV-T129 - Verify implementation of Provide Calibrated Photometry

Version **1**. Status **Approved**. Open *LVV-T129* test case in Jira.

Verify that the DMS provides photometry calibrated in AB mags and fluxes (in nJy) for all measured objects and sources. Must be tested for both DRP and AP products.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T129 LVV-E3558-3953:
Note: Steps ”Not Executed” and with No Result are not shown in this report.

5.1.3.55 LVV-T30 - Verify implementation of Wavefront Sensor Data Acquisition

Version **1**. Status **Defined**. Open *LVV-T30* test case in Jira.

Verify successful ingestion of wavefront sensor data from L1 Test Stand DAQ while simulating all modes.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T30 LVV-E3559-3954:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.56 LVV-T29 - Verify implementation of Raw Science Image Data Acquisition

Version **1**. Status **Defined**. Open *LVV-T29* test case in Jira.

Verify acquisition of raw data from L1 Test Stand DAQ while simulating all modes

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T29 LVV-E3560-3955:
Note: Steps "Not Executed" and with No Result are not shown in this report.

5.1.3.57 LVV-T2297 - Verify implementation of Science Data Archive

Version **1**. Status **Draft**. Open *LVV-T2297* test case in Jira.

Verify that a Science Data Archive has been created and that all LSST public data products have been archived together with the raw data necessary to reproduce them. Verify that the archive is scalable to the data from the full survey and all Data Releases.

This requirement will be verified by analysis. Verification must demonstrate that we have a a written plan for how data will be archived and that the storage systems needed exist. The plan should include details on recovery. This is needed before commissioning to support commissioning data taking.

Preconditions:

Execution status:

Final comment:

Detailed steps results LVV-C275-LVV-T2297 LVV-E3561-3956:
Note: Steps "Not Executed" and with No Result are not shown in this report.

A Documentation

The verification process is defined in LSE-160. The use of Docsteady to format Jira information in various test and planing documents is described in DMTN-140 and practical commands are given in DMTN-178.

B Acronyms used in this document

Acronym	Description
AP	Alert Production
AURA	Association of Universities for Research in Astronomy
BDC	Base Data Center
BPS	Batch Production Service
CCS	Camera Control System
CPP	Calibration Production Processing
CTIO	Cerro Tololo Inter-American Observatory
ComCam	The commissioning camera is a single-raft, 9-CCD camera that will be installed in LSST during commissioning, before the final camera is ready.
DAQ	Data Acquisition System
DC2	Data Challenge 2 (DESC)
DESC	Dark Energy Science Collaboration
DM	Data Management
DMS	Data Management Subsystem
DMSR	DM System Requirements; LSE-61
DMTN	DM Technical Note
DRP	Data Release Production
DTN	Data Transfer Node
DWDM	Dense Wave Division Multiplex
EFD	Engineering and Facility Database
HSC	Hyper Suprime-Cam
ISO	Information Security Officer
L1	Lens 1
LAN	Local Area Network
LATISS	LSST Atmospheric Transmission Imager and Slitless Spectrograph

LDM	LSST Data Management (Document Handle)
LSE	LSST Systems Engineering (Document Handle)
LSST	Legacy Survey of Space and Time (formerly Large Synoptic Survey Telescope)
LVV	LSST Verification and Validation
NCSA	National Center for Supercomputing Applications
PMCS	Project Management Controls System
PSF	Point Spread Function
REUNA	Red Universitaria Nacional
RMS	Root-Mean-Square
RSP	Rubin Science Platform
SLAC	SLAC National Accelerator Laboratory
TCS	Telescope Control System
USDF	United States Data Facility