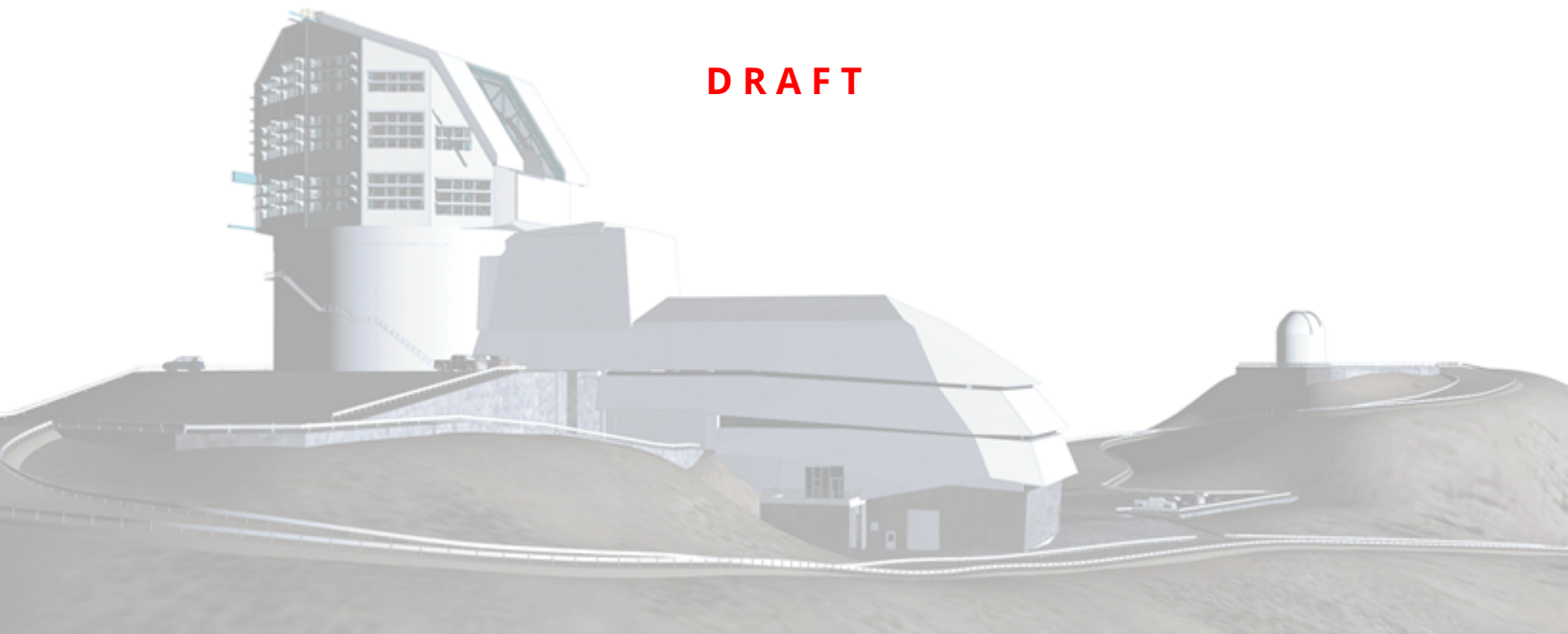**Vera C. Rubin Observatory**
Data Management

LVV-P72: DM Acceptance Testing, Operations Rehearsal #2 Test Plan and Report

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DMTR-231

Latest Revision: 2020-07-15

D R A F T

Abstract

This is the test plan and report for LVV-P72 (DM Acceptance Testing, Operations Rehearsal #2), an LSST milestone pertaining to the Data Management Subsystem.

Change Record

Version	Date	Description	Owner name
	2020-05-18	First Draft	J. Carlin

Document curator: J. Carlin

Document source location: `https://github.com/lsst-dm/DMTR-231`

Version from source repository: 157f7e6

Contents

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1 Introduction

1.1 Objectives

This Acceptance Test campaign aims to verify a small number of DMSR (LSE-61) requirements related to the LSST Science Pipelines. It will be executed in conjunction with Operations Rehearsal #2. This Test Plan aims to demonstrate that the included requirements have been met by the activities carried out during the Operations Rehearsal, and to thus fully verify their completion and readiness for LSST Operations.

1.2 System Overview

The tests to be executed are intended to verify that the DM system satisfies a subset of the requirements outlined in the Data Management System Requirements (DMSR; LSE-61). This subset of requirements is related to pipeline algorithms, network and observing facility infrastructure, and some basic camera and data backbone functionalities. Additional DMSR requirements will be verified in later Acceptance Test Campaigns.

The tests will be performed using...

Planning for the Operations Rehearsal is being tracked at this Confluence page .

Applicable Documents:

LSE-61 Data Management System Requirements
LDM-503 Data Management Test Plan
LDM-639 LSST Data Management Acceptance Test Specification (issue 2.1)

LDM-643 Proposed DM Ops Rehearsals (Chapter 3 in particular)
? Rubin Observatory Network Verification Baseline

1.3 Document Overview

This document was generated from Jira, obtaining the relevant information from the LVV-P72 Jira Test Plan and related Test Cycles (LVV-C154).

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 over-all 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-P72 in Jira is **Draft** .

1.4 References

[1] **[LSE-61]**, Dubois-Felsmann, G., Jenness, T., 2018, *LSST Data Management Subsystem Requirements*, LSE-61, URL `https://ls.st/LSE-61`

[2] **[LDM-639]**, Guy, L., 2018, *DM Acceptance Test Specification*, LDM-639, URL `https://ls.st/LDM-639`

[3] **[LDM-643]**, Johnson, M., Gruendl, R., 2019, *Proposed DM OPS Rehearsals*, LDM-643, URL `https://ls.st/LDM-643`

[4] **[LDM-503]**, O'Mullane, W., Swinbank, J., Jurić, M., Economou, F., 2018, *Data Management Test Plan*, LDM-503, URL `https://ls.st/LDM-503`

2 Test Plan Details

2.1 Data Collection

Observing is not required for this test campaign.

2.2 Verification Environment

Tests that require code and/or data analysis will use the "lsst-lsp-stable" instance of the Rubin Observatory/LSST Science Platform (LSP), hosted at the LDF, and the "lsst-dev" development cluster at NCSA.

2.3 Related Documentation

The documentation related to this test campaign should be provided in the following DocuShare Collection (as per Verification Artifacts in Jira test plan LVV-P72).

- DocuShare Collection Not Specified

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-P72 owner:	**Jeffrey Carlin**		
T. Cycle LVV-C154 owner:	**Jeffrey Carlin**		
Test Cases	**Assigned to**	**Executed by**	**Additional Test Personnel**
LVV-T190	Robert Gruendl		
LVV-T191	Robert Gruendl		
LVV-T1830	Jeffrey Carlin		
LVV-T29	Kian-Tat Lim		
LVV-T32	Kian-Tat Lim		
LVV-T84	Robert Lupton		
LVV-T85	Robert Lupton		
LVV-T88	Robert Lupton		
LVV-T115	Kian-Tat Lim		

4   Test Campaign Overview

4.1   Summary

T. Plan LVV-P72:	**DM Acceptance Testing, Operations Rehearsal #2**			Draft
T. Cycle LVV-C154:	**DM Acceptance Testing, Operations Rehearsal #2**			Not Executed
Test Cases	**Ver.**	**Status**	**Comment**	**Issues**
LVV-T190	1	Not Executed		
LVV-T191	1	Not Executed		
LVV-T1830	1	Not Executed		
LVV-T29	1	Not Executed		
LVV-T32	1	Not Executed		
LVV-T84	1	Not Executed		
LVV-T85	1	Not Executed		
LVV-T88	1	Not Executed		
LVV-T115	1	Not Executed		

Table 2: Test Campaign Summary

4.2   Overall Assessment

Not yet available.

4.3   Recommended Improvements

Not yet available.

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5   Detailed Test Results

5.1   Test Cycle LVV-C154

Open test cycle *DM Acceptance Testing, Operations Rehearsal #2* in Jira.

Test Cycle name: DM Acceptance Testing, Operations Rehearsal #2
Status: Not Executed

This test cycle verifies a subset of DMSR (LSE-61) requirements in order to verify their completion and readiness for LSST Operations (i.e., that the requirements laid out in LSE-61 have been met by the DM Systems). These acceptance tests are to be carried out during DM Operations Rehearsal #2.

5.1.1   Software Version/Baseline

Not provided.

5.1.2   Configuration

Not provided.

5.1.3   Test Cases in LVV-C154 Test Cycle

5.1.3.1   LVV-T190 - Verify implementation of Base Facility Co-Location with Existing Facility

Version **1**. Open *LVV-T190*   test case in Jira.

Verify that the Base Facility is located at an existing known supported facility.

 Preconditions:

Execution status: **Not Executed**

Final comment:

Detailed steps results:

Step	Step Details
1	**Description**
	Analyze design
	Expected Result
	Actual Result
	Status: **Not Executed**

5.1.3.2   LVV-T191 - Verify implementation of Commissioning Cluster

Version **1**. 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: **Not Executed**

Final comment:

Detailed steps results:

Step	Step Details

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1	**Description**	
	Analyze design and budget	
	Expected Result	
	Actual Result	
	Status: **Not Executed**	

5.1.3.3   LVV-T1830 - Verify Implementation of Scientific Visualization of Camera Image Data

Version **1**. Open *LVV-T1830*   test case in Jira.

Verify that all scientific visualization of camera image data uses the coordinate systems defined in LSE-349.

 Preconditions:

Execution status: **Not Executed**

Final comment:

Detailed steps results:

Step	Step Details	
1	Description	
	Expected Result	
	Actual Result	

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Status: **Not Executed**

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

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

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

 Preconditions:

Execution status: **Not Executed**

Final comment:

Detailed steps results:

Step	Step Details
1	**Description**
	Ingest raw data from L1 Test Stand DAQ, simulating each observing mode
	Expected Result
	Actual Result
	Status: **Not Executed**
2	**Description**
	Observe image and its metadata is present and queryable in the Data Backbone.
	Expected Result
	Well-formed image data with appropriate associated metadata.
	Actual Result
	Status: **Not Executed**

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5.1.3.5   LVV-T32 - Verify implementation of Raw Image Assembly

Version **1**. Open *LVV-T32*   test case in Jira.

Verify that the raw exposure data from all readout channels in a sensor can be assembled into a single image, and that all required/relevant metadata are associated with the image data.

 Preconditions:

Execution status: **Not Executed**

Final comment:

Detailed steps results:

Step	Step Details
1	Description
	Ingest data from the L1 Camera Test Stand DAQ.
	Expected Result
	Actual Result
	Status: **Not Executed**
2	Description
	Simulate all different modes of data gathering.
	Expected Result
	Actual Result
	Status: **Not Executed**
3	Description
	Verify that a raw image is constructed in correct format.
	Expected Result

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A single raw image combining data from all readout channels for a given sensor.

Actual Result

Status: **Not Executed**

4	Description

Verify that a raw image is constructed with correct metadata.

Expected Result

Image header or ancillary table contains the required metadata about the observing context in which data were gathered.

Actual Result

Status: **Not Executed**

5.1.3.6   LVV-T84 - Verify implementation of Bias Residual Image

Version **1**. Open *LVV-T84*   test case in Jira.

Verify that DMS can construct a bias residual image that corrects for temporally-stable bias structures.
Verify that DMS can do this on demand.

 Preconditions:

Execution status: **Not Executed**

Final comment:

Detailed steps results:

Step	Step Details
1	Description

Identify the location of an appropriate precursor dataset.

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Expected Result

Actual Result

Status: **Not Executed**

---

2   Description

Identify the path to the data repository, which we will refer to as 'DATA/path', then execute the following:

Example Code

```
import lsst.daf.persistence as dafPersist
butler = dafPersist.Butler(inputs='DATA/path')
```

Expected Result

Butler repo available for reading.

Actual Result

Status: **Not Executed**

---

3   Description

Import the standard libraries required for the rest of this test:

Example Code

import osimport lsst.afw.display as afwDisplay
from lsst.daf.persistence import Butler
from lsst.ip.isr import IsrTask
from firefly_client import FireflyClient
from IPython.display import IFrame

Expected Result

Actual Result

Status: **Not Executed**

---

4   Description

Ingest the dataset from step 1 using the Butler (e.g., following example code below).

Example Code

butler = Butler($REPOSITORY_PATH)
raw = butler.get("raw", visit=$VISIT_ID, detector=2)
bias = butler.get("bias", visit=$VISIT_ID, detector=2)

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Expected Result

Actual Result

Status: **Not Executed**

5   Description

Display the bias image and inspect that its pixels contain unique values.

Expected Result

A relatively flat image showing the bias level with roughly Poisson noise.

Actual Result

Status: **Not Executed**

6   Description

Configure and run an Instrument Signature Removal (ISR) task on the raw data. Most corrections are disabled for simplicity, but the bias frame is applied.

Example Code

```
isr_config = IsrTask.ConfigClass()
isr_config.doDark=False
isr_config.doFlat=False
isr_config.doFringe=False
isr_config.doDefect=False
isr_config.doAddDistortionModel=False
isr_config.doLinearize=False
isr = IsrTask(config=isr_config)
result = isr.run(raw, bias=bias)
```

Expected Result

A trimmed, bias-corrected image in 'result'.

Actual Result

Status: **Not Executed**

7   Description

Display the 'result' image and confirm that the bias correction has been performed.

Expected Result

A displayed image with bias removed (i.e., typical background counts reduced relative to the raw frame).

Actual Result

Status: **Not Executed**

5.1.3.7   LVV-T85 - Verify implementation of Crosstalk Correction Matrix

Version **1**. 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: **Not Executed**

Final comment:

Detailed steps results:

Step	Step Details
1	Description
	Identify an appropriate calibration dataset that can be used to derive the crosstalk correction matrix.
	Expected Result
	Actual Result
	Status: **Not Executed**
2	Description
	Execute the Calibration Products Production payload. The payload uses raw calibration images and information from the Transformed EFD to generate a subset of Master Calibration Images and Calibration Database entries in the Data Backbone.

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	Expected Result
	Actual Result
	Status: **Not Executed**
3	Description
	Confirm that the expected Master Calibration images and Calibration Database entries are present and well-formed.
	Expected Result
	Actual Result
	Status: **Not Executed**
4	Description
	Confirm that the crosstalk correction matrix is produced and persisted.
	Expected Result
	A correction matrix quantifying what fraction of the signal detected in any given amplifier on each sensor in the focal plane appears in any other amplifier.
	Actual Result
	Status: **Not Executed**
5	Description
	Apply the crosstalk correction to simulated images, and confirm that the correction is performing as expected.
	Expected Result
	A noticeable difference between images before and after applying the correction.
	Actual Result
	Status: **Not Executed**

5.1.3.8   LVV-T88 - Verify implementation of Calibration Data Products

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

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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: **Not Executed**

Final comment:

Detailed steps results:

Step	Step Details
1	**Description**
	Identify a suitable set of calibration frames, including biases, dark frames, and flat-field frames.
	Expected Result
	Actual Result
	Status: **Not Executed**
2	**Description**
	Execute the Calibration Products Production payload. The payload uses raw calibration images and information from the Transformed EFD to generate a subset of Master Calibration Images and Calibration Database entries in the Data Backbone.
	Expected Result
	Actual Result
	Status: **Not Executed**
3	**Description**
	Confirm that the expected Master Calibration images and Calibration Database entries are present and well-formed.
	Expected Result
	Actual Result

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	Status: **Not Executed**
4	Description
	Confirm that the expected data products are created, and that they have the expected properties.
	Expected Result
	A full set of calibration data products has been created, and they are well-formed.
	Actual Result
	Status: **Not Executed**
5	Description
	Test that the calibration products are archived, and can readily be applied to science data to produce the desired corrections.
	Expected Result
	Confirmation that application of the calibration products to processed data has the desired effects.
	Actual Result
	Status: **Not Executed**

5.1.3.9   LVV-T115 - Verify implementation of Calibration Production Processing

Version **1**. 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: **Not Executed**

Final comment:

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Detailed steps results:

Step	Step Details
1	**Description**
	Identify a suitable set of calibration frames, including biases, dark frames, and flat-field frames.
	Expected Result
	Actual Result
	Status: **Not Executed**
2	**Description**
	Execute the Calibration Products Production payload. The payload uses raw calibration images and information from the Transformed EFD to generate a subset of Master Calibration Images and Calibration Database entries in the Data Backbone.
	Expected Result
	Actual Result
	Status: **Not Executed**
3	**Description**
	Confirm that the expected Master Calibration images and Calibration Database entries are present and well-formed.
	Expected Result
	Actual Result
	Status: **Not Executed**
4	**Description**
	Confirm that the expected data products are created, and that they have the expected properties.
	Expected Result
	Repos containing valid calibration products that are well-formed and ready to be applied to processed datasets.
	Actual Result
	Status: **Not Executed**

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A Traceability

Test Case	VE Key	VE Summary
LVV-T29	LVV-8	DMS-REQ-0018-V-01: Raw Science Image Data Acquisition
LVV-T32	LVV-11	DMS-REQ-0024-V-01: Raw Image Assembly
LVV-T84	LVV-23	DMS-REQ-0060-V-01: Bias Residual Image
LVV-T85	LVV-24	DMS-REQ-0061-V-01: Crosstalk Correction Matrix
LVV-T88	LVV-57	DMS-REQ-0130-V-01: Calibration Data Products
LVV-T115	LVV-120	DMS-REQ-0289-V-01: Calibration Production Processing
LVV-T190	LVV-80	DMS-REQ-0178-V-01: Base Facility Co-Location with Existing Facility
LVV-T191	LVV-147	DMS-REQ-0316-V-01: Commissioning Cluster
LVV-T1830	LVV-18465	DMS-REQ-0395-V-01: Scientific Visualization of Camera Image Data_1

B   Acronyms used in this document

Acronym	Description
CPP	Calibration Production Processing
DAQ	Data Acquisition System
DM	Data Management
DMS	Data Management Subsystem
DMS-REQ	Data Management System Requirements prefix
DMSR	DM System Requirements; LSE-61
EFD	Engineering and Facility Database
ISR	Instrument Signal Removal
L1	Lens 1
LAN	Local Area Network
LDF	LSST Data Facility
LDM	LSST Data Management (Document Handle)
LSE	LSST Systems Engineering (Document Handle)
LSP	LSST Science Platform
LSST	Legacy Survey of Space and Time (formerly Large Synoptic Survey Telescope)
NCSA	National Center for Supercomputing Applications
PMCS	Project Management Controls System