LARGE SYNOPTIC SURVEY TELESCOPE

Large Synoptic Survey Telescope (LSST)

Commissioning Science Validation Test Plan

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Abstract

Abstract text.

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Commissioning Science Validation Test Plan

1 Introduction

This document provides an overview on the approach that will be used to verify, validate, and characterize the high-level scientific performance of the as-built LSST system during commissioning. The emphasis here is on enumerating the tasks to be undertaken by the commissioning science validation team, identifying the roles and responsibilities of the members of that team, and recognizing the interfaces with other aspects of the Project. This document is similar to the *Data Management Test Plan* LDM-503, and extends the planning of science validation efforts through the commissioning phase, focusing on the collection and analysis of on-sky data.

See also LDM-639.

We introduce a few over-arching concepts below.

1.1 Objectives

The primary purpose of this document is to outline the scope of work for commissioning science validation at a sufficient level of detail to facilitate the coordination of activity across the commissioning team. The commissioning science validation team includes individuals drawing expertise from each of the subsystems that we want to use as effectively as possible. Our objective is to identify discrete units of work that can then be associated with individuals or small teams in order to efficiently make progress on multiple fronts.

1.2 Contexts for Evaluating Performance Metrics

High-level system performance will be measured in a variety of contexts during commissioning, ranging from individual visits to

1.2.1 Single-Visit Performance Tracking

We want some quality assessment of every science image acquired during commissioning. I envision that this functionality will persist into Science Operations. We probably want a rapid assessment to support commissioning activities, but longer term, I think we want something that runs as part of the prompt processing pipeline and/DRP when we go back and reprocess all the individual visits. From an operational standpoint, we think of these metrics as monitoring the realtime health of the system. Longer term, these metrics will allow us to examine the distribution of performance at the single-visit level and look for correlations with hardware/software configurations and environmental conditions.

1.2.2 On-sky Continuous Integration Dataset

I image this as a small static dataset or collection small static datasets that is regularly reprocessed with the latest version of the science pipelines. The main purpose of these datasets is to monitor performance with respect to changes in the science pipelines as we process through commissioning and into science operations. The purpose is similar to the `ci_hsc` dataset, but for actual on-sky LSST images.

Need some thought about what would be the most appropriate dataset(s) for this purpose, which may evolve (or at least expanded upon) during commissioning.

1.2.3 Large-Scale Analysis

We will identify specific milestones during commissioning to (re-)process larger volumes of data through the Science Pipelines in order to provide our best current assessment of the distribution of system performance.

2 Roles and Responsibilities

As described in *System AI&T and Commissioning Plan* LDM-503, the commissioning science validation team reports to the Commissioning Manager and Commissioning Deputy Manager. The commissioning manager and deputy manager are responsible for the overall commissioning effort, including planning, prioritizing, coordinating the day-to-day commissioning ac-

tivities, and functional supervision of assigned staff. The commissioning manager leads the monthly work planning meeting.

2.1 Commissioning Science Validation Lead

Roles: coordinates the commissioning science validation effort.

Responsibilities:

2.2 Commissioning Science Validation CPP, AP, and DRP Leads

Roles: three separate roles for the CPP, AP, and DRP pipelines, respectively.

Responsibilities:

2.3 Observatory Run Manager

Roles: Envisioned to be a rotating role

Responsibilities:

2.4 Commissioning Scheduler Scientist

Roles:

Responsibilities:

2.5 Data Facility Run Manager

Roles: data wrangler.

Responsibilities:

2.6 Members of DM Construction Team Assigned to Commissioning SV

Roles:

Responsibilities:

3 Preparation Leading up to First On-sky Images

3.1 Quality Assessment Frameworks

Contacts: Simon Krughoff, Angelo Fausti, others

This task begins a decision regarding the quality assessment framework(s) that will be used.

3.2 Implement and Test SRD Metric Calculations

This task is to work out the details of how we will interpret, compute, and present the SRD metrics for on-sky data. Considerable thought has already been put into many of the SRD metrics, e.g., in `validate_drp`.

3.3 Implement Rapid Automated Data Quality Assessment for Individual Images/Visits

Contacts: Tony Johnson, Stuart Marshall, Steve Ritz, Eric Bellm (?)

Online prompt products processing is not scheduled to be available until partway through the LSSTCam AI&T. We probably want

3.4 Notebooks as Documentation

3.5 Identify and Curate External Reference Datasets

3.6 Define Additional SRD-Motivated Analyses

3.7 Test Interactions with Environmental Facilities Database

EFD. Transformed EFD. Simon Krughoff.

3.8 Observing Control Scripts and Survey Tactitians

Contacts: Tiago, Tim Jeness

OCS.

3.9 End-to-end Data Access Test with Test Stand and AuxTel

Contacts: Margaret

3.10 Image Visualization Tools

Contacts:

We want the capability to quickly scan many images, i.e., the eyeball checkers.

4 Reverifying Science Pipelines Components

5 SRD Test Plan

For each metric, what is the earliest stage that we will have a useful dataset to test.

5.1 Single-Visit

5.2 Full Survey Performance

6 Null Tests

Which ones fall out automatically?

Which require specific observations?

7 Additional SRD-Motivated Analyses

7.1 Alert Production

7.2 Data Release Production

8 Data Collection Campaigns

For each on-sky observing campaign, include the expected total number of visits and the science pipelines that we expect to run (and whether they will be run in on-line mode).

8.1 ComCam Early AI&T

8.2 ComCam AI&T KPMs

8.3 ComCam AI&T 20-year Depth Tests

8.4 LSSTCam Early AI&T

8.5 LSSTCam AI&T KPMs

8.6 LSSTCam AI&T 20-year Depth Tests

8.7 Science Validation Survey 1: Template Generation and Alert Production

8.8 Science Validation Survey 2: 10-year Depth

9 Documenting System Performance

Documenting the distribution of delivered performance of the as-built system is part of the work of the commissioning science validation team, though we should be careful to limit the scope to something manageable. We should plan for this work in advance to have an estimate for the required resources.

9.1 Documentation for the Operations Team

9.1.1 Operators Manual

Whose deliverable is this?

9.1.2 Characterizing Normal System Performance

9.2 Operations Readiness Review

It seems that the main emphasis should be placed on the formal requirements.

9.3 Journal Publications

Link to confluence page.

References

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

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