



LARGE SYNOPTIC SURVEY TELESCOPE

Large Synoptic Survey Telescope (LSST)
Data Management

LSST Science Platform Final Design Review

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LDM-652

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Abstract

This document provides the charge to the review committee for the LSST Science Platform (LSP) Final Design Review (FDR). The review will be a formal and internal review of the planned LSP capabilities in the LSST operations era as per the guidelines outlined in LDM-294 and LSE-159.

Change Record

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LSST Science Platform Final Design Review

1 Introduction

1.1 Objectives

The LSST Science Platform is a unified set of web applications and services made available to the scientific community to access, visualize, and perform ‘next-to-the-data’ analysis of the LSST data. The platform exposes the LSST data and services to the user through three primary user facing “Aspects” — the web Portal, the JupyterLab analysis environment, and a machine-accessible Web API interface, each providing different ways to access the data and analysis services provided by the LSST Data Access Centers (DACs).

Although primarily conceived as a platform for scientific analysis of the LSST data in the operations-era, the LSP will also be the major platform for integration and test activities during LSST commissioning, and as such, the relevant stakeholders comprise not only members of the scientific community but also the LSST Camera and Commissioning teams.

The objective of this review is to evaluate the vision and design of the LSP against the LSST science requirements, and to verify both the current implementation and the design for future planned operations-era aspects of the system. LSST Data Management want to explore how the LSP can best meet the needs of the LSST science user community by identifying issues now before committing to further implementation or reprioritization of already-planned work.

1.2 Scope of the Review

This is the Final Design Review of the LSST Science Platform (LSP), as defined and described in LSE-319: LSST Science Platform Vision Document. The services provided by the LSP can be decomposed into the three different “Aspects”:

- A web Portal designed to provide essential data access and visualization services through a simple-to-use website.
- A JupyterLab environment, that will provide a Jupyter Notebook-like interface enabling next-to-the-data analysis.
- An extensive set of Web APIs that the users will be able to use to remotely examine the LSST data with familiar tools.

The LSST teams developing the Science Platform — Science User Interface and Tools (SUIT) at IPAC, Software Quality and Reliability Engineering (SQuaRE) at LSST-Tucson, and Data Access (DAX) at SLAC — are requested to demonstrate the detailed product design to be realized as well as the realization process.

Science use cases addressing all four of the LSST key science themes — probing dark energy and dark matter, taking an inventory of the Solar System, exploring the transient optical sky, and mapping the Milky Way — should be addressed. These use cases should cover database-oriented data access, data access for large-scale analytics (possibly non-database), bulk data access for non data centers, and user interfaces.

It should be noted that the LSST database, Qserv, is considered to be outside the scope of this review; however, certain aspects of the database design can affect the performance of the LSP. Where pertinent, those aspects of the Qserv design and expected performance relevant to science users and the ability of the LSP to satisfy the LSST science requirements should be presented.

A representative group of LSST stakeholders will be asked to provide science-oriented feedback and recommendations on the design of the LSST Science Platform.

1.3 Review Materials

Materials to be presented for each Aspect of the LSP will include:

- Design documents covering requirements, architecture and interfaces, including details pertaining to the underlying database design that could impact the science performance of the LSP;
- Current status of development including technical progress;
- Test specifications, verification and validation plans;
- Description of future development plans and milestones to completion and their relationship to major project milestones though commissioning and the start of operations; and
- Risk and mitigation plans.

All relevant documentation should be provided to the review committee no later than 2 weeks prior to the date of the review.

1.4 Applicable Documents

LSE-319	LSST Science Platform Vision Document
LDM-554	LSST Science Platform Requirements
LDM-542	LSST Science Platform Design
LSE-163	LSST Data Products Definition Document
LPM-17	LSST Science Requirements Document (SRD)
LSE-61	LSST DM Subsystem Requirements (DMSR)
LDM-148	LSST Data Management System Design
LSE-30	LSST Observatory System Specifications (OSS)
LDM-294	LSST Data Management Organization and Management
LSE-159	LSST Review Definitions, Guidelines, and Procedures

1.5 References

- [1] **[LSE-159]**, Angeli, G., 2013, *Reviews Definitions, Guidelines, and Procedures*, LSE-159, URL <https://ls.st/LSE-159>
- [2] **[LSE-30]**, Claver, C.F., The LSST Systems Engineering Integrated Project Team, 2018, *Observatory System Specifications (OSS)*, LSE-30, URL <https://ls.st/LSE-30>
- [3] **[LSE-61]**, Dubois-Felsmann, G., Jenness, T., 2018, *LSST Data Management Subsystem Requirements*, LSE-61, URL <https://ls.st/LSE-61>
- [4] **[LDM-542]**, Dubois-Felsmann, G., Lim, K.T., Wu, X., et al., 2017, *LSST Science Platform Design*, LDM-542, URL <https://ls.st/LDM-542>
- [5] **[LDM-554]**, Dubois-Felsmann, G., Ciardi, D., Mueller, F., Economou, F., 2018, *Science Platform Requirements*, LDM-554, URL <https://ls.st/LDM-554>
- [6] **[LPM-17]**, Ivezić, Ž., The LSST Science Collaboration, 2018, *LSST Science Requirements Document*, LPM-17, URL <https://ls.st/LPM-17>
- [7] **[LSE-319]**, Jurić, M., Ciardi, D., Dubois-Felsmann, G., 2017, *LSST Science Platform Vision Document*, LSE-319, URL <https://ls.st/LSE-319>

- [8] **[LSE-163]**, Jurić, M., et al., 2017, *LSST Data Products Definition Document*, LSE-163, URL <https://ls.st/LSE-163>
- [9] **[LDM-148]**, Lim, K.T., Bosch, J., Dubois-Felsmann, G., et al., 2018, *Data Management System Design*, LDM-148, URL <https://ls.st/LDM-148>
- [10] **[LDM-294]**, O'Mullane, W., Swinbank, J., Jurić, M., DMLT, 2018, *Data Management Organization and Management*, LDM-294, URL <https://ls.st/LDM-294>

1.6 Acronyms

Acronym	Description
DAX	Data Access
DM	Data Management
DMSR	DM System Requirements
LDM	LSST Data Management
LPM	LSST Project Management (Document Handle)
LSE	LSST Systems Engineering (Document Handle)
LSP	LSST Science Platform
LSST	Large Synoptic Survey Telescope
OSS	Observatory System Specifications
SRD	Science Requirements Document
SUIT	Science User Interface and Tools
s	second; SI unit of time

2 Charge to the review committee

The review committee is asked to assess the following items based on the material presented and made available.

1. Is the traceability of requirements from higher design documents, e.g., from LPM-17: The LSST Science Requirements Document, to LDM-554: The LSST Science Platform Requirements, complete and will it ensure coverage of the four key LSST science themes?
2. Are the stakeholders clearly identified and understood? Have the requirements been prioritized and communicated to a representative set of the stakeholders?
3. Does the design presented in LDM-542: LSST Science Platform Design capture the requirements for the LSP as detailed in LDM-554: The LSST Science Platform Requirements?
4. Are the verification, validation and software quality assurance plans adequate?
5. Does the performance of the current system and its development status inspire confidence that both the interim and operations-era functionality can be delivered?
6. How does the design of the LSP compare with that of other contemporary astronomical data archives and interfaces, or, more generally, other scientific data analysis environments? How well does the design and current implementation reflect trends in software engineering? Do the current design and technology choices give confidence that the LSP can evolve over time with the needs of 21st century astronomy?
7. Are there items of significance in the design that would unnecessarily limit the science harvest of LSST?
8. Are the risks associated with the design of the LSST Science Platform understood and adequately captured? Are there any overlooked areas of risk?
9. Are there appropriate scope options accompanying the plan? If cuts had to be made, are there areas of the plan that could be descoped with minimal impact on LSST science? What is the scope for use of third party-tooling in place of in-house development?

In addition, the committee is asked to provide actionable advice on addressing any issues raised during the course of the review as well as guidance based on experience that will ensure the success of the LSST Science Platform.

3 Review Committee Composition

The review committee shall be composed of persons external to LSST Data Management and who are representative of the LSST DM stakeholders and principal users of the LSST Science Platform. We envisage ~ 9 reviewers at most, with representation from static and time-domain science, the LSST Commissioning and Camera teams, and persons with technical experience building astronomical portals & science archives.

4 Committee report

At the conclusion of the review, the committee is requested to provide a written report to the LSST Project Scientist within 2 weeks detailing their major recommendations. The report should contain the consensus of the committee's findings, comments and recommendations. The committee is also requested to provide a verbal exit briefing based around a closeout presentation on the last day to convey actions and comments. This closeout briefing need not necessarily be final and it is understood that the committee can revise their findings prior to presentation in the final written report.

5 Proposed Agenda

We propose a full 2-day review, possibly with one full day and two half days either side, in Spring 2019, possibly in March or April. The review committee are requested to be present for the full duration.

(Draft) Proposed Review Agenda:

Day 1

9:00 - 10:00	Committee session
10:00 - 12:30	Review
12:30 - 13:30	Lunch
13:30 - 16:30	Review
16:30 - 17:00	Committee session

Day 2



9:00 - 12:30 Review
12:30 - 13:30 Lunch
13:30 - 16:30 Review
16:30 - 17:00 Committee session

Day 3

9:00 - 11:30 Committee private session
11:30- 12:30 Closeout session