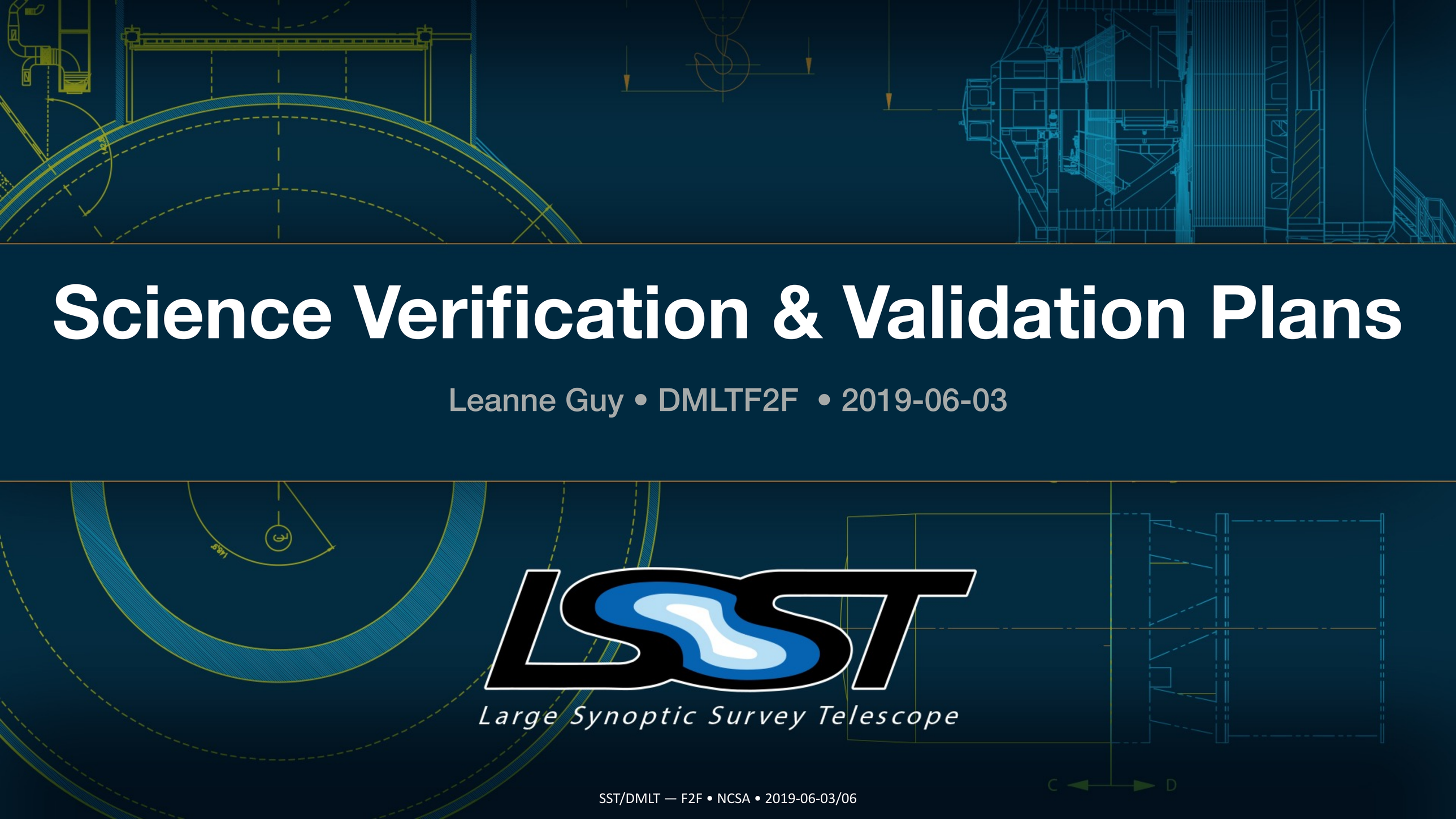
Science Verification & Validation Plans

Leanne Guy • DMLTF2F • 2019-06-03



Terminology

Did we build what we said we were going to build (i.e., as specified in Requirements documents)?

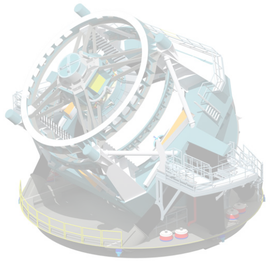
- **Verification**

Does what we built do what we want and expect it to do (i.e., can we do LSST science with it)?

- **Validation**

Do we understand how and why what we built works the way it does?

- **Characterization**



DM V&V Scope

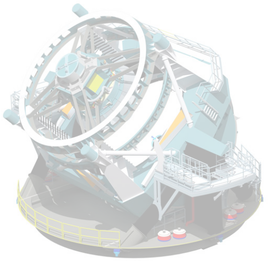
Verify all requirements in the DMSR LSE-61 and all derived requirement documents

LDM-639 is the high-level DM document describing the detailed acceptance test specification for the LSST Data Management System. Derived requirements documents may have their own corresponding test specifications,

Verification Control Document (VCD) provides a summary of progress on verifying LSE-61 requirements specified in LDM-639

- https://ldm-692.lsst.io/v/DM-18617/index.html

See also K-T's talk on document and product tree



Requirements Prioritization

Priority 1

- Must be done to enter commissioning (a) or operations (b); no waivers will be granted if not met.”
  - 1a: Must be demonstrated to be working before the start of the commissioning period.
  - 1b: Must be demonstrated to be working before the start of the observing.

Priority 2

- Should be done to enter Operations; but waiver likely to be granted if not met,
  - i.e., we could enter Operations without this fulfilled, for first 3 years.

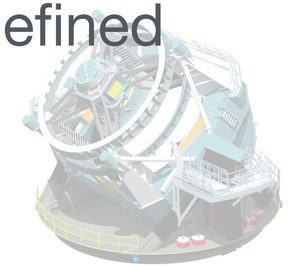
Priority 3

- Overall capability/efficiency/ease of use/etc., may be reduced but science will not critically suffer if not done.” Could enter operations without this requirement fulfilled, and have the operations team decide whether they want to pursue it.

DM Verification approach

Overview

- Map requirements from requirements documents to **Verification Elements** in the LSST Verification and Validation (LVV) Jira project
- Write **Test Cases** that outline detailed test scripts that will be executed to satisfy each LVV.
- Summarize tests in the **Test Specification**, which lists the **Test Cases** defined for the component, and provides details on the planned test activities.
- Organize these into **Test Cycles** — collections of **Test Cases** that are grouped based on some desired property they all require (timeframe, conditions, availability of subsystem etc.).
- Design Jira **Test Plans** — collections of **Test Cycles** into a campaign; includes defined objectives, required conditions, success criteria, and reporting on test results.



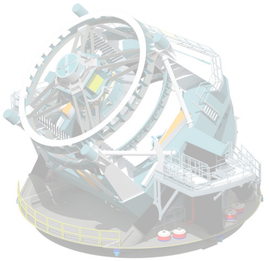
DM Verification approach

From the top down — we are ensuring that:

- all requirements are flowed down through the document tree
  - see K-T's talk on document/product trees
- are clearly defined and sufficient to meet the science goals of LSST,
- have been mapped to **Verification Elements**, with corresponding **Test Cases**,
- Test Specifications are generated and fully populated.

From the bottom up — we are:

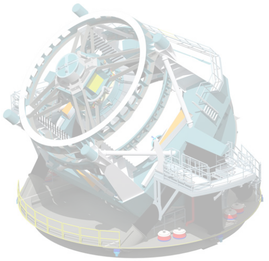
- drafting detailed test scripts in **Test Cases**,
- creating a library of re-usable test scripts,
- turning test scripts into executable code.



DM Verification

Current Status

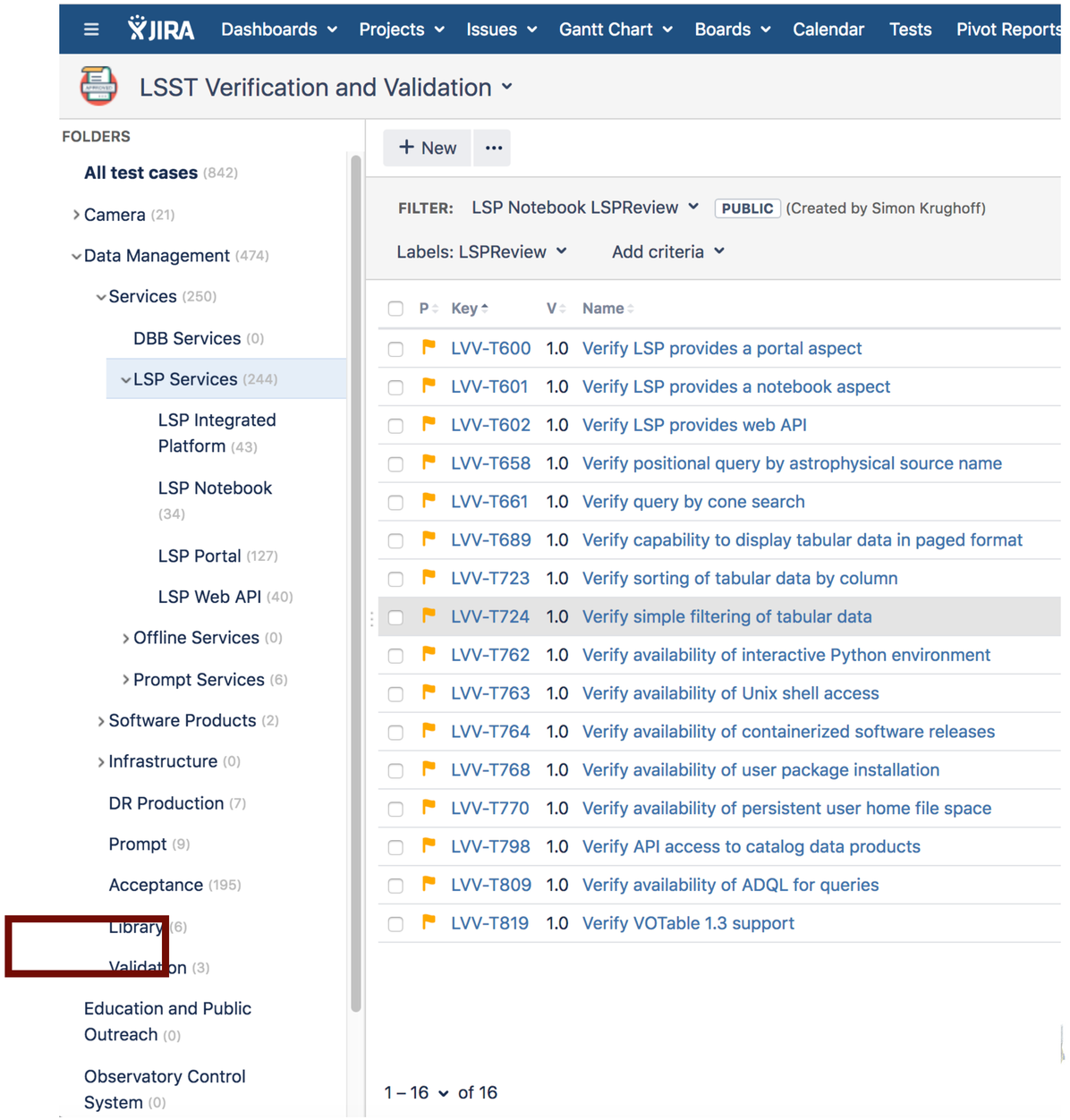
- All requirements from LSE-61 have been mapped to **Verification Elements**
- Placeholder **Test Cases** have been created for all **Verification Elements.**
- First version of LDM-639 issued for JSR 2018 with ~ 30% of **Test Cases** described
- Test specification for LDM-540 (LSP) issued with ~ 10% of **Test Cases** described
- Currently drafting detailed test scripts for all priority 1a requirements of LSE-61 for JSR-2019
  - 53 Priority 1a requirements
- Creating a library of re-usable, modular **Test Cases** that can be used to build more specific test scripts.



Test Cases

Re-usable, modular Test Cases

We are factoring out frequently repeated portions of test scripts to build a library of re-usable, modular **Test Cases** that can be inserted into test scripts.



Test Cases

Re-usable, modular Test Cases

LSST Verification and Validation / Test Cases / LVV-T849 (1.0)

Authenticate to the portal aspect of the LSP

Back | Save | New Version | 1.0 •••

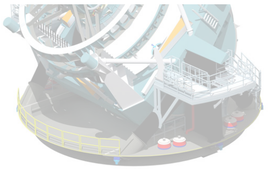
Details | Test Script | Execution | Traceability | Attachments | Comments | History

Type: Step-by-Step

Steps

	STEP	TEST DATA	EXPECTED RESULT
1	Navigate to the portal endpoint. The stable version should be used for this test and is currently located at: https://lsst-lsp-stable.ncsa.illinois.edu/portal/suit/. EXAMPLE CODE: *Click to add text*	*Click to type the test data*	Currently this drops the user into an active portal environment.
2	Though the current stable system does not authenticate currently, this step and the previous one should be updated as the system evolves. EXAMPLE CODE: *Click to add text*	*Click to type the test data*	No-op.

Hint: when editing the last step, press **tab** to add a new one.



Performance Requirements

Current Status

Work started at DMLT/SST F2F meeting in Seattle 2018 to draft performance requirements for the science pipelines, flowing down from OSS and LSR

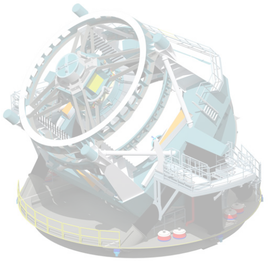
- Define metrics and specifications based on simulations and precursor data
- Trying to define performance requirements precursor data or simulations for the DMSR is difficult and not a good use of time

DMSR updated (LCR-1344) to add a section for performance metrics stating

- DMS shall include software to enable the calculation of the photometric/astrometric/ellipticity performance metrics defined in OSS-REQ-0387/0388/390

Performance metrics also defined in (not issued) LDM-502

- Based on OSS and LSR requirements



Performance Requirements

Plan

DM will not try to set performance requirements on simulations or precursor data, but will provide implementations of metrics and verify that we can calculate them.

- Run on precursor data/simulations to monitor pipelines performance and identify regressions.

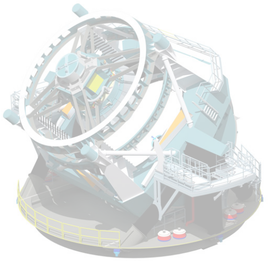
Flowdown the remaining requirements defined at the Seattle SST to the DMSR as per the photometric and astrometric reqs.

Specifications already defined in LDM-502 will be moved into corresponding OSS/LSR LVV elements in the Jira LVV project and LDM-502 discontinued

- Commissioning team have already started some work on this -> we need to merge these efforts

Several performance metrics implemented in ap_verify and validate_drp already

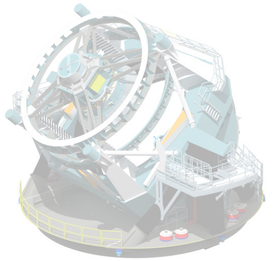
- Will continue to add to these



Overlap with Commissioning

- Strong overall with the work of the commissioning team.
  - Joint development of test cases/specifications and reusable test cases

- Commissioning workshop next week (2019-06-11/13)



Personnel

Michael Wood-Vasey, current DM V&V Scientist stepping down end July 2019

Jeff Carlin extended for another year

- Will focus on analysis of requirements and development of test cases/specifications working with DM-SST science leads and commissioning team

Open position for DM Validation Scientist

- Currently interviewing expect to have new team member onboard later this year
- Will focus on implementing tests cases, scientific validation

David Monet will be coming onboard at a 20% level, working with DM V&V and Commissioning on verification of the astrometry