Standing up SIT-Com Science Units for System-Level Science Verification and Validation

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Today's Objective

The objective of today's discussion is to collect feedback and ideas for how to provide the guidance, tooling, and organizational structure such that the newly formed SIT-Com Science Units are successful in completing the deliverables for system-level science verification and validation.

A kickoff meeting with the SIT-Com Science Unit Leads has been scheduled for Wednesday 9 November as part of the regular Wednesday Science Pipelines team meeting series.

- Everyone who normally attends the Science Pipelines team meeting is welcome and encouraged to participate as usual. We specifically invited all of the SIT-Com Science Unit leads to this kickoff meeting to share more information to help get started and provide an opportunity for questions and discussion on next steps.

Opening Remarks

The list of individuals named as SIT-Com Science Unit Leads is not intended to be exclusionary in any way, but rather to ensure that **someone** is accountable for the substantial amount of effort needed to verify the scientific performance of the as-built system.

The boundaries between Science Units are intentionally soft, and individuals can contribute in multiple areas.

Topics

- Organization and deliverables
  - Construction Completeness, operational Readiness, and proposed system-level requirements prioritization scheme
- Template for requirement specification (scientific methodology)
- Work management (i.e., Jira)
- Milestones prior to on-sky observations with ComCam and LSSTCam
- Meetings
- Commissioning era data / information sharing

Organization and Deliverables

Deliverables for Operational Readiness Review

- **Verified system-level requirements** in LSR + OSS
  - Roughly 100-200 normative "science performance" requirements for which verification involves using data from science pixels
  - Detailed specifications, test plans and reports, final compliance status
  - Impact studies in cases of non-compliance
- Documented set of **science verification and validation analysis software and visualization** capabilities to provide to Operations
- **Studies to inform LSST Operations** based on commissioning on-sky observations, e.g.,
  - Correlating delivered data quality with environmental conditions / telemetry
  - Minimum number of visits and quality of visits to use for template generation for difference imaging
  - Dithering strategy in both WFD and Deep Drilling Fields
  - Visit definition as 2 x 15 sec snaps versus 1 x 30 sec
- Drafts of **construction papers**
  - Additional publications and tech notes to document details
- Press **images**

Organizational Goals (i.e., motivation for forming Science Units)

- Focus on performance of the as-built system (rather than individual components)
- Ensure coverage of deliverables
- Motivate scientists + provide opportunities for visibility and leadership
- Create regular forum for detailed scientific/technical discussion
- Enable multiple science topics to be pursued in parallel
- Facilitate science validation / characterization beyond normative requirements
- Efficiently assign both planned work and emergent issues
- Incorporate expertise of in-kind contributors
- Match tasks to skill sets (e.g., let scientists focus on what they do best)

Science Units Overview

Organize effort around a set of **"Science Units"** that map onto system-level requirements and other construction completeness deliverables

Science Units are a way to spread the load of science verification and validation (data analysis + recommending observations + reporting issues)

⇒ Each normative requirement assigned to a science unit to ensure coverage; Systems Engineering provides support with formal verification aspects

Each Science Unit has 1-2 leads (Rubin staff) to provide scientific leadership; Units incorporate expertise from across subsystems as well as in-kind contributors

Boundaries between Units are soft; individuals may contribute in multiple topics

Charge to Science Units

- Develop **methods/algorithms for evaluating science performance of the as-built system**, including identifying needs for on-sky observations and external reference datasets, for a set of formal requirements from the OSS and LSR (see charge for details)
- Assist Science Pipelines to **implement and test software to generate diagnostic metrics and plots**; develop additional code for specialized analyses
- **Suggest, prioritize, and perform ad hoc and science validation investigations** using on-sky commissioning data; report issues and recommend potential solutions and/or further studies
- **Document the results** in the form of tech notes and (sections of) Construction Papers

Science Units are NOT responsible for…

Science Units are NOT responsible for operational aspects of observing, data processing, or adjustments to Science Pipelines; nor formal systems engineering aspects. In particular, Science Units are NOT responsible for:

- Generating observing scripts
- Pushing commissioning data through Science Pipelines
- Implementing fixes to Science Pipelines to optimize performance / respond to data quality anomalies
- Producing the Data Previews
- Formal systems engineering aspects of verification / acceptance testing

(partly by design, likely that individuals will contribute to these tasks wearing other hats)

Planned Set of Science Units

- Throughput for focused light
- Delivered image quality and PSF modeling
- Instrument signature removal / detector characterization
- Sky background / low surface brightness / ghosts and scattered light
- Photometric calibration
- Astrometric calibration / proper motions
- Survey performance / survey strategy optimization
- Object detection, quality flags, classification, survey property maps
- Difference image analysis – transient and variable objects
- Difference image analysis – Solar System objects
- Galaxy photometry / photo-z
- Weak lensing shear
- Crowded stellar fields
- Eyeball squad / beautiful images

Status of Science Units Leads

- **Throughput for focused light** – Merlin Fisher-Levine
- **Delivered image quality and PSF modeling** – Josh Meyers
- **Instrument signature removal / detector characterization** – Chris Waters and Yousuke Utsumi
- **Sky background / low surface brightness / ghosts and scattered light** – Lee Kelvin
- **Photometric calibration** – Jeff Carlin
- **Astrometric calibration / proper motions** – Clare Saunders
- **Survey performance / survey strategy optimization** – Lynne Jones and Leanne Guy
- **Object detection, quality flags, V&V sample production, survey property maps** – Peter Ferguson
- **Difference image analysis – transient and variable objects** – Eric Bellm
- **Difference image analysis – Solar System objects** – Mario Juric
- **Galaxy photometry / photo-z** – Dan Taranu and Melissa Graham
- **Weak lensing shear** – Arun Kannawadi
- **Crowded stellar fields** – TBD
- **Eyeball squad / beautiful images** – TBD

Science Pipelines representative and EPO science representative

Mapping of Tasks to Science Units

- Initial mapping of OSS and LSR requirements to Science Units available in draft charge to Science Units
  - For a few requirements, need to mapping at the level of individual verification elements (see spreadsheet for LSR and OSS)
- Draft charge also includes mapping of SIT-Com In-Kind Contributing groups and ex officio groups to Science Units
  - Science Unit leads serve as natural "technical directors" to guide day-to-day efforts
  - Ex officio groups
    - SCOC ⇒ Survey performance / survey strategy optimization
    - Photometric redshift ⇒ Galaxy photometry / photo-z
    - Alert brokers ⇒ (Difference image analysis – transient and variable objects) + (Difference image analysis – Solar System objects)
- Suggested science validation topics for individual Science Units not yet fully developed

Role of Science Unit Leads

- Provide **scientific leadership** to guide the development, implementation, and interpretation of science data analyses relevant to the Unit (see charge on previous slide)
- Report data quality analysis findings to a single meeting where overall commissioning priorities are discussed
  - Observatory commissioning
  - On-sky observing strategic and tactical planning
  - Science Pipelines development
  - Verification / systems engineering
- Offer the necessary support to empower their teammates to accomplish tasks
  - Most efficient if science unit leads are willing and able to provide coordination for the group

Role of Commissioning Science “Core Group”

- **Provide support to science unit leads to guide overall priorities and assist with coordination**
- Provide global oversight to ensure consistent approach and help to triage complex/emergent issues across the science units
- Provide support to in-kind contributions related to science validation
- Work with the Systems Engineering group to develop test plans and to complete formal acceptance testing (“witnessing”) around system-level science performance
- Synthesize needs for on-sky observations and data processing to Commissioning
- Coordinate with subsystems, as well as System Integration, Commissioning, and Operations
- Assemble and provide editorial oversight for Operations Readiness Review materials and construction papers related to the demonstrated science performance of the as-built system

Steps to Verify a typical OSS/LSR science performance requirement

- Requirements are decomposed into individual **verification elements** that have well defined specifications including pass/fail criteria
- All verification elements must have links to passed **test cases** (a single test case can cover multiple verification elements)
- The test cases can have links to the **documentation of the scientific evaluation methodology that must include a summary of the method and steps to verify the linked requirements**
  - Propose to document scientific methodology in a separate technote
- When stepping through test cases in a **test cycle**, we attach the evidence that specifications have been met, which could be accomplished by loading **metric values and diagnostic plots that have been generated using dedicated data analysis software outside the Jira system**
  - Propose to run notebooks that query Butler for persisted metric values (e.g., generated by analysis_tools) and create summary tables / plots of distributions of metric values; acceptance testing done by small group in coordination with Systems Engineering

Steps to Verify a typical OSS/LSR science performance requirement

Key point:

The formal verification evidence should be captured in the verification system, but the scientific methodology and mechanisms to characterize and verify the requirement performance parameters do not have to be fully contained in the verification system; the evidence must be version controlled, and the link to the associated code repository, data, etc., must be static.

Deliverables of Science Units

- Document science methodology in technote
  - Rubin Science Performance Metrics (RTN-038) – placeholder at the moment
- Implementation of science performance analyses as software
  - Science Pipelines (e.g., ComputeExposureSummaryStatsTask, analysis_tools, cp_verify)
    - Recommended default for analyses that touch calibration, image, or catalog-level data products directly
  - Stand-alone analyses
    - Utilities / scripts / notebooks residing in separate (project-controlled) code repo?
- “Narrative” documentation
  - Construction papers
  - Additional infrastructure papers on specific topics
  - Additional technotes

Construction completeness, Operational Readiness, and proposed system-level requirements prioritization scheme

Major Future Milestones

Celebratory Milestones: https://dmtn-232.lsst.io/

(synchronized ~monthly from P6 plan)

Current Forecast	Name
30-Sep-2022	EPO Construction Finish
18-Oct-2022	TMA Contract Complete
28-Mar-2023	Dome Complete
1-May-2023	CompleteCOMP: Camera Pre-Ship Review at SLAC
02-June-2023	3-Mirror Optical System Ready for Testing
19-Jul-2023	Engineering First Light w/ComCam
17-Oct-2023	Camera Ready for Full System AI&T
13-Mar-2024	System First Light
09-Jul-2024	Test report: Final Pipelines Delivery
09-Jul-2024	~~Mini-Survey 2~~ Science Validation Surveys Complete
16-Jul-2024	Operation Readiness Review Complete.
31-Jul-2024	Complete Delivery of Data Preview One (DP1)
01-Oct-2024	("Survey"/"Full") Operations Begins
30-Nov-2024	Survey Start **Operations milestones**
31-Mar-2025	Compete Delivery of Data Preview Two (DP2) (assume late construction finish)
31-Jan-2026	Complete Delivery of Data Release One (DR1)

Note: "first light" milestones with ComCam and LSSTCam on this table refer to delivery of science-grade image quality across full field of view; first photons on camera occurs roughly ~5 weeks earlier in current schedule.

Detailed Timeline: ComCam

2023-06-02 : 3-Mirror Optical System Ready for Testing

- Full optical system is ready and we are "on sky" for first time (i.e., first photons). ComCam has been on the telescope for nearly a year and is ready for on-sky observations

2023-06-05 : Start ComCam On-Sky Engineering w/ ComCam

- Begin on-sky electro-optical testing, including pointing, AOS look-up table

2023-07-19 : ~~Engineering First Light~~ Start System Optimization w/ComCam

- Celebratory milestone for delivery of science-grade image quality over the full ComCam field of view
- Begin optimization, AOS tuning, testing under range of conditions

2023-09-13 : Optical testing on TMA complete

- ComCam is now coming off the telescope

July 2022 Forecast

Commissioning Timeline: LSSTCam

2024-01-11 : LSSTCam Installed on TMA

- Critical lift, followed by utility hookups, quick functional checks, etc

2024-02-08 : Start On-sky Engineering w/ LSSTCam

- LSSTCam is cold, first photons through fully integrated optical system (details available). Begin pointing, AOS look-up table, etc.

2024-03-13 : ~~"System First Light"~~ Start System Optimization w/ ComCam

- Celebratory milestone for delivery of science-grade image quality over the full LSSTCam field of view
- Begin full system optimization, e.g., performance under range of conditions, tuning of closed-loop AOS

2024-04-18 : ~~Begin Science Verification~~ Start Science Validation Surveys

- Transition to mostly science-driven activities, including Science Validation Surveys

2024-07-09 : ~~Mini-Survey 2~~ Science Validation Surveys Complete

- Conclusion of Science Validation Surveys

2024-07-16 : Operation Readiness Review Complete

Commissioning Data Collection

ComCam

Electro-optical Testing at Level 3	In-dome Engineering	On-sky Engineering (~1.5 months)	System Optimization (~2 months)	
biases, darks, flats	suite of in-dome calibration	pointing, AOS testing star flats, dithering around bright stars, airmass scans	20-year LSST WFD equivalent depth, synthesizing LSSTCam FoV, prioritizing LSST DDF	**remove ComCam, install LSSTCam**

LSSTCam

Electro-optical Testing at Level 3	In-dome Engineering	On-sky Engineering (~1.5 months)	System Optimization (~1.5 months)	Science Validation Survey(s) (~2 months)
biases, darks, flats	suite of in-dome calibration	pointing, AOS testing star flats, dithering around bright stars, airmass scans	20-year LSST WFD equivalent depth in fields for extragalactic, Galactic, and Solar System science, ~100 deg^2 in multiple bands with dense temporal sampling	Menu includes pilot LSST WFD survey, ~1000 deg^2 in multiple bands to 1-2 year LSST equivalent depth Increase coverage of LSST DDFs Astrophysical targets / ToO

Big Picture Goals

Is the as-built system capable of routinely acquiring raw pixel-level data that will support the science goals of the 10-year LSST survey?

(e.g., throughput, delivered image quality, capability to calibrate)

Do we understand the distribution of delivered data quality and how **hardware, software, and observatory operations together** contribute to generating science-ready data products?

Prioritization of Commissioning SVV Studies

Fixed by the telescope, camera, and observing strategy

Potential to be continually improved through refinements of the Science Pipelines

Image quality (PSF profile, ellipticity), system throughput, ghosts/scattered light, sky brightness and readout noise, detector anomalies

Instrument signature removal

Threshold for starting System Optimization

Visit-level PSF modeling, photometric, and astrometric calibration

Coaddition, difference imaging, deblending, galaxy photometry including shape measurement, moving object link-age, and proper motions

Prioritization of Commissioning SVV Studies

Fixed by the telescope, camera, and observing strategy

Potential to be continually improved through refinements of the Science Pipelines

Image quality (PSF profile, ellipticity), system throughput, ghosts/scattered light, sky brightness and readout noise, detector anomalies

Instrument signature removal

Threshold for starting Science Validation Survey(s)

Visit-level PSF modeling, photometric, and astrometric calibration

Coaddition, difference imaging, deblending, galaxy photometry including shape measurement, moving object link-age, and proper motions

Prioritization of Commissioning SVV Studies

Fixed by the telescope, camera, and observing strategy

Potential to be continually improved through refinements of the Science Pipelines

Image quality (PSF profile, ellipticity), system throughput, ghosts/scattered light, sky brightness and readout noise, detector anomalies

Instrument signature removal

Operations Readiness Review

Visit-level PSF modeling, photometric, and astrometric calibration

Coaddition, difference imaging, deblending, galaxy photometry including shape measurement, moving object link-age, and proper motions

Proposed Prioritization for System-level Science Performance Requirements

Proposed

1a: Must be demonstrated to achieve “System First Light” milestone

1b: Must be demonstrated for Construction Completeness

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.

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.

Proposed

Prioritization of Commissioning SVV Studies

Fixed by the telescope, camera, and observing strategy

Image quality (PSF profile, ellipticity), system throughput, ghosts/scattered light, sky brightness and readout noise, detector anomalies

Instrument signature removal

System First Light (1a)

Visit-level PSF modeling, photometric, and astrometric calibration

Coaddition, difference imaging, deblending, galaxy photometry including shape measurement, and moving object link-age

Proper motions

Potential to be continually improved through refinements of the Science Pipelines

VERA C. RUBIN OBSERVATORY

Proposed

Prioritization of Commissioning SVV Studies

Fixed by the telescope, camera, and observing strategy

Image quality (PSF profile, ellipticity), system throughput, ghosts/scattered light, sky brightness and readout noise, detector anomalies

Instrument signature removal

Construction Completeness (1a + 1b)

Visit-level PSF modeling, photometric, and astrometric calibration

Coaddition, difference imaging, deblending, galaxy photometry including shape measurement, and moving object link-age

Proper motions

Potential to be continually improved through refinements of the Science Pipelines

Prioritization of Commissioning SVV Studies

Fixed by the telescope, camera, and observing strategy

Potential to be continually improved through refinements of the Science Pipelines

Image quality (PSF profile, ellipticity), system throughput, ghosts/scattered light, sky brightness and readout noise, detector anomalies

Instrument signature removal

Operations Readiness (1a + 1b + 2)

Visit-level PSF modeling, photometric, and astrometric calibration

Coaddition, difference imaging, deblending, galaxy photometry including shape measurement, and moving object link-age

Proper motions

Construction Completeness

Recently updated version of (RTN-011) clarifies on-sky observing plan in the event that the timeline for on-sky observations during commissioning is further compressed:

> “The late dates for the DP2 and DR1 data release milestones allow for the possibility that the Project completes within its late date, but in doing so reduces the amount of on-sky LSST Cam commissioning time. *In this eventuality, the operations team would spend up to 3 months at the start of the full/survey operations phase completing any remaining Science Validation Survey observations, such that DP2 could be realized as planned.* The LSST survey will start shortly after the completion of the SV surveys.”

Proposed

Possible Scenario

- LSSTCam On-sky Engineering
  - Data needed to verify system-level 1a and 1b requirements is collected as part of achieving System First Light milestone
  - Priority 1a requirements verified as part of System First Light milestone
- LSSTCam System Optimization
  - Priority 1b requirements verified to demonstrate readiness to begin SV Surveys
  - Construction completeness achieved
- SV Surveys
  - Functional rehearsal for operations readiness
- Start LSST (follows completion of SV Surveys)
- DP2 release (completion of SV Surveys + 6 months)
  - Priority 2 requirements verified as part of preparation for DP2
  - Construction papers that involve on-sky data from LSSTCam appear at time of DP2 release and become part of the documentation package for DP2
- LSST DR1 release (completion of SV Surveys + 12 months)

Template for requirement specification (scientific methodology)

Developing Detailed Specifications for Science Performance Metrics

At the DM-SST virtual face-to-face meeting of 2021-02-22 we reviewed DMSR requirements related to science performance (slides) and developed a plan of action to implement metrics and/or develop specifications

DMSR has partial overlap with system-level science requirements in the OSS and LSR

As with the DMSR, some of the system-level requirements are challenging to interpret in terms of developing detailed specifications with well-defined pass/fail criteria

Proposed Approach

Rather than using Jira LVV system directly, propose to capture scientific methodology to evaluate science performance requirements in a separate technote that would be linked from Jira

- Target audience includes both developers and general LSST science users
- Contains algorithmic description at the level of pseudo-code, including mathematical procedures as well as pass / fail criteria

Useful to have a google-doc type scratch space before going to repo?

Any preference between RST and LaTex?

Proposed Template

- Requirement identifier
  - e.g., DMSR, OSS, LSR
- Metric name
- Detailed specification
- Pass / fail criteria
- Implementation
  - Initially, this is a proposed plan (e.g., implement in analysis_tools, cp_verify, or standalone script/notebook)
- Dataset(s) to use for verification
  - Default to select from menu of planned on-sky observations
    - Goal to complete initial verification as far forward in time as possible (i.e., don't save all the verification work for the end of SV surveys)
  - Note any special observation considerations (e.g., airmass range, band coverage, minimum visits)
  - Note any specialized data processing
  - Note any needed external datasets

Open Questions

- How do we document non-normative metrics developed for science validation purposes? Should we use same document?
- How should we distinguish between documenting current implementation and aspirational implementation?

Work Management / Jira

Jira

- DM project
  - Propose to continue using DM project for development on Science Pipelines packages (e.g., analysis_tools, cp_verify)
  - Expect that work done by Science Units is likely to lead to tickets being filed in DM project to request functionality and to address emergent issues
- SIT-Com project
  - Reference: SIT-COM Work Management and Organization (SITCOMTN-023)
  - Use cases for SIT-Com Jira project:
    1. Planned work linked to level 2 and level 3 milestones described in P6
    2. Planned work not linked to a milestone
    3. Unplanned emergent issues
- LVV project
  - LSST Verification and Validation project gathers all the requirement verification and validation procedures as well as incremental testing procedures
  - Propose to assign Science Unit Leads to individual verification elements formalize mapping to Science Units; these can be further delegated as appropriate

System-level Science Performance in Jira (LVV)

LSR Science Verification LVV Verification Elements in Jira

OSS Science Verification LVV Verification Elements in Jira

Spreadsheet with proposed updates to verification element decomposition

- Included proposed prioritization (1a, 1b, 2, 3)

Open Questions

- Suggestions / recommendations for work management for system-level science verification preparation?
    - What has worked well for DM verification?
    - Organization into epics / stories?
- Interaction between DM project and SIT-Com Jira projects
    - It is possible to point to epics / tickets in other projects from the SIT-Com Jira project

Milestones prior to on-sky observations with ComCam and LSSTCam

Proposed Sprints / Milestones

Types of milestones:

- "Specifications review"
  - Success criteria is algorithmic descriptions in tech note
  - Identify any missing functionality (e.g., external reference datasets)
- "Implementation"
  - Success criteria is functional data analysis code in analysis_tools, cp_verify, or similar package that can persists metric values in Butler
- "Rehearsal"
  - Success criteria is retrieving metric values, summarizing results, and determining whether pass/fail

Schedule for sprints / milestones to be coordinated with overall construction schedule; schedule workshop scheduled for 16-17 November

Proposed Sprints / Milestones

- Specifications review for First Light (1a) analyses
- Specifications review for Construction Completeness (1a + 1b) analyses
- Implementation of First Light (1a) analyses – precursor dataset
- Implementation of Construction Completeness (1a + 1b) analyses – precursor dataset
- Rehearsal of Construction Completeness (1a + 1b) analyses – precursor dataset
- Implementation of Construction Completeness (1a + 1b) analyses – precursor dataset – AuxTel imaging survey
- Rehearsal of Construction Completeness (1a + 1b) analyses – AuxTel imaging survey
- Specifications review for Operational Readiness (2) specifications
- Implementation of Operational Readiness (2) specifications – precursor datasets
- Rehearsal for

Meetings

Focus for today’s discussion

Focus of today’s discussion is on **time period between now and ComCam on sky**

Anticipate that there will be a phase change around time of going on-sky with ComCam

Existing Standing Meetings

- DM-SST
  - By design, many DM-SST members are part of Science Units and/or “core group”
- DRP metrics monitoring
  - Current monthly cadence
  - Current focus on HSC RC2, DC2 ; driven by Science Pipelines development
- AP metrics monitoring (??)
- Science Pipelines cowork
  - Current weekly cadence
  - Not sure if this is the “right fit” for Science Units
- Rubin Data Reduction and Planning
  - Current every 2 weeks cadence
  - To date has been focused on data collection, processing, and interpretation for AuxTel (spec + imaging) and ComCam calibration data from summit
  - Still in the phase of standing up the infrastructure to routinely process and interpret the quality of data from the summit

Possible New Standing Meetings

- Status / decision-making meeting
  - Rotating focus so as to touch each Science Unit every 1-2 months
  - Science Units would
    - Present verification strategy for system-level requirements
    - Describe additional science validation studies
    - Update implementation status, questions, outstanding issues
- Coworking meeting
  - Model off successful Science Pipelines cowork
  - Creates regular time for many groups to be discussing / working in parallel
  - Common coworking time facilitates interactions across Science Units and reduces organizational burden for each Science Unit to establish their own meeting series
- Leave it up to each individual Science Unit to decide what works for them
  - Individuals distributed across time zones
  - Some Science Units might already have natural

Workshop/Sprint-based Approach

Alternative to creating new standing meetings would be to plan a series of (virtual) workshops and/or sprints over the coming months

- Each workshop / sprint has specific goals
  - Could be tied to milestone
- Assign homework prior to the workshop / sprint
  - Identify and prepare dataset to be used for development and testing
  - Refine goals, expected outcomes, success criteria
  - Ensure that needed infrastructure is in place
- Potential advantages
  - Reduce additional standing meetings / scheduling challenges
  - Building up team mentality

Kickoff Meetings

- Kickoff with Science Unit Leads + Science Pipelines 9 November
- Kickoff with broad science verification and validation effort (December 2022 ??)

Asynchronous Communication

- Suggest to continue to use #rubinobs-analysis-tools for package-specific discussion
- Suggest to revive #rubinobs-science-verification for general discussion on scientific methodology
  - Open channel actively used during development of faro package, but has become quiet in recent months
  - Encourage use of threading
  - Science focus more than systems engineering focus
- Continue using #rubinobs-sitcom-surveys for discussion of on-sky data collection strategy
  - There is separate channel for virtual control room
- Individual Science Units might already have active channels for specific projects
  - Suggest to collect these on Science Unit confluence pages for transparency

Commissioning Era
Data/Information Sharing

Caveats

This section is work in progress – still trying to understand boundary conditions and process for developing guidelines / policy

Boundary Conditions

We have a set of documents that set basic boundary conditions

- Project Publication Policy (LPM-162)
- Vera C. Rubin Observatory Data Policy (RDO-13)
- Announcement of Opportunity: Community Engagement with Rubin Observatory Commissioning Effort (SITCOMTN-10)
    - LSST Community post with FAQs

but there remain several open questions around the details of the communication channels we use to discuss on-sky data, discussing derived data products with the broader LSST science community prior to Data Previews, and how to handle the transition from “commissioning science validation” to members of the commissioning team writing independent science papers based on Data Previews that do not go through the Rubin Observatory publication process.

Ideally, we would provide team with clear guidelines for what to expect well before we go on sky with ComCam. This is important for establishing norms, expectations, and culture within the team, and to help the team to focus on priority tasks during the intense period of on-sky commissioning. This is also important for our interactions with the broad science community and for the Rubin Observatory Communications team.

Boundary Conditions

Vera C. Rubin Observatory Data Policy (RDO-13)

5.4 Commissioning Data

In this section, the term commissioning refers to the final stages of the Rubin Observatory Construction Project, starting from first light and continuing through Science Validation, up to the start of full Operations. Commissioning data include data from the single-raft commissioning camera (ComCam) and the full LSST camera. Production of data products from commissioning is the responsibility of the commissioning team and will have QA levels that could differ from those in operations. Provision of commissioning data products to LSST Users is the responsibility of the Rubin Observatory (pre)-Operations team and will be at a level that resources permit, with a goal to provide access to Users via an early version of the US DAC and RSP.

DPOL-514 Commissioning Team: *The commissioning team may select and include non-staff members that will perform analysis of commissioning data that is necessary for successful Rubin Observatory commissioning.*

DPOL-515 Commissioning Data: *Release of commissioning data to LSST Users will be as resources permit and at the discretion of the Rubin Observatory Operations team. Commissioning data will be proprietary and subject to the same policies as LSST data during operations.*

DPOL-516 Science Data from Commissioning: *Scientific analysis of the commissioning data will be an integral and necessary part of the science verification process. All commissioning data used for science will be released to all LSST Users prior to any publication by anyone. Members of the commissioning team may not submit science papers to a journal and/or the arXiv based on commissioning data prior to the release of those data to LSST Users, but they may undergo the Rubin Observatory Publication Board process (this board is part of the construction project, not operations) in advance of the release of those data.*

Boundary Conditions

Project Publication Policy (LPM-162)

This policy covers the public presentation of LSST engineering requirements and products. Two types of publications are recognized in this policy: 1) technology papers that describe LSST infrastructure, and 2) data release papers.

This policy covers all publications that describe LSST Project-funded work to design, develop, construct, commission, or operate the LSST, and all publications based on access to non-public intellectual property of the LSST Project or proprietary information related to the LSST Project.

This policy does not cover LSST papers that rely only upon public data. Science collaborations are encouraged to develop publication policies that recognize the contributions of those who brought the Project to fruition, through citation of relevant technical and data release publications. This policy also does not cover posters, presentations (e.g. those given at talks) and abstracts, DocuShare documents handled by the CCB, and community.lsst.org forum posts.

All papers that have any authors who are supported by LSST Project funds to conduct the LSST infrastructure work described in the paper also fall under the LSST Project Publication Policy. The Publication Manager has authority to grant an exception if the contribution from project-supported authors is very minor and an internal review of the paper is being conducted within a science collaboration.

Boundary Conditions

Announcement of Opportunity: Community Engagement with Rubin Observatory Commissioning Effort (SITCOMTN-010)

LSST Community post with FAQs

Possible Guiding Values

- Allowing team to focus on Rubin Observatory Construction priorities
- Robust science analysis
- Transparency
- Education / training
  - i.e., guidelines and policies that encourage high-quality documentation of findings

Not yet fully developed ideas

Possible Phased Approach

Prior System Optimization: Prior to the delivery of science-grade image quality across the full field of view (i.e., "First Light" milestone / Start of System Optimization) with ComCam and LSSTCam, all communications regarding on-sky data products are internal to Rubin Observatory.

Between System Optimization and Data Previews Release: Information sharing (e.g., showing Derived Data Products) beyond Rubin Observatory occurs through publicly visible channels that are broadly accessible to the LSST Science Community, specifically

- Tech notes (gold standard)
- Notebooks in repositories maintained by Rubin Observatory
- LSST Community forum posts

After Data Previews Release: Construction papers document the major findings on the scientific performance of the as-built Rubin Observatory and the attributes of data products released as part of Data Preview 2. We expect that there will be additional infrastructure / technology papers that fall under the Project Publication Policy.

For science publications based on public data that are co-authored by members of Rubin Commissioning team and that directly benefited from early access to commissioning era data products, these are not formally covered by the Rubin Publication Policy, but we suggest the following patterns:

- Announce plans for science publications as soon as possible
- Circulate draft in advance of submitting / posting paper (~1 week timescale??)
- Include standard acknowledgment