System Integration, Testing and Commissioning (SIT-Com) Status
Update to the Science Collaboration Chairs: May 26, 2021
C. Claver with S. Thomas, K. Riel, A. Roberts
Agenda for the Science Collaboration Chairs

- Quick overview of revised schedule and current activities
- Key near term milestones
- Commissioning data releases
- Opportunity for commissioning engagement
- Closing out the construction project
Features of the re-baseline schedule:

- Telescope mount assembly remains the critical path. Significant uncertainty remains due to COVID.
- Dome Completion estimated May 2022
- Level-3 integrated systems tests with active optics control of M1M3, M2 and hexapod/Rotator
- Added the early integration activities with ComCam on level 3 while waiting for the TMA to be complete (FY21
Systems at Level-3 in the Summit Facility (clockwise from the bottom):

- ComCam+
- PathFinder
- Camera Cart w/integrating assembly
- M2 Cell w/surrogate mirror
- Coating plant & washing station
- M1M3 cell w/surrogate mirror
- M1M3 thermal systems (boxes)
Features of the re-baseline schedule:

- Added the early integration activities with ComCam on level 3 while waiting for the TMA to be complete (FY21)

- Installation of ComCam and the refrigeration pathfinder on the TMA earlier (FY22)

- Testing of systems on TMA starts Feb. 2022

- Engineering first light w/ComCam Nov. 2022

- LSSTCam integration Jan. 2023
Site View of Integration Status

Chile:
- ComCam + PathFinder at functioning at Level-3
- Camera Cart Assembly testing Hexapod/Rotator & CCW
- Mirror Systems verification tests of M1M3 and M2
- Commissioning Computing Cluster HW installed
- Engineering & Facilities Database operational and recording data for verification analysis
- Command script processing
- AuxTel (addressing technical issues)

Tucson
- Software test stand (needed before NCSA move)
- Calibration integration

SLAC
- LSSTCam I&T (presentations presented at this meeting)
- Shipping verification test (currently delayed)

NCSA
- System software test stand (will eventually be moved to Chile)
- Gen-3 Butler
- Rubin Science Platform
- Engineering & Facilities database mirror

ComCam + refrigeration PathFinder integrated at Level-3 - ComCam running in stable state for past few months

PathFinder plumbed and ready at Level-3 - Cold system turned on this week for functionality test - <-30C achieve in ~2min - next up heat load testing

LSSTCam shipping test preparations (left, center) and filter exchange procedure test (right)
Key Milestones

We track of technical milestones and system integration milestones ([https://sitcomtn-006.lsst.io](https://sitcomtn-006.lsst.io)).

Upcoming Technical Milestones for 2021-Early 2022

- June 15th, 2021: ComCam + Pathfinder integrated on cart
- October 1st, 2021: ComCam and Pathfinder testing start on TMA
  - Dome weather tight
  - TMA is ready for control testing
  - EAS equipment is ready for testing and optimization (EAS ready for Version 4)
- August 1st 2021: Scheduler Driven Observation with AuxTel
- February 7th 2022: Integration of the M1M3 cell on the TMA
  - TMA contract complete
  - M1M3 software

Upcoming System Integration Milestones

- IM1: ComCam image capture/archive with Gen-3 butler: 2021-04-23 merged with IM2
- IM2: ComCam image processing with Observatory Control System Processing (OCPS): May 2021
- IM3: Scripted Observing plus OCPS Image Process with AuxTel: June 2021
Other dates to watch

- Announcement of opportunity - early June (see following charts)
- Re-baseline Review - June 15-17, Virtual
- Rubin 2021 Project-Community Workshop - August 9-13, Virtual
- Joint (NSF/DOE) Status Review - September 13-15, Virtual
- AMCR - September 23-24, 27, Virtual
Upcoming I&T events (FY21Q3 and Q4)

- Software integration of
  - Pointing Component and MTMount Simulator
  - MTMount Simulator + M1M3, M2 and Cam Hexapod at Summit Facility Level-3
  - MTAOS + M1M3, M2 and Cam Hexapod

- ComCam image data + header services, archiver and DM pipeline

- Cart Assembly - ComCam + PathFinder + Rotator/CCW (HW and SW components)
  - Support utilities
  - Refrigeration systems
  - Communications links for Command, Control & Data transfer
Looking longer term: Commissioning Data

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Credit: Phil Marshall
Community Engagement with Commissioning

Key objectives of the AO:
- Seeking expertise from the community
- Commitment to advance the commissioning effort
- Provide early data access during the commissioning phase
- Provide training opportunities

Timeline:
- June AO release - June 2021
- PCW QA session - Aug 9-13, 2021
- AO responses - Sep 31, 2021
- Project Response - Dec. 2021
Project Closeout: Completion Criteria

Governing Documents:

Agency:
- NSF Major Facilities Guide (NSF-19-68) sections:
  - 2.4.2.1 – Project Closeout Process,
  - 3.4.2.15 – Commissioning
  - 4.4 – System Integration, Testing and Acceptance
  - 4.5 – Documentation Requirements.
- AURA-NSF Rubin Cooperative Services Agreement

Project:
- LPM-17 Science Requirements Document
- LPM-54: Rubin Project Execution Plan
- LSE-360: Rubin Commissioning Execution Plan
- LSE-29: LSST System Requirements
- LSE-30: Observatory Specifications Document
- LSE-79: Commissioning Plan
- LSE-160: Verification Plan

Rubin Construction Completeness Criteria: https://sitcomtn-005.lsst.io - in review
10 categories of completeness criteria

1. LSST System Requirements (LSE-29) & SRD (LPM-17) Verification/Validation
2. Observatory System Specifications (LSE-30) Verification
3. Verification of Data Processing, Products and User Services
4. Science Data Quality Assessment
5. 30-day Science Validation Survey
6. Recording and Archiving of the System State & Technical Data
7. Verification of Education and Public Outreach
8. Operational Procedures
9. As-Built Record, Modifications, non-Compliance and Recommendations
10. Rubin Operations Team Readiness

For each category we detail the following:
- Statement of the completeness requirement
- Statement of the intended objective of the requirement
- Specific criteria for meeting the requirement
- Pre-operations interactions (if any)
- Artifacts to be delivered by the Project
A list of items to deliver to NSF as part of completion:

1. Final Education and Public Outreach (EPO) Report (to NSF) to close MREFC WBS 05C
   a. This report is not cumulative; it is the last annual report of the project and should be written specifically for the most recently completed budget period.

2. Final Outcomes Report (for general public)
   a. EPO Team is writing a final construction paper for publication that summarizes the EPO program as delivered.

3. Demonstration of Requirements Verification

Also see description of specific program deliverables of EPO in the document: *Construction Completeness and Operations Readiness Criteria* ([SITCOMTN-005](#)).
Questions?