VERA C. RUBIN OBSERVATORY

Rubin Alert Status

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NSF AURA U.S. DEPARTMENT OF ENERGY SLAC CHARLES AND LISA SIMONYI FUND FOR ARTS AND SCIENCES LSST CORPORATION

A powerful Data Management system will provide science-ready data products on rapid timescales.

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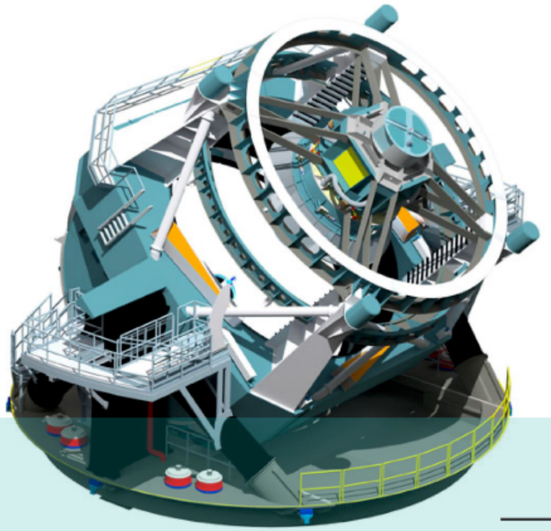
Raw Data: 20TB/night

Sequential 30s images covering the entire visible sky every few days



LSST SCIENCE PIPELINES

Prompt Data Products

Alerts: up to 10 million per night

60s via nightly alert streams

Raw & Processed Visit Images, Difference Images, Templates

Transient and variable sources from Difference Image Analysis

Solar System Objects: ~ 6 million

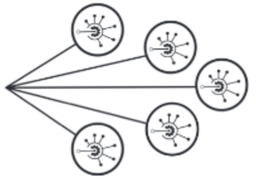
24h via Prompt Products DB

Data Release Data Products

Final 10yr Data Release:

- Images: 5.5 million x 3.2 Gpixels
- Catalog: 15PB, 37 billion objects

via Data Releases



Community Brokers

Rubin Data Access Centres (DACs)

USA (USDF)
Chile (CLDF)
France (FRDF)
Uniter Kingdom (UKDF)

Independent Data Access Centers (IDACs)

Access to proprietary data and the Science Platform require Rubin data rights

LSST Science Platform

Provides access to LSST Data Products and services for all science users and project staff

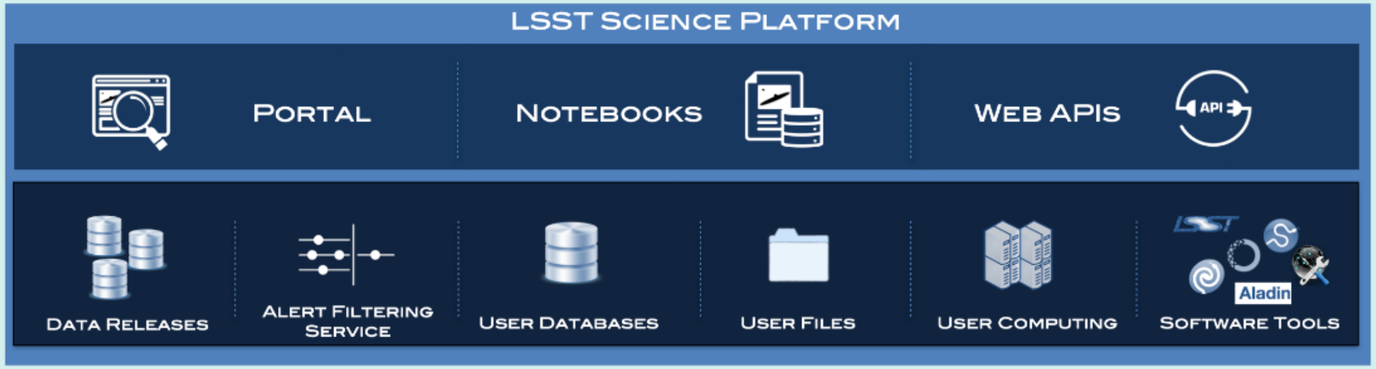


Figure credit: Leanne Guy

Rubin has agreed to send the full alert stream to seven brokers; others will operate downstream.

Seven brokers were selected for direct access to the full alert stream:

- ALeRCE
- AMPEL
- ANTARES
- Babamul
- Fink
- Lasair
- Pitt-Google

Two additional brokers were recommended to operate downstream:

- SNAPS
- POI/Variables

All brokers have active prototypes working with ZTF data.

Alert formats and distribution have remained stable.

Alerts will be serialized with Apache Avro.

- current schemas are available at https://github.com/lsst/alert_packet
- (see also https://dm.lsst.org/sdm_schemas/browser/)

Alerts will be distributed with Apache Kafka.

Bulk alerts are available at https://github.com/lsst-dm/sample_alert_info
New samples are coming from our latest reprocessing runs to capture improvements in false positive rate, cutout handling, schema changes, prototype Real/Bogus, etc.

DMTN-093 provides an overview of the alert distribution system.

We have been providing sample alert streams to broker teams.

A test deployment of the Rubin Alert Distribution system in the Google IDF has been available to broker teams for some months.

Production deployment of the alert distribution system to the USDF is in progress.

Scale, latency, and load testing with broker teams from the USDF alert distribution system will follow using DC2 alerts later this fall.

We're developing a plan for when we can send the first LSST alerts to brokers.

We anticipate sending the first alerts during the commissioning period, after the System First Light milestone.

Once Alert Production begins we anticipate that it will continue throughout the ten-year LSST survey.

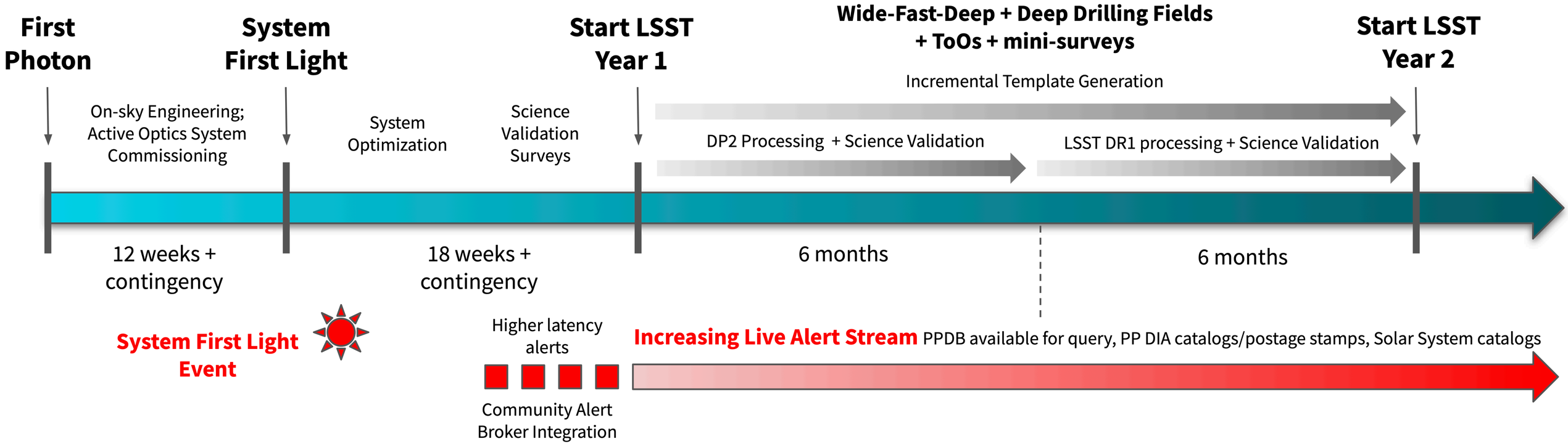
Need to ensure technical, scientific, and operational readiness for beginning Alert Production.

- necessary pipelines and services deployed
- useable scientific quality of the the alerts
- operational procedures and documentation in place

We plan to only send public data to broker teams.

Look for a technote on this in the next couple of months.

Alert Production will ramp up as templates become available.



Data Preview 1
Subset of DRP processed visit images from System First Light to familiarize community with a small amount of on-sky data

All current-draft construction tech notes on science performance available

Data Preview 2
DRP coadd images, objects, DIA catalogs, forced sources; Commissioning science validation data
Science Performance Construction Papers Complete

LSST DR1
Data Release Processing from first 6 months of LSST

K. Bechtol

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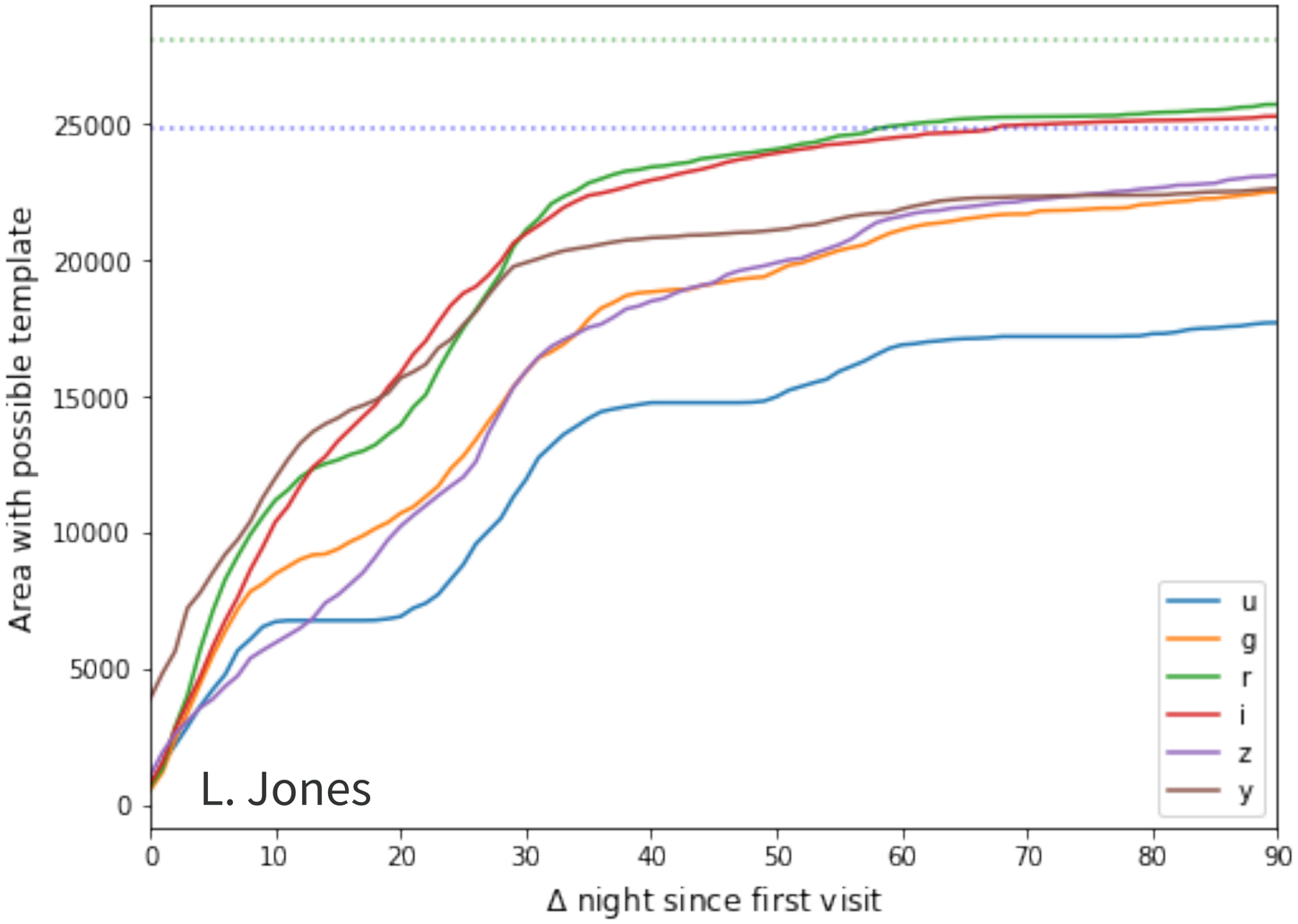

We will generate templates incrementally as images of sufficient quality become available.

Commissioning and Deep Drilling fields will provide earliest template coverage.

We are studying tradeoffs in incremental template generation strategy.

Rubin Observatory will provide a powerful resource for time-domain astronomy.

Community alert brokers will be vital for enabling followup-driven science.

Rubin commissioning will begin next year, with the full survey expected in 2025.

Look for further documents and discussion of how we'll integrate broker teams this fall.

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OBSERVATORY