

# LSST Operations: Sites and Data Flows

CCI2P3

Data Release Production  
Data Access center



## Archive Site

### Archive Center

Alert Production  
Data Release Production  
Calibration Products Production  
EPO Infrastructure  
Long-term Storage (copy 2)

### Data Access Center

Data Access and User Services

## Dedicated Long Haul Networks

Redundant 100gbps paths from Chile to Florida

## Summit and Base Sites

Telescope and Camera  
Data Acquisition  
Crosstalk Correction  
Long-term storage (copy 1)  
Chilean Data Access Center



## HQ Site

Science Operations  
Observatory Management  
Education and Public Outreach



Lyon Meeting





# LSST From the Astronomer's Perspective



- A stream of ~10 million time-domain events per night, detected and transmitted to event distribution networks within 60 seconds of observation.
- A catalog of orbits for ~6 million bodies in the Solar System.

Level 1

- A catalog of ~37 billion objects (20B galaxies, 17B stars), ~7 trillion observations (“sources”), and ~30 trillion measurements (“forced sources”), produced annually, accessible through online databases.
- Deep co-added images.

Level 2

## Level 2.5(proposed)

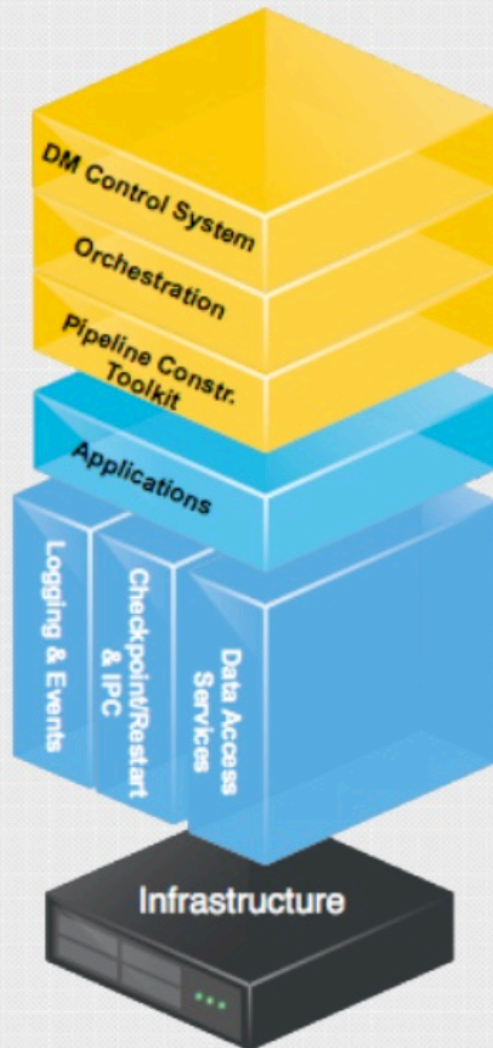
User specified processing integrated into Annual Processing

- Services and computing resources at the Data Access Centers to enable user-specified custom processing and analysis.
- Software and APIs enabling development of analysis codes.

Level 3



# Middleware Layer: Isolating Hardware, Orchestrating Software



*Enabling execution of science pipelines on hundreds of thousands of cores.*

- Frameworks to construct pipelines out of basic algorithmic components
- Orchestration of execution on thousands of cores
- Control and monitoring of the whole DM System



*Isolating the science pipelines from details of underlying hardware*

- Services used by applications to access/produce data and communicate
- "Common denominator" interfaces handle changing underlying technologies



# Going Where the Talent is: One Distributed Team



UI

Database

Core Algorithms ("Apps")

Middleware

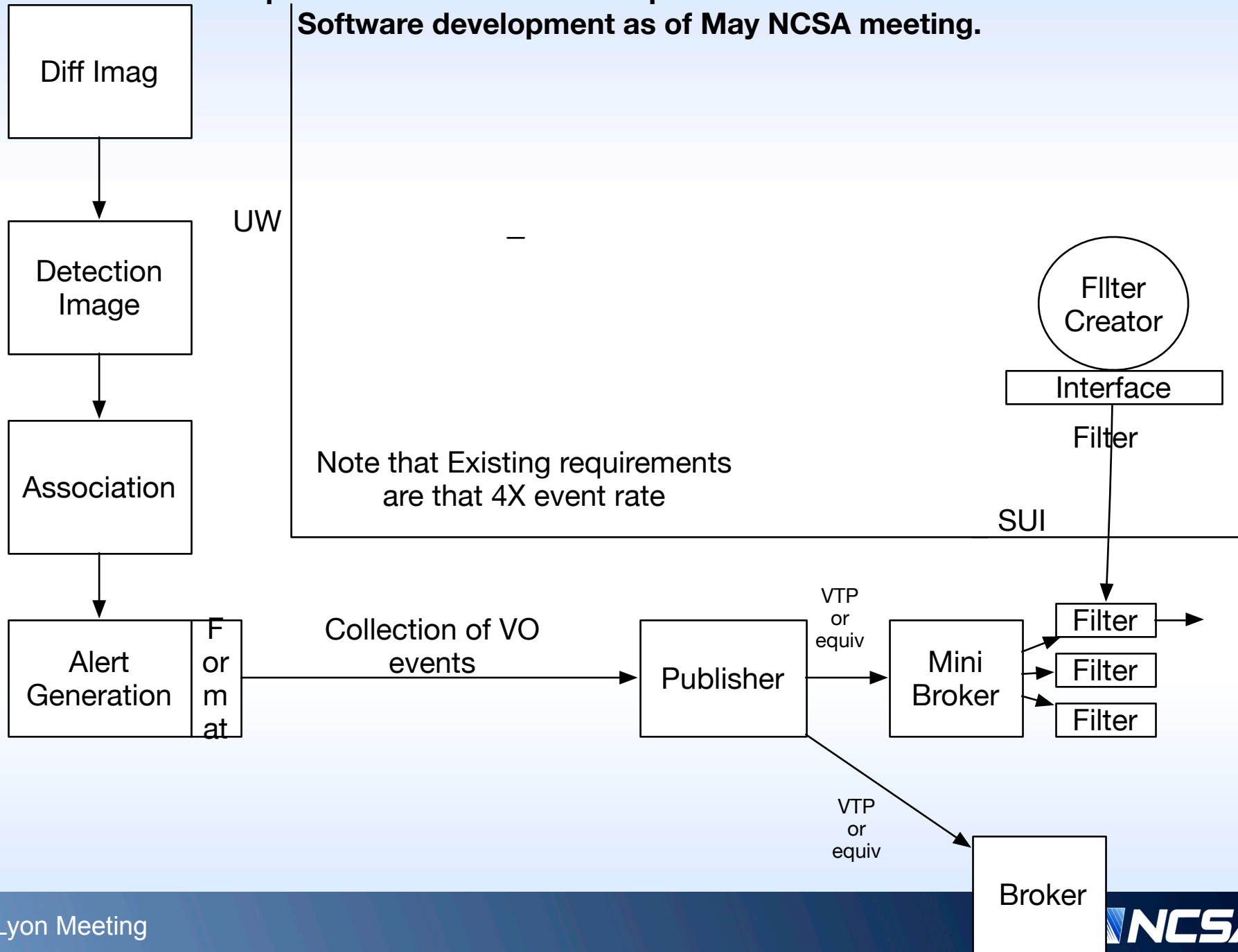
Infrastructure



Mgmt, I&T, and Science QA



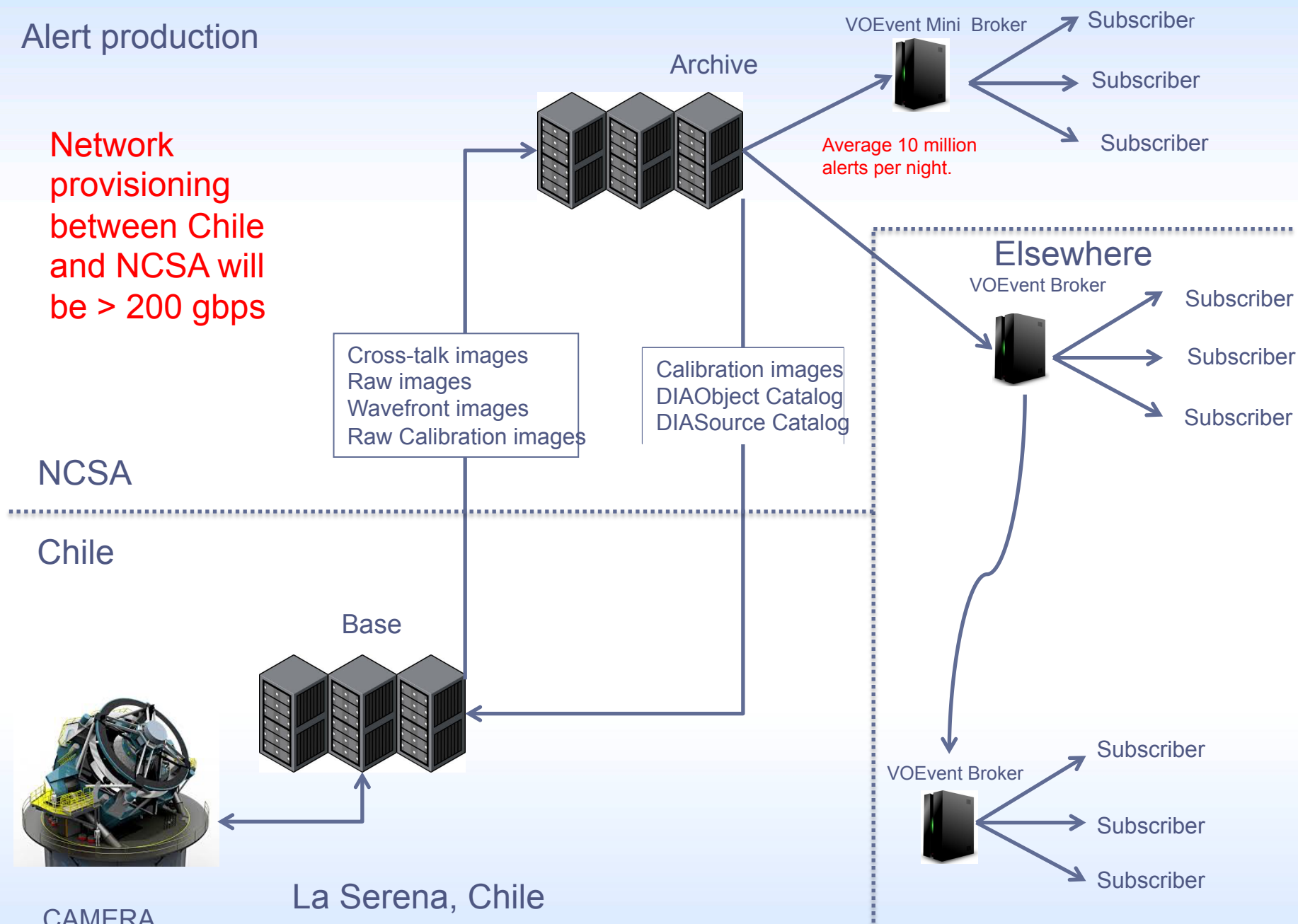
## Components and Division of responsibilities for Alert/ VOEvent Software development as of May NCSA meeting.





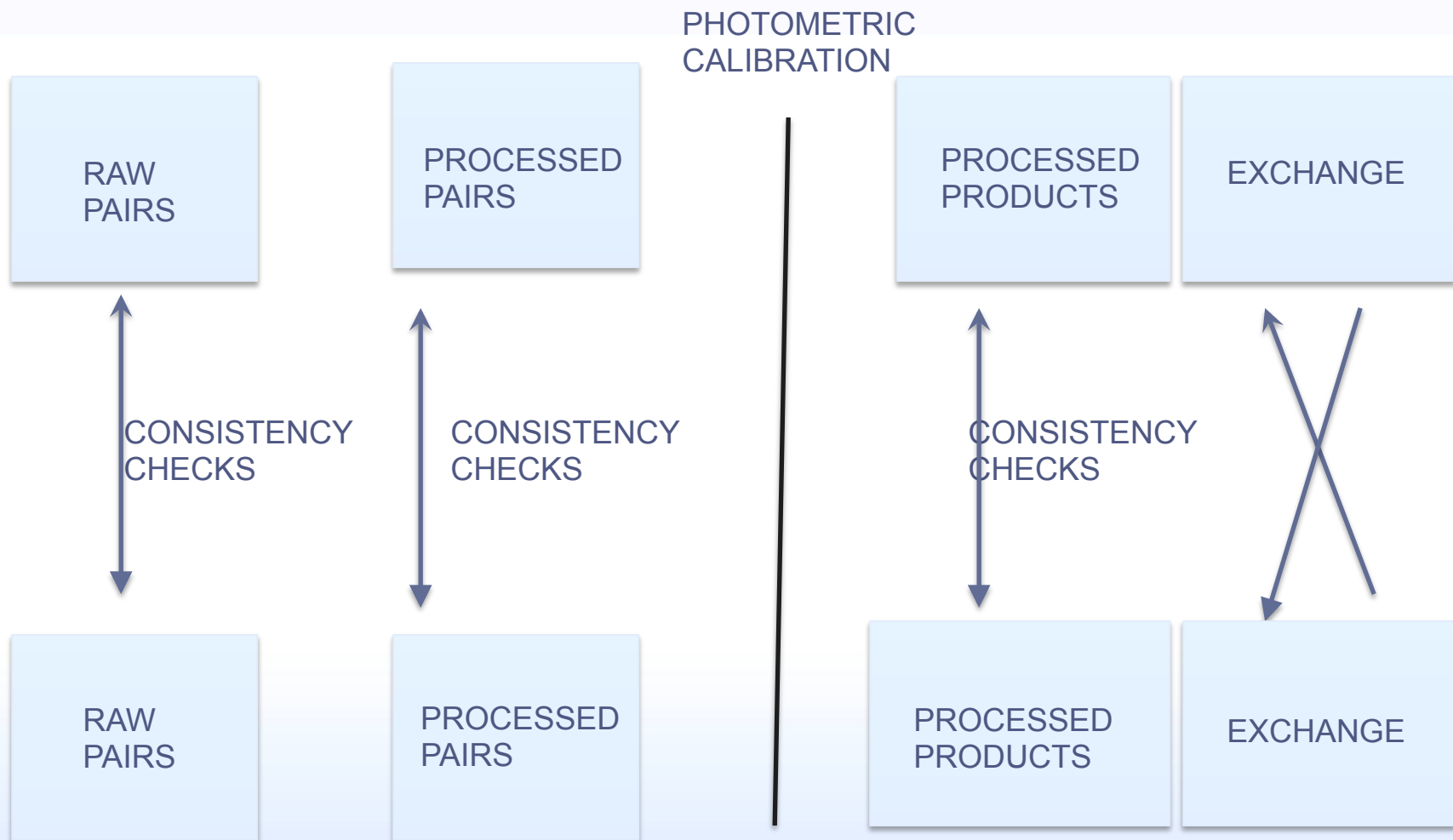
## Alert production

Network  
provisioning  
between Chile  
and NCSA will  
be > 200 gbps





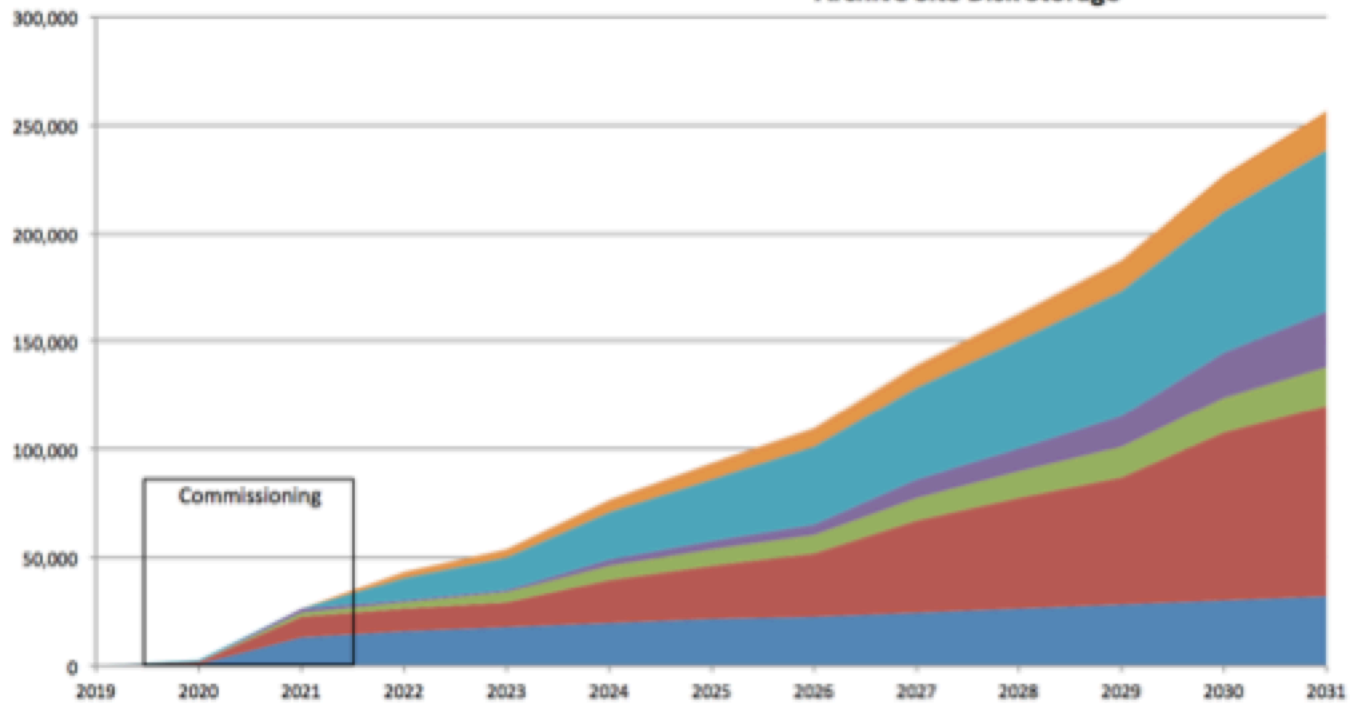
# Elements of a Level 2 Production Cadence





# LSST Capacity Baseline

Archive Site Disk Storage





# Other Provisioning Considerations

- Data Center Interoperation
  - A satellite data center in Europe will assist with the data release production.
  - A major customer of DES and LSST data are DOE laboratories.
    - NCSA will define the exchange mechanisms
- However...
  - The overall community desires that the production methods be reasonably re-useable by others.

# Concept (draft) of Operations

