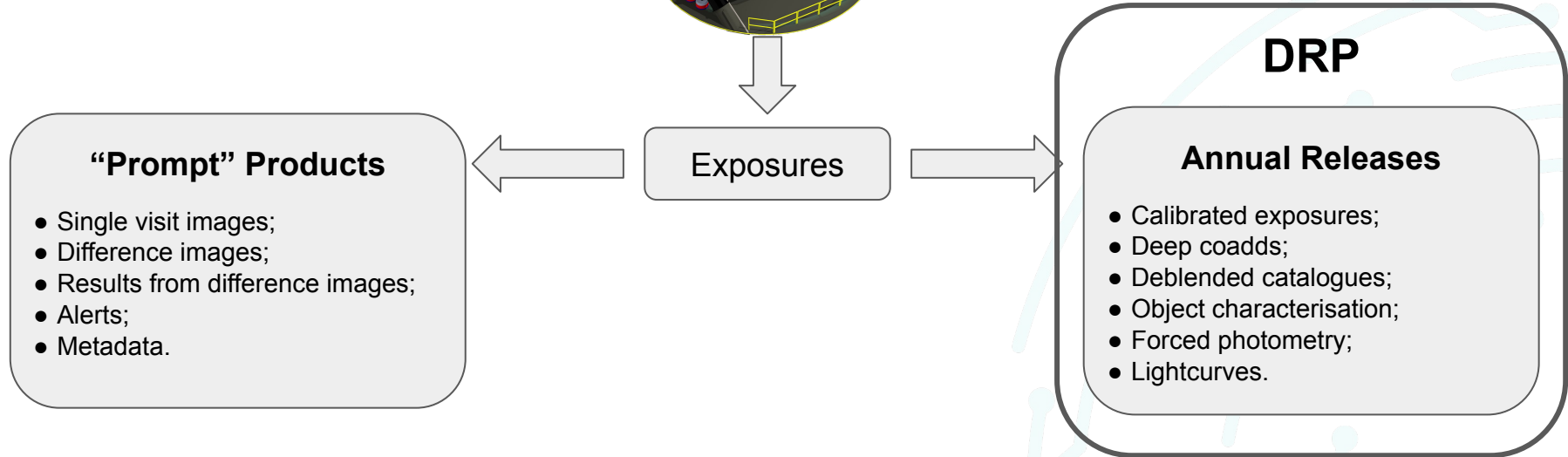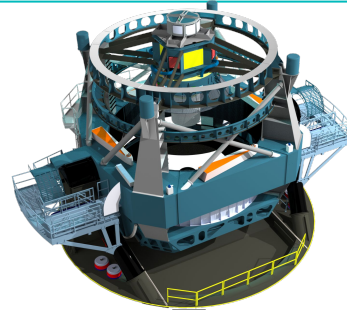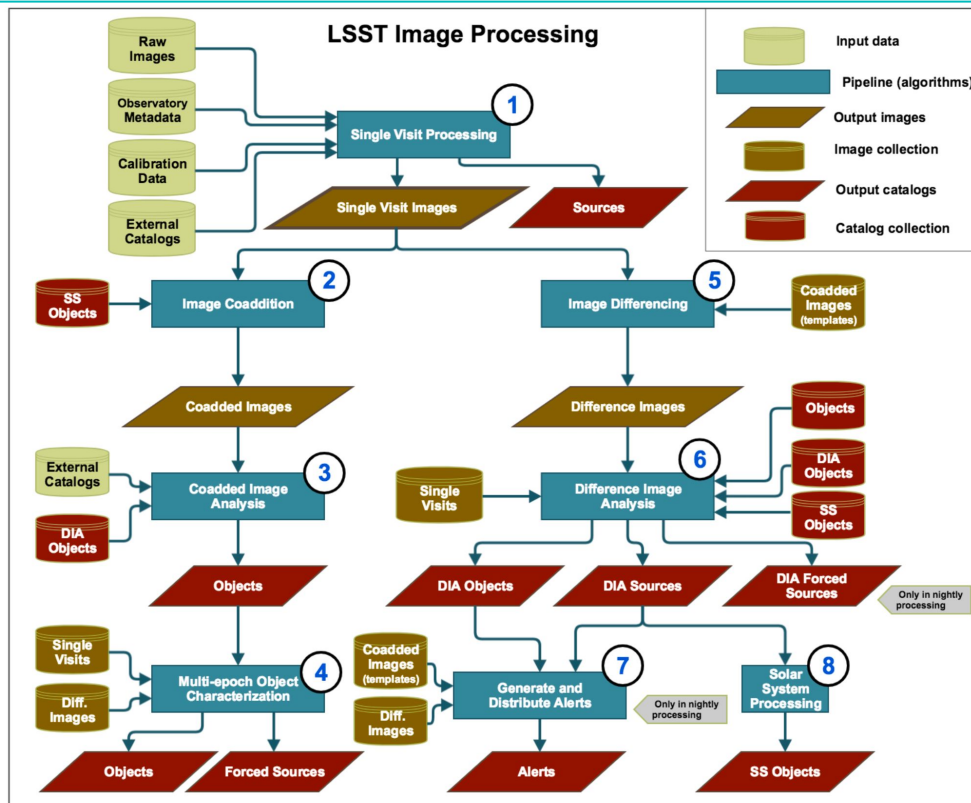# What I'll cover in this talk

- **What** is Rubin Data Release Processing (DRP) constitutes and **what** it will deliver.

- **When** will DRP happen and **when** will it deliver its products to the scientific community.

- **Where** will DRP take place and **where** the UK's role fits within the bigger DRP picture.

What is Rubin's Data Release Processing?

"Prompt" Products

- Single visit images;
- Difference images;
- Results from difference images;
- Alerts;
- Metadata.

Exposures

DRP

Annual Releases

- Calibrated exposures;
- Deep coadds;
- Deblended catalogues;
- Object characterisation;
- Forced photometry;
- Lightcurves.

Data flow through the DRP pipeline

From
https://lse-163.lsst.io/

Data flow through the pipeline (simplified)

```
Raw Images
Metadata
Calibrations  →  Single Visit  →  Single Visit  →  Image        →  Coadded  →  Coadd
External cats.   Processing        Images           Coaddition      Images      Analysis
                                                                                    ↓
                                                                                 Objects
```

- ⬜ = Inputs
- 🟨 = Processes
- 🟧 = Output Images
- ⬛ = Output Catalogues

Data flow through the pipeline (simplified)

Key Data Products
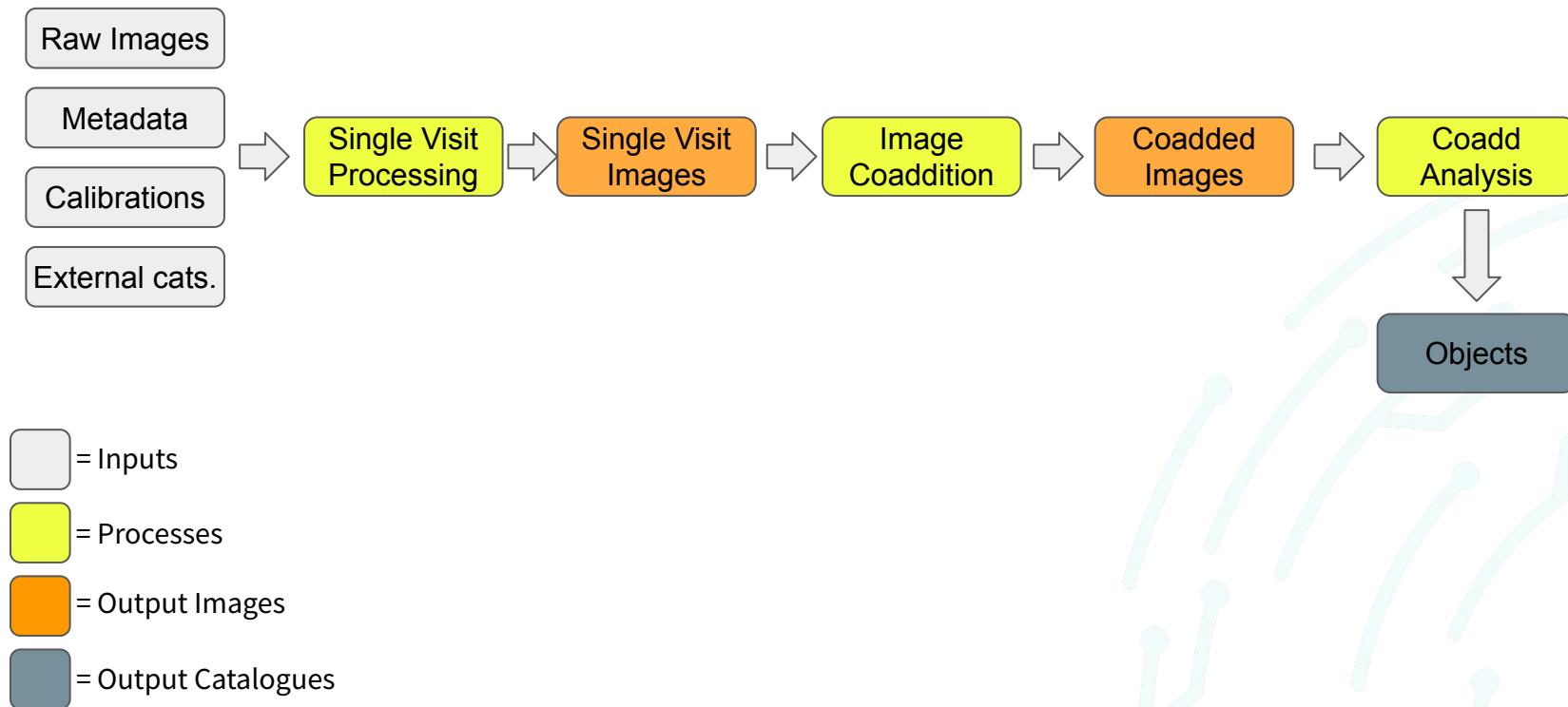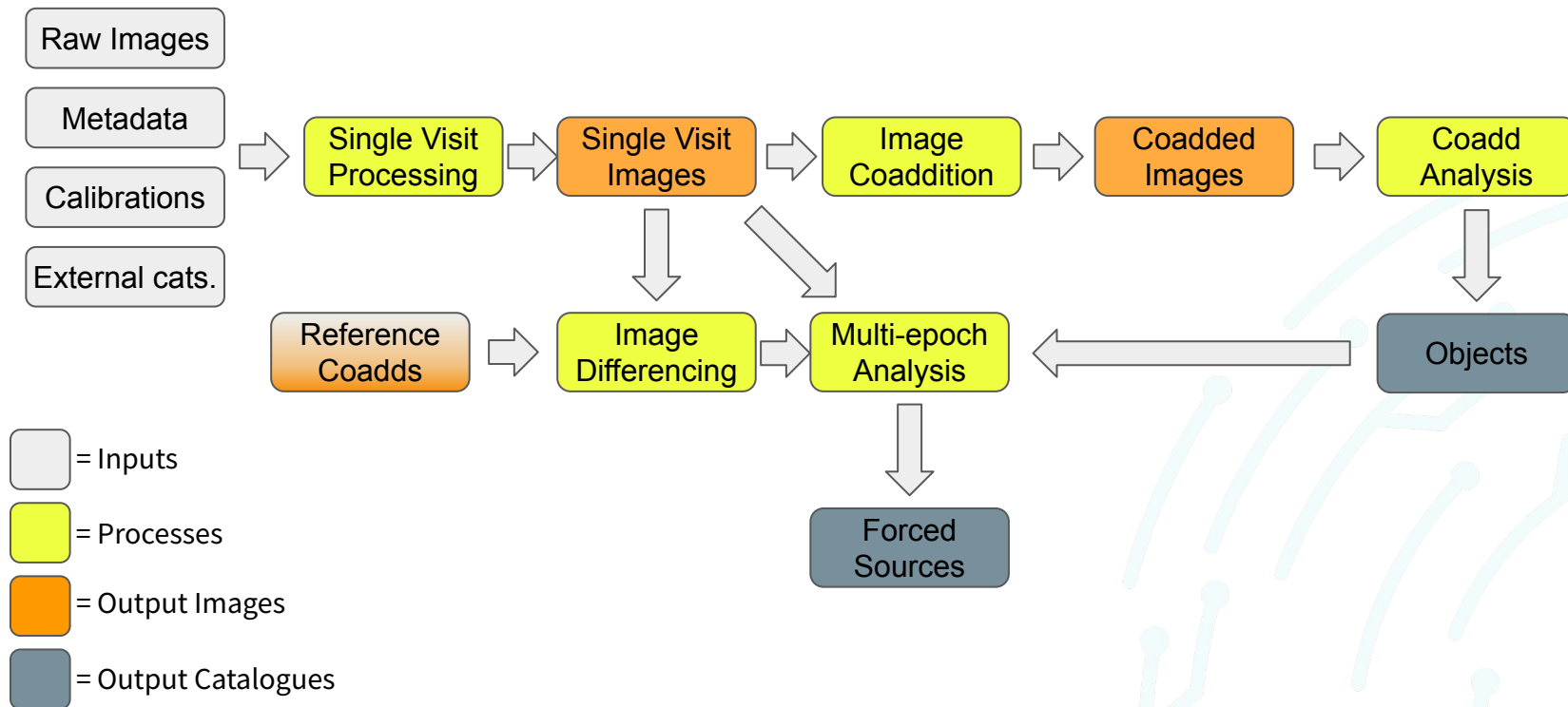
Images

Single visit images, coadded (i.e., "full depth") images, difference images.

Catalogue data

Lots of different photometry data: aperture, PSF, Kron, Petrosian, Disk+Bulge, etc.;

Colours;

Centroids;

Shear estimations (i.e., for weak lensing);

Surface brightness;

Variability characterisation (details TBC);

Photo-z's.

See https://lse-163.lsst.io/ for many more details.

Get involved…

- All of the DRP code is freely available on GitHub.

- The top level code is written in Python, and is highly modular.

- You can try it out for yourself using simulated data - register for DP0 delegate status!

- Or use it to process your own data -
  as my student (L. Makrigianni) and
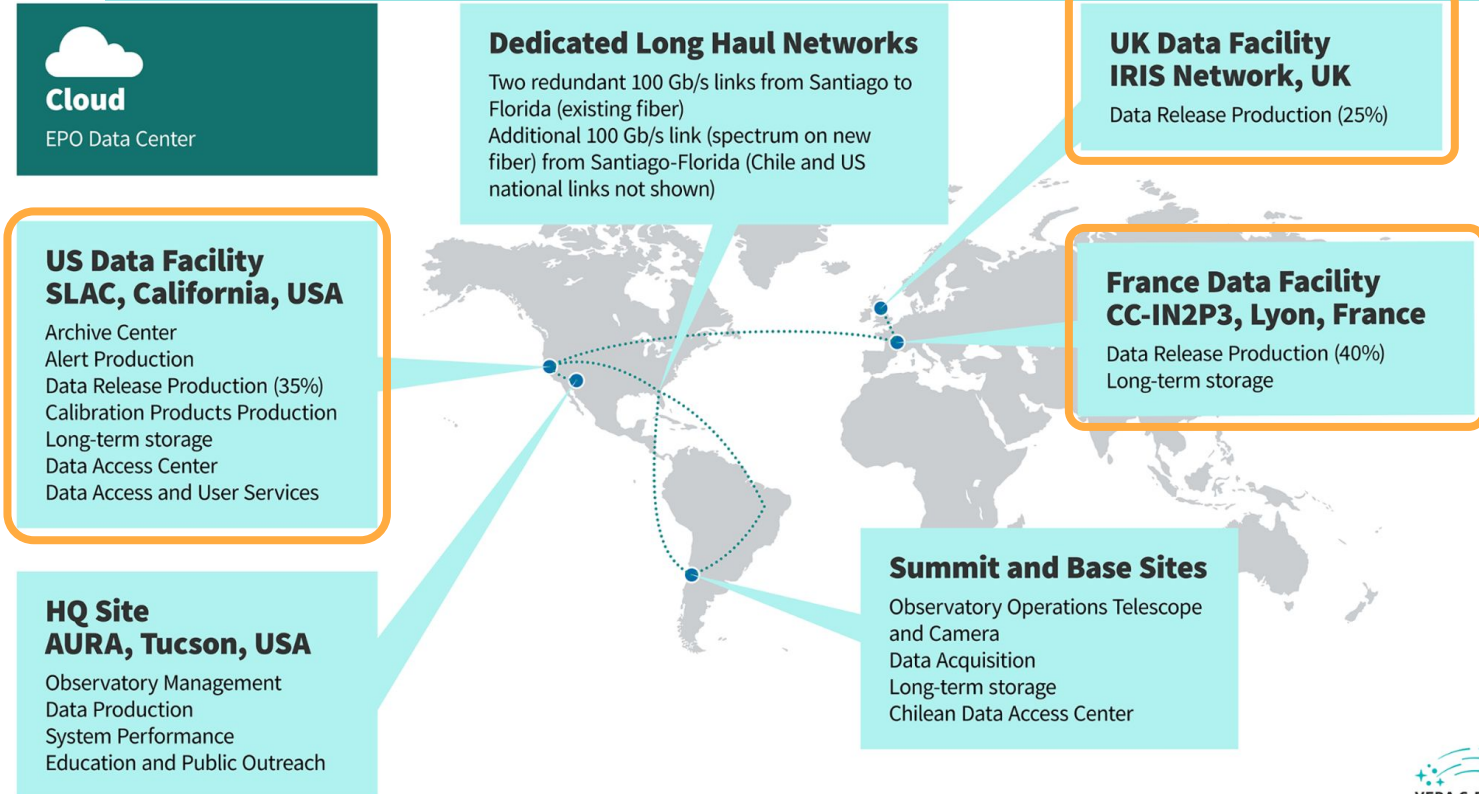 I did with data from GOTO!

*https://data.lsst.cloud/

LSST Data Release Timeline

| Milestone	A date between…
Telescope first light	Oct. 2024 - Feb. 2025
Data Preview 1: Based on a *few days'-worth* of data around first light.	Dec. 2024 - Apr. 2025
Data Preview 2: All science validation surveys & commissioning data.	Aug. 2025 - Mar. 2026
Data Release 1: First six months of the 10-year survey.	Feb. 2026 - Nov. 2026
Data Release 2: First year of the 10-year survey.	Feb. 2027 - Nov. 2027
Data Released 3-11: All data to date of 10-year survey.*	Annually thereafter.

*Note: Only data from the latest and penultimate release will be kept on fast storage for easy access. Older releases will be kept on tape for archiving purposes, but will not be queryable.

Where will DRP happen?

Cloud
EPO Data Center

Dedicated Long Haul Networks

Two redundant 100 Gb/s links from Santiago to Florida (existing fiber)
Additional 100 Gb/s link (spectrum on new fiber) from Santiago-Florida (Chile and US national links not shown)

**UK Data Facility
IRIS Network, UK**

Data Release Production (25%)

**US Data Facility
SLAC, California, USA**

Archive Center
Alert Production
Data Release Production (35%)
Calibration Products Production
Long-term storage
Data Access Center
Data Access and User Services

**France Data Facility
CC-IN2P3, Lyon, France**

Data Release Production (40%)
Long-term storage

**HQ Site
AURA, Tucson, USA**

Observatory Management
Data Production
System Performance
Education and Public Outreach

Summit and Base Sites

Observatory Operations Telescope and Camera
Data Acquisition
Long-term storage
Chilean Data Access Center

The UK's DRP "Team"

- George Beckett (Edin)
- Tim Noble (RAL)
- Stephen Simpson (Lancs)
- Peter Love (Lancs)
- Matt Doidge (Lancs)
- James Mullaney (Sheff)
- Dominic Sloan-Murphy (Edin)
- Mathew Sims (RAL; until Aug 2023)
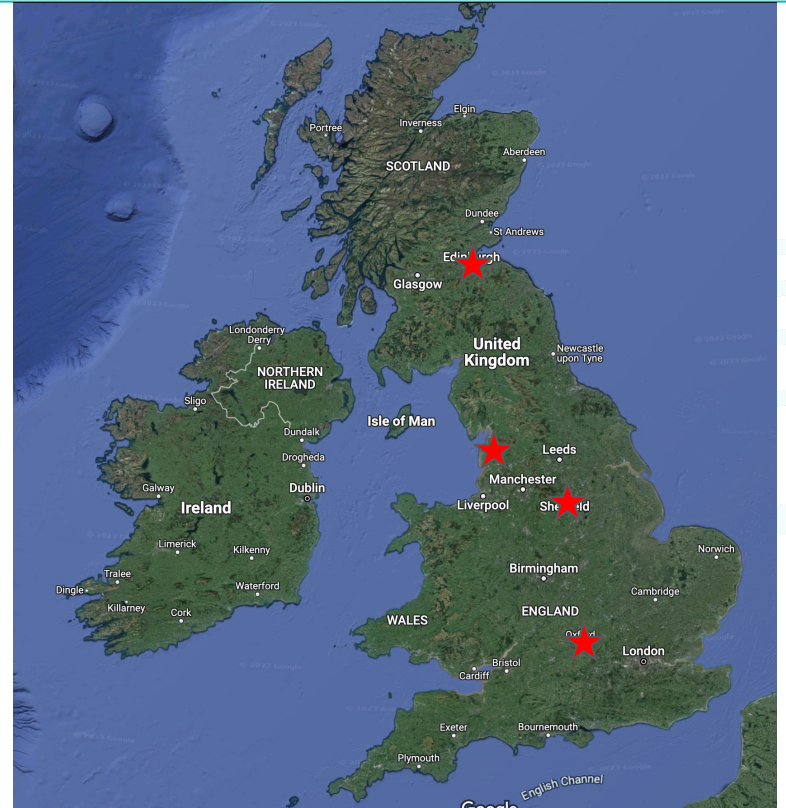
DRP summary

What: DRP will process the LSST's raw images to deliver the "static sky" data products, as opposed to the nightly "prompt" data products.

It will deliver both image and catalogue data, including deep coadded images and lightcurve data.

It is written in Python and is highly modular.

When: DRP is already happening!
Currently limited to simulated data (DP0), and AuxTel & HyperSupremeCam data.

Expect the LSSTCam data to be delivered in early 2025.

Where: DRP is distributed across multiple sites in three different countries:
the US, France and the UK.

The UK is committed to processing 25% of all LSST data.