

Rubin Observatory

# Operations Overview



U.S. DEPARTMENT OF  
**ENERGY**

The Vera C. Rubin Observatory mission is to *create a vast astronomical dataset and web-based analysis environment for unprecedented discovery of the deep and dynamic universe.*

*By acquiring, processing, and making available the vast dataset collected with the Vera C. Rubin Observatory, the Legacy Survey of Space and Time will provide the community with the data to address some of the most fundamental questions in astrophysics, advance the field of astronomy, and engage the public in the discovery process.*

# Keep Calm and Carry On Planning

- Three phases: pre-, survey, & post operations. FY19-35 (5, 10, 2) = 17 years (assumed COVID extension, not approved)
- Pre-operations began FY19. Define ops plan, staff up (including transition from construction), activities to achieve readiness (esp. the “data previews”)
- Rubin’s LSST start scheduled for Oct 2022 (now later due to COVID).
- Post operations: final two years of data processing and ramp out of operations
- Flexibility has always been part of ops planning, even more important now.



# Pre-operations “Data Previews” will support development of our data production and community support system

Rubin Operations Milestones					
ROO ID	Date	Quarter	Year	Q	Milestone
	2021-03-31	FY21 - Q2	FY21	Q2	DP0.1 Early Access: Provide access to processed images and visit level catalogs from the IDF
SP-VV-M01	2021-06-30	FY21 - Q3	FY21	Q3	DP0.1 Data Release: science-ready catalogs released from the IDF
DP-SR-M04	2021-09-30	FY21 - Q4	FY21	Q4	DP0.2 Early Access: Provide access to reprocessed images and visit level catalogs from the IDF
SP-VV-M02	2022-03-31	FY22 - Q2	FY22	Q2	DP0.2 Data Release: science-ready catalogs from reprocessed DP0 images released from the IDF
DP-SR-M06	2022-10-31	FY23 - Q1	FY23	Q1	DP1 Early Access: provide access to processed images and visit level catalogs from the USDF
SP-VV-M07	2023-03-31	FY23 - Q2	FY23	Q2	DP1 Data Release: science-ready catalogs released from the USDF
DP-SR-M07	2023-06-30	FY23 - Q3	FY23	Q3	DP2 Early Access: provide access to processed images and visit level catalogs from the USDF.
SP-VV-M09	2023-12-15	FY24 - Q1	FY24	Q1	DP2 Data Release: science-ready catalogs from the final Data Preview (LSSTCam SV) released to community from the USDF.

DP0 MS Dates  
to be updated in  
early FY21 (+  
several months)

- We are planning a sequence of three pre-survey data releases, the “Data Previews,” in order to develop our capabilities to produce, verify and release LSST data.
- We are collaborating with the LSST DESC to use their large scale simulated LSST dataset in DP0.
- DP1 and DP2 will involve releasing and supporting commissioning data, so will be delayed by COVID-19. We’ll know more about this delay in the Fall.

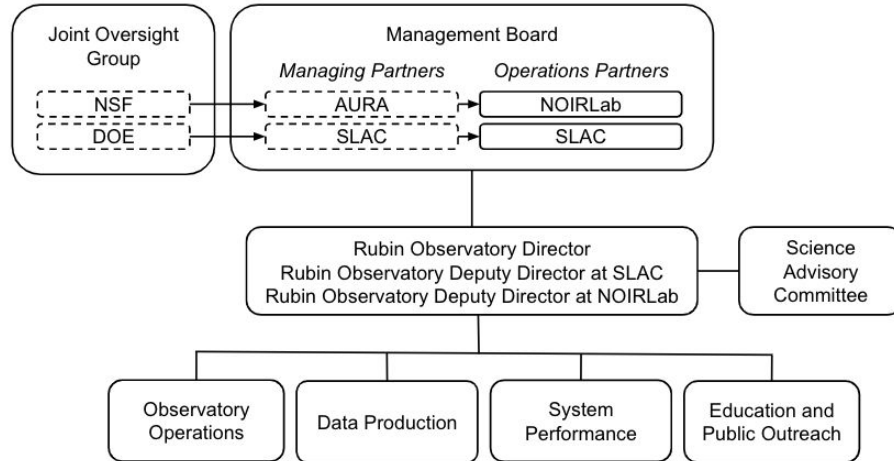
# The Operations Team is on Track

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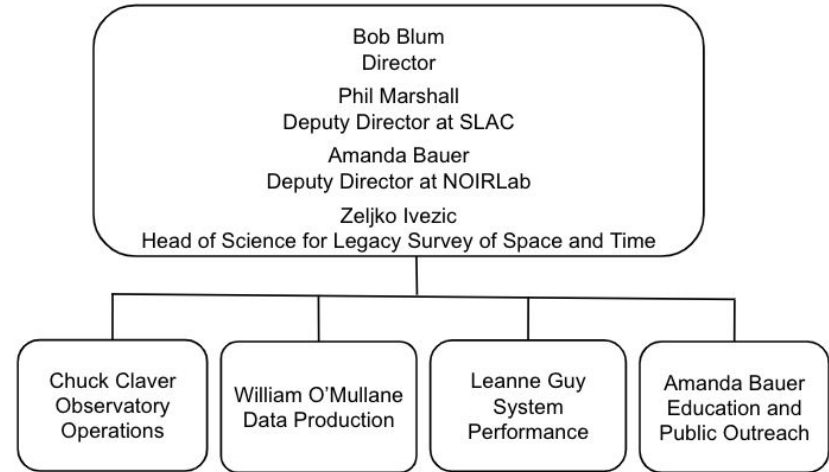
- Identifying staff, including leadership
- Operations objectives are understood
- Robust preliminary plan in hand that can be improved in 2.5 (or more) years left
- Budgets and schedule tools in hand to plan forward
- Challenges and risks are being addressed
- “Final” plan due in December, 2021. Agencies have reviewed preliminary plan, but no final approval yet

# Rubin Operations is a 50-50 partnership between NOIR Lab and SLAC, NSF/DOE and DOE

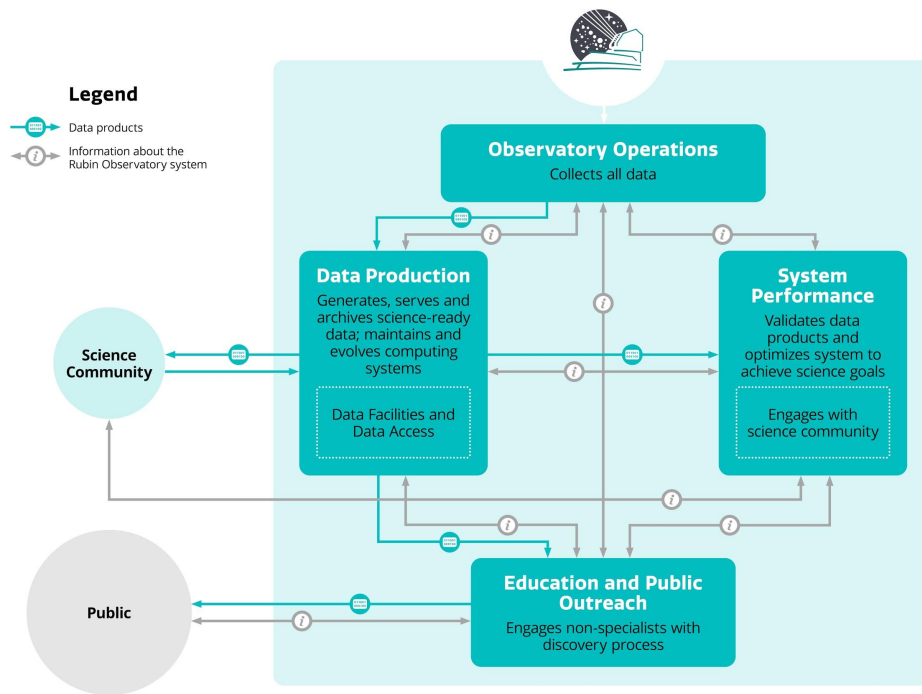
Rubin Observatory Governance Structure  
(not approved)



Rubin Observatory Operations



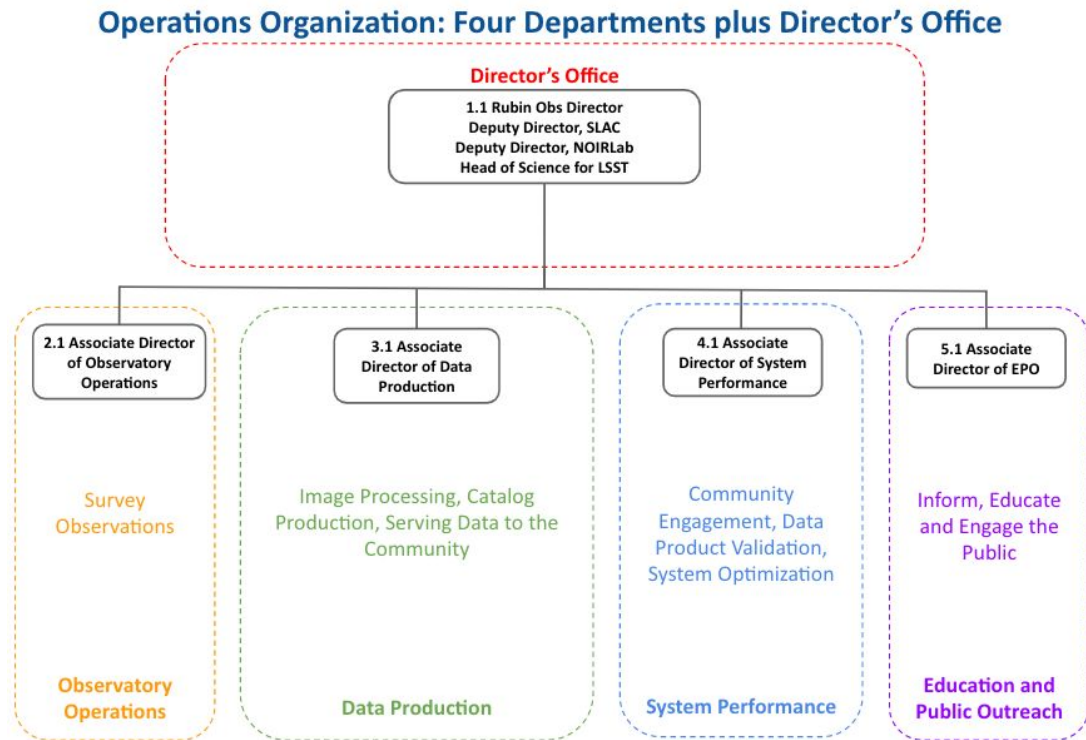
# The information flow through the Rubin system drives the design of its mgmt structure





# Rubin Operations has 4 departments each focused on a particular product, under a supported Director

- Each technical department led by a responsible Associate Director (AD)
- The ADs with others form an Executive Council (S10) that supports the Director and oversees operations progress
- Head of Science for LSST represents science community within Executive Council



# Pre-operations key task: identify or recruit staff, the Leadership Team

Key Personnel: Director, Deputies, Associate Directors (department heads)

- Directorate: [Blum](#), [Marshall](#), [Bauer](#), [Ivezic](#)
- Observatory Operations: [Claver](#)
- Data Production: [O'Mullane](#)
- System Performance: [Guy](#)
- Education and Public Outreach: [Bauer](#)

Joining the leadership team to round out the Executive Council:

- NOIR Lab/Rubin Program Coordinator, [Pettry](#)
- SLAC Program Coordinator/Business Manager, [Soldahl](#)
- Rubin Executive Assistant, [Wiest](#)

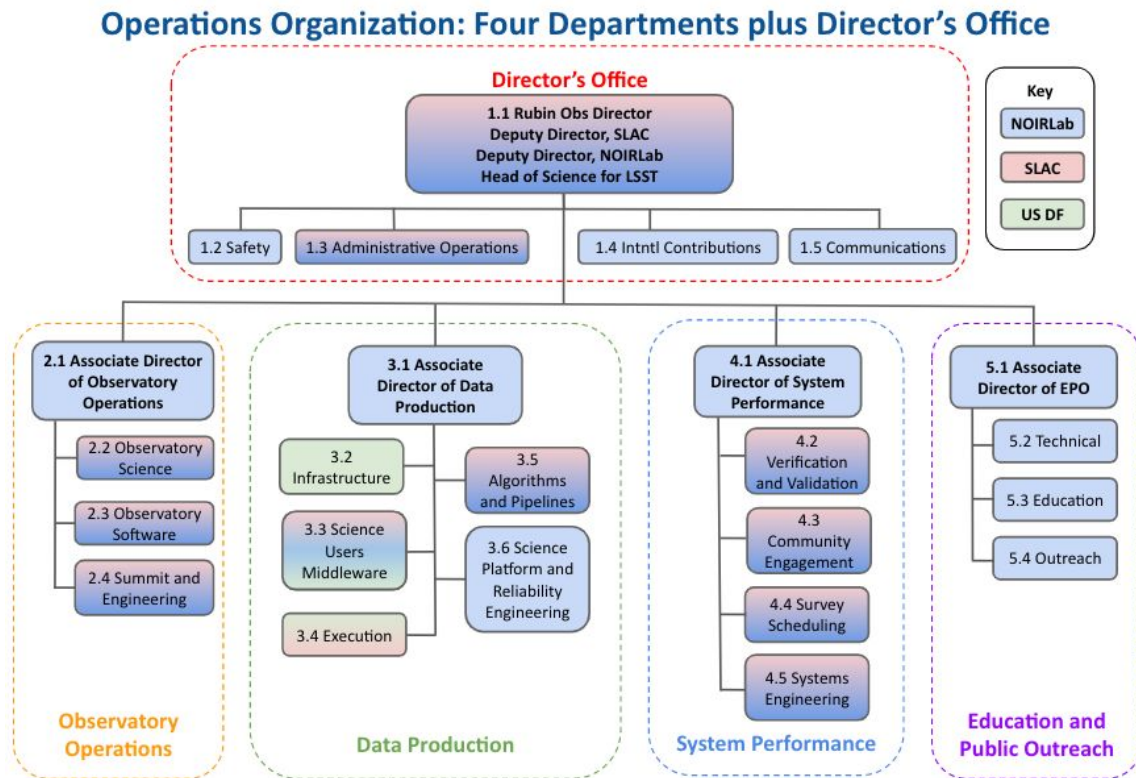
Other significant actors, contributors

- Deputy for DP, [AlSayyad](#); Deputy for EPO, Corlies; Community Engagement lead, Graham; Lead Scheduler Scientist, Jones; Communications Manager, [Gill](#)
- Safety: [Gessner](#)

# Departments are subdivided into teams organized according to the the work breakdown structure

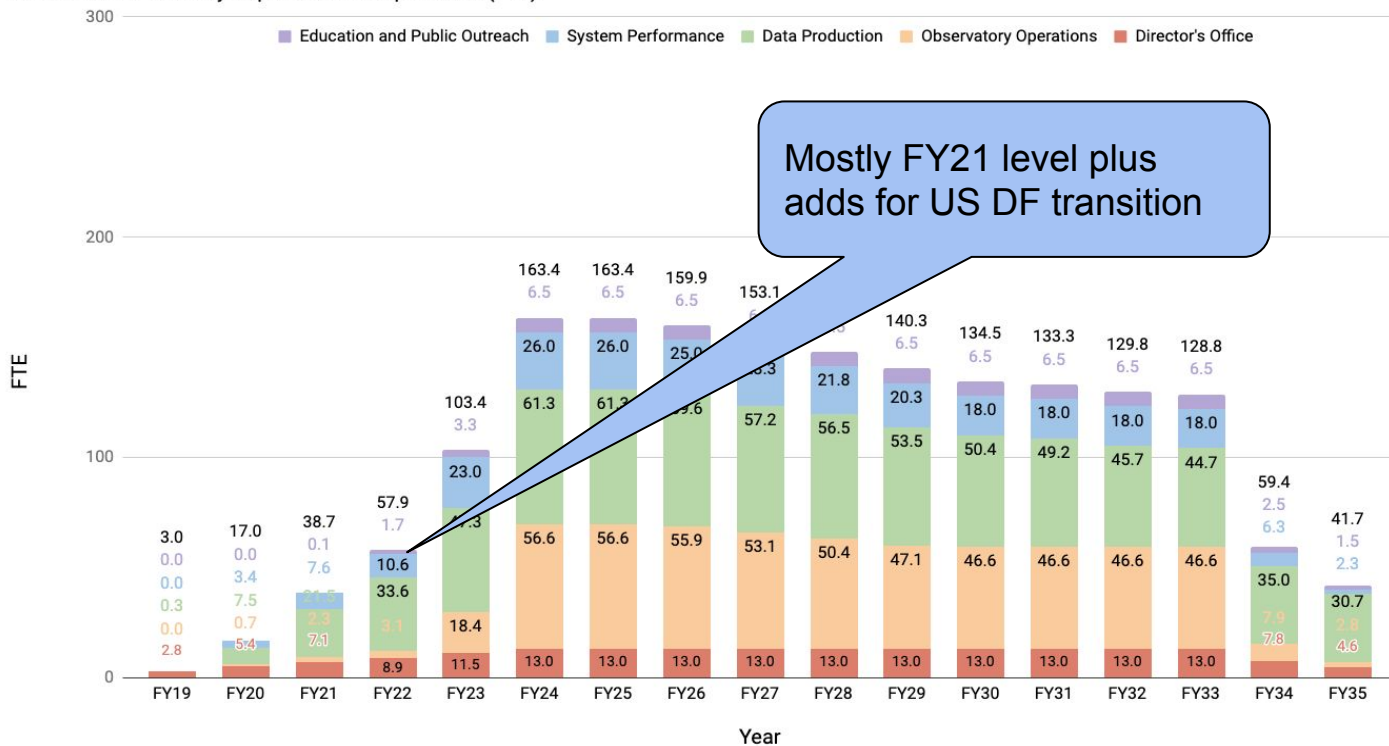
Fully integrated teams plan work together based on milestones set by the Executive Council (S10)

Team Leaders serve as functional supervisors for their team members, providing feedback on performance to administrative supervisors at host institutions



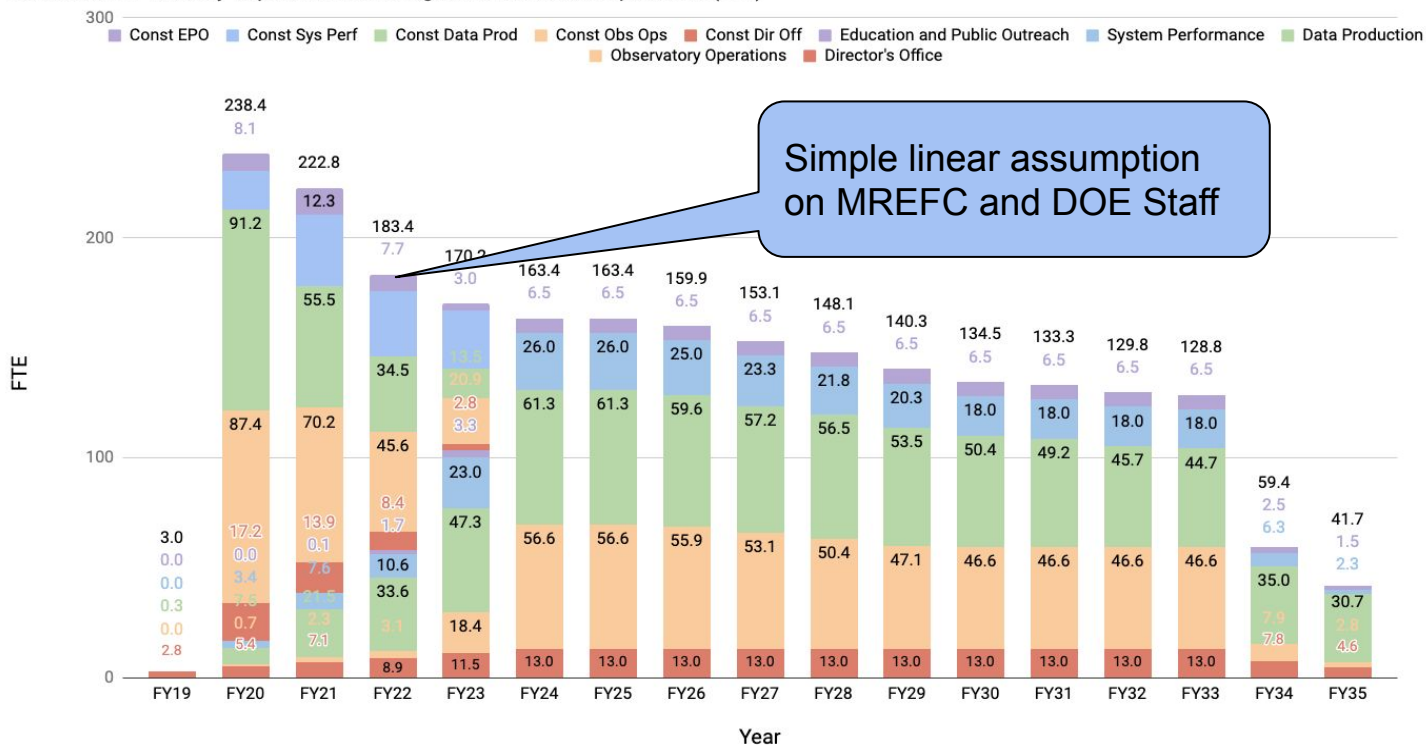
# Staffing plan includes COVID19 delay and USDF needs

Distribution of Effort by Department for Operations (FTE)



# Construction staff fill most of the need

Distribution of Effort by Department Including Construction and Operations (FTE)



# The eventual US DF will be DOE-funded, and scoped according to the construction project's specifications

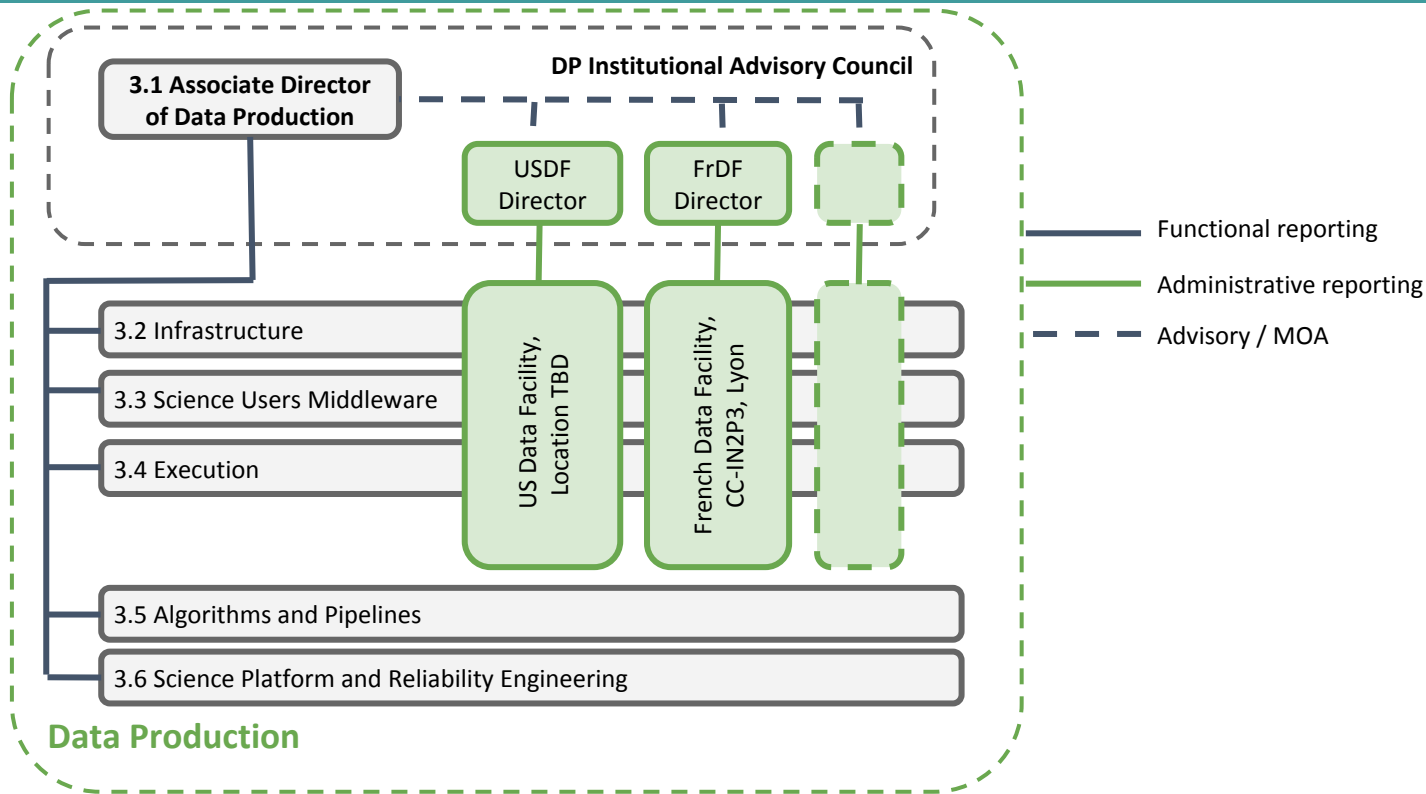
- DOE has committed to funding the US Data Facility scope during survey operations, and supporting the work needed to make the transition
- We have designed a baseline DOE-funded US DF model based closely on the Rubin construction project DM team's sizing analysis, and including *all the hardware and staffing needed to stand up a US Data Facility (including transition)* and carry out the processing of the Y1 survey data
  - Rubin Data Production includes a multi-site Data Facility system that includes at least two locations: the US Data Facility and the France Data Facility (at CC-IN2P3, Lyon).
  - We are now planning for a third Data Facility in the UK that would take on a fraction of the annual data release processing (DRP). Cost offset for DOE and NSF.
  - The US DF will execute all of the alert production (AP) and a fraction (25-50%) of the DRP. Data Production is majority NSF and DOE based activity.
  - We have planned for resources to support transition to the USDF in FY22-23.
- IDF allows Ops team to progress and provides flexibility to transition to US DF.

# Data Production as a Matrixed, International, Multi-center Department

Multiple data facilities in one integrated Data Production dept.

French Data Facility at CC-IN2P3 will do 50% of annual DRP

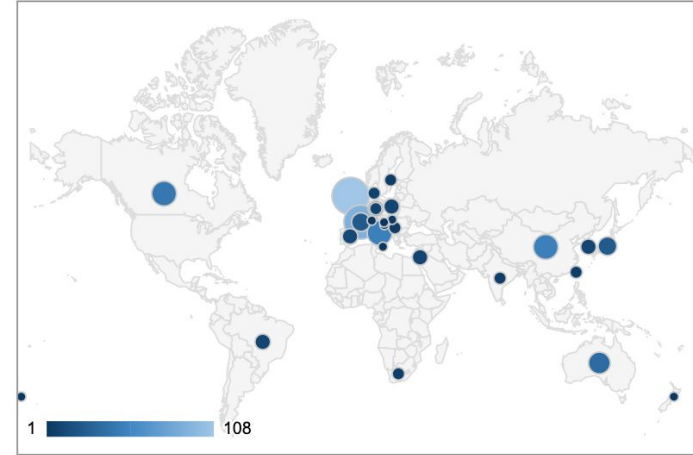
We are anticipating a UK DF taking on up to 25% of DRP with associated cost offsets



# An international program of in-kind contributions will add value while offsetting some operations costs

About 40 international (non-US and Chile) groups are seeking data rights for  $\sim 500$  PIs in return for in-kind contributions to Rubin and LSST:

- Follow-up time, complementary datasets, science infrastructure, observatory (and commissioning) enhancements, some operations cost offsets (UK)
- \$170M equivalent value, but only a few \$M per year in ops cost offsets. *The in-kind program will primarily boost US LSST science*
- Proposals were due Sept 25, 2020. Evaluation begins Nov 6, 2020
- Community-centered Contribution Evaluation Committee (CEC) established and evaluating proposed contributions through FY20
- International Program Coordinators within Director's Office to help track
- Agency-level Resource Board to oversee program, solve problems together (not established yet)





# Top risks in the operations register involve potential delays to operations readiness

The pre-ops Data Preview program is designed to prepare the operations team and the LSST science community for the survey

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The top risks in the Rubin Operations Risk Registry all involve delays to operations readiness. Our approach to mitigation is to *strive to stay on schedule for the data previews (initially with IDF) while continuing to match our plans to the Construction Project's*.

- Stay in sync with the Project and LSST science community's capacity to prepare for LSST in the face of COVID-19
- Identify an [Interim Data Facility](#) that enables the Data Production department and Community Engagement team to build up their capability as planned, that retains flexibility to move to the eventual survey operations DF