

News from

Rubin
Observatory



Legacy Survey of Space and Time

Emmanuel Gangler – LPC – Clermont-Ferrand (France)

At the menu

- Hello newcomers !
- Names matter
- Project status
- DESC status
- LSST-France organization
- Key dates

New in LSST-France

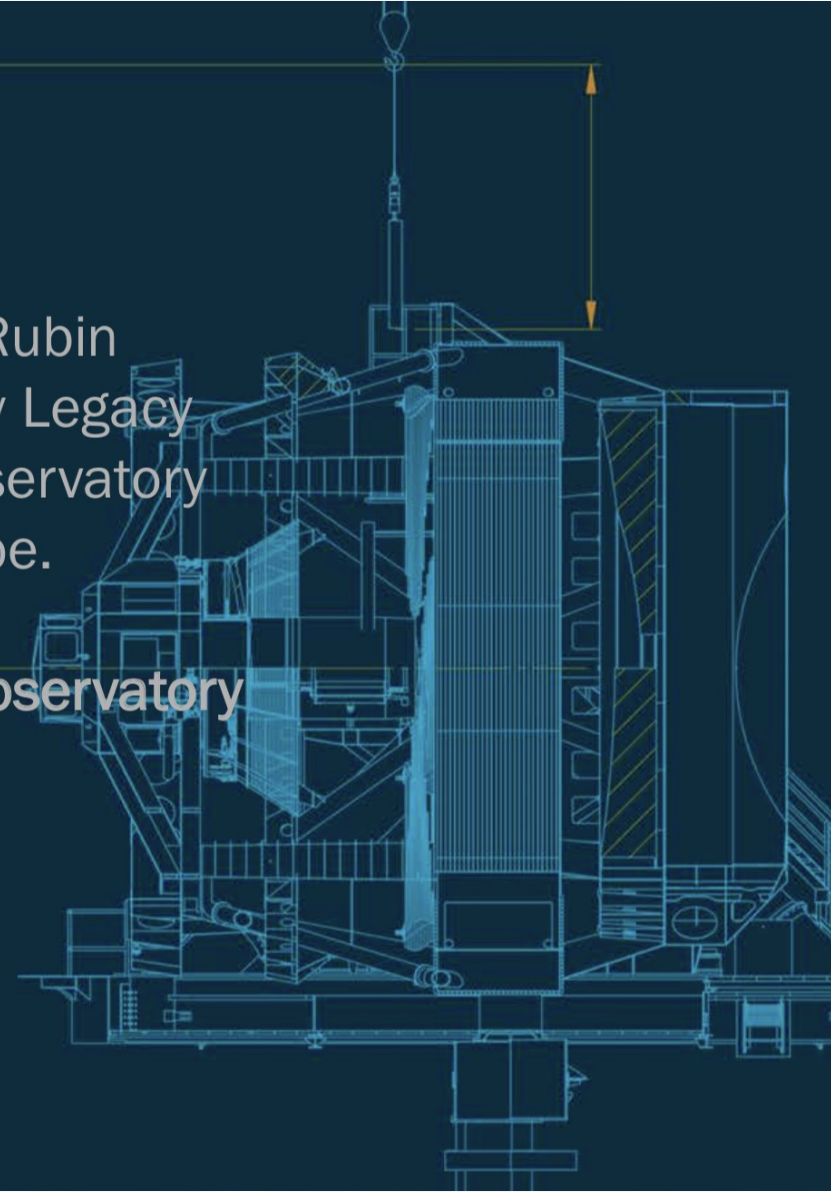
- New members introduction
 - Benjamin, Nora
 - Make sure you read the starting pages:
<https://doc.lsst.eu>
- *Be nice* to our junior & international members !
 - Use english whenever comfortable
 - Let them ask the first questions...
 - see also tomorrow about “**mediation LSST-France**”

Summary statement

For the first ten years of operation the Vera C. Rubin Observatory will perform the Rubin Observatory Legacy Survey of Space and Time, using the Rubin Observatory LSST Camera and the Simonyi Survey Telescope.

NSF and DOE are joint partners in the Rubin Observatory project and operations.

Rubin
Observatory



Visual overview

Project, facilities in Chile and Tucson → Vera C. Rubin **Observatory**

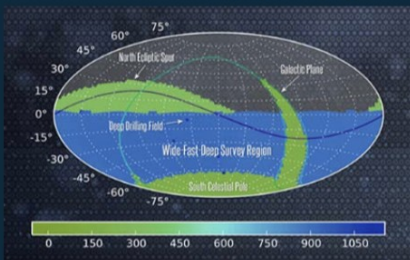


Rubin
Observatory

The astronomical Telescope → Simonyi Survey **Telescope**



10 year optical survey → Legacy **Survey** of Space and Time



What you should know

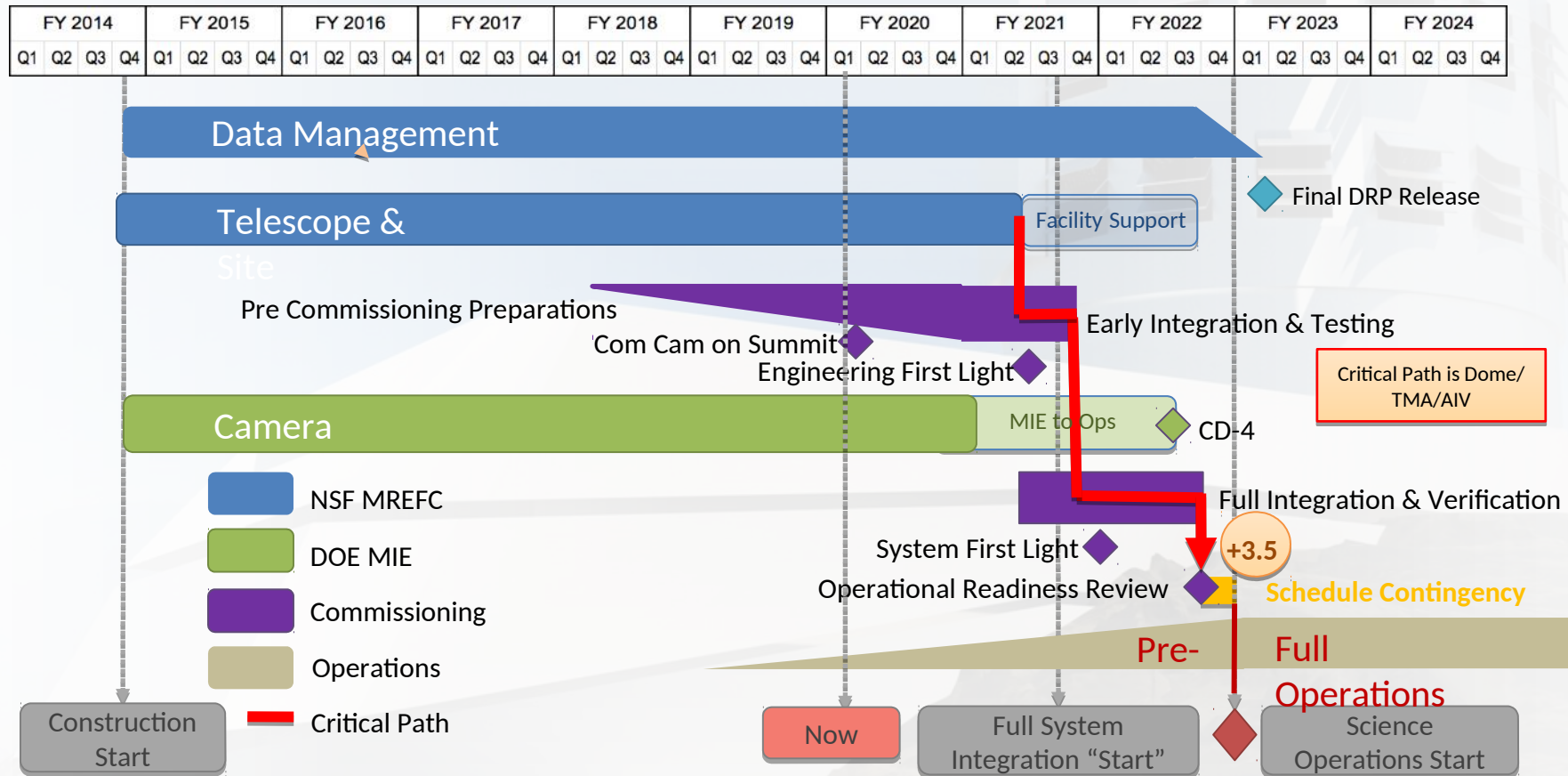
- Official name signed into law on December 20, 2019 is Vera C. Rubin Observatory.
- Accepted short name is **Rubin Observatory** - if word count is limited then Rubin Obs. can be used. (at first mention use Vera C. Rubin Observatory, subsequent mentions just use Rubin Observatory).
- ~~VRO~~ acronym should not be used in written or verbal communication towards community or public.
- When referring to the survey you should write "Rubin Observatory Legacy Survey of Space and Time"
- Camera: at first mention use Rubin Observatory LSST Camera, subsequent mentions use LSSTCam



> sed 's/LSST/Rubin\ Observatory\ LSST/g'

RubinObservatory/LSST Timeline

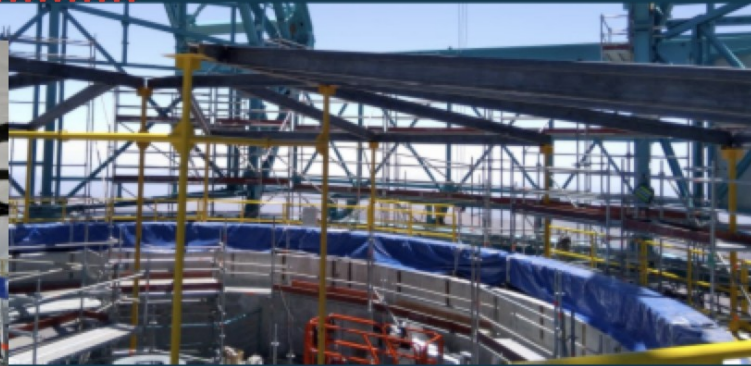
Make sure to check <https://www.lsst.org/news/digest> (if not in project mailing list)



Commissioning is happening NOW !

- **AuxTel (=1CCD):** Operational
- **ComCam (=9 CCD):** On site march 2020 ; First light may 2021 (Chile)
- **LSST Cam:** FEXCH interation at SLAC → Apr 2020 ; End of integration (SLAC, Feb 2021), First light oct-nov 2021 (Chile)

Telescope summit integration in progress



Azimuth track installation completed in December.



500 Ton crane reassembly this week for installation of trunnions in February.



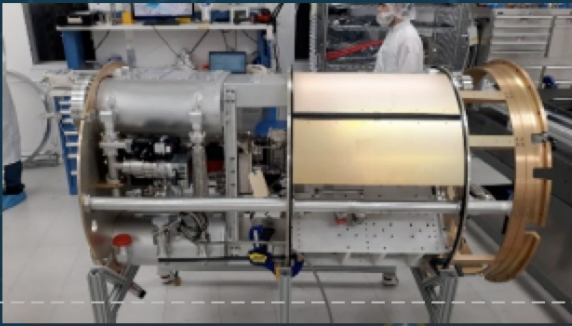
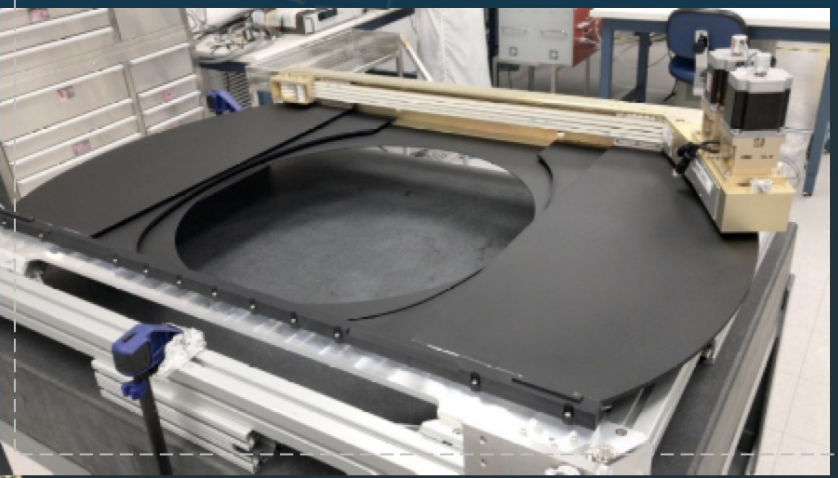
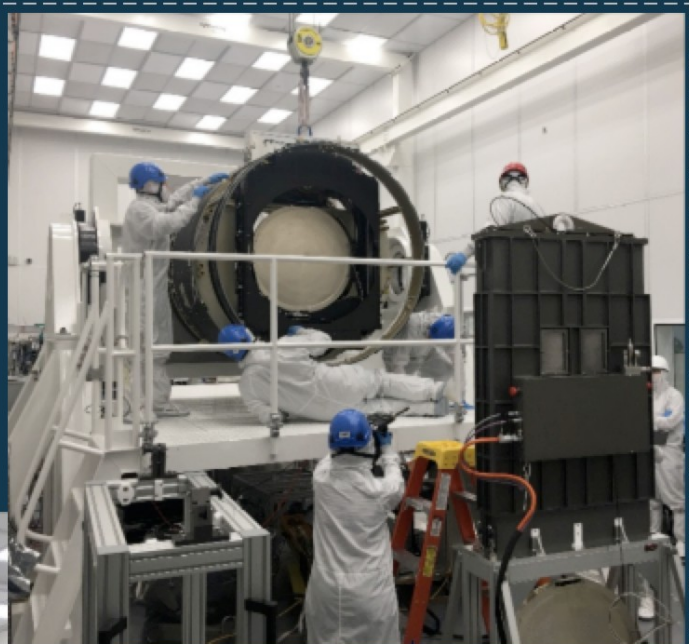
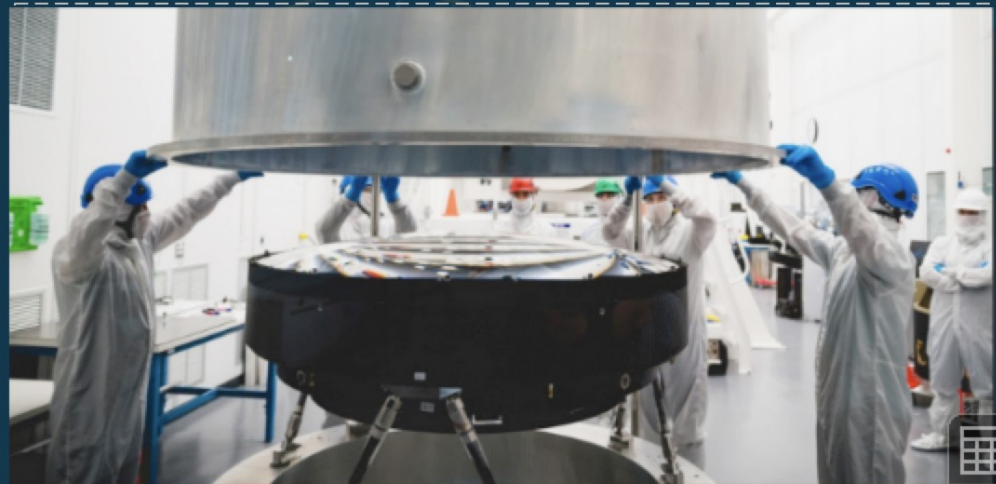
RUBIN OBSERVATORY CONSTRUCTION STATUS * 22 JANUARY 2020 * DESC TUCSON AZ

Telescope Mount factory tested and shipped to site



RUBIN OBSERVATORY CONSTRUCTION STATUS * 22 JANUARY 2020 * DESC TUCSON AZ

Camera lenses, body and mechanism



RUBIN OBSERVATORY CONSTRUCTION STATUS * 22 JANUARY 2020 * DESC TUCSON AZ

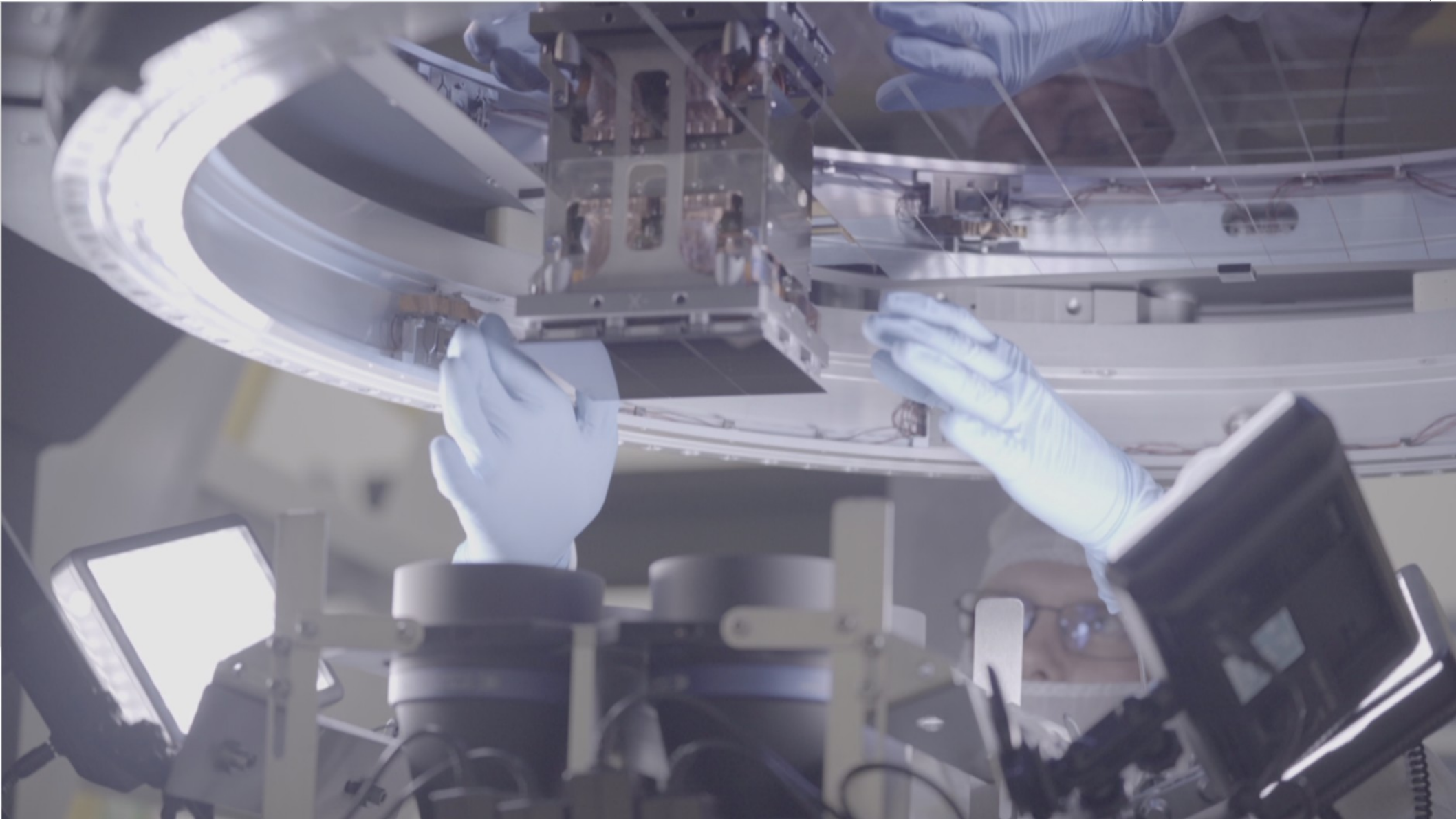
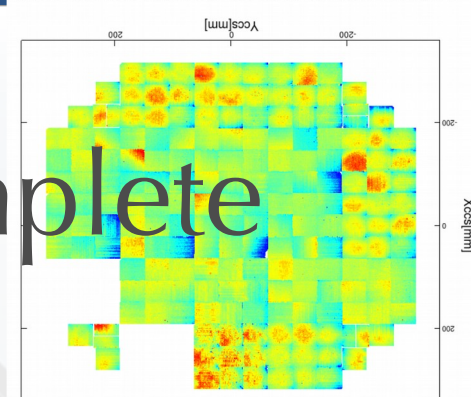


The actual heroes who did the job !



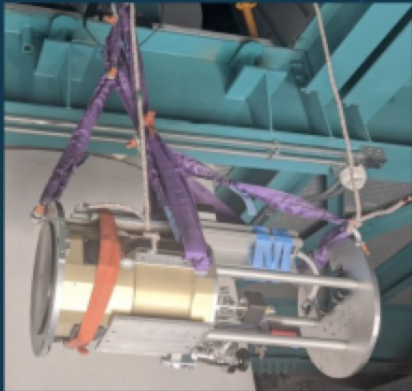
Focal plane assembly is complete

- All rafts successfully inserted (Jan 14th 2020)

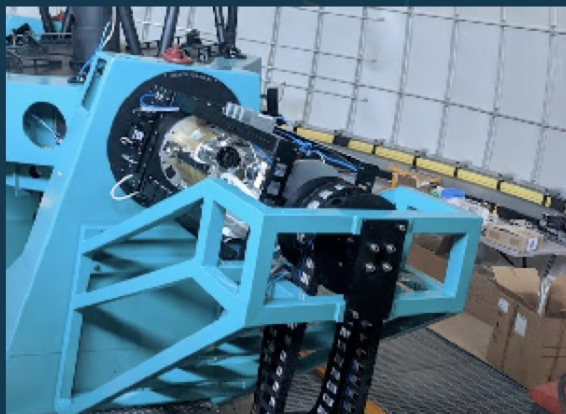


AuxTel Integration &

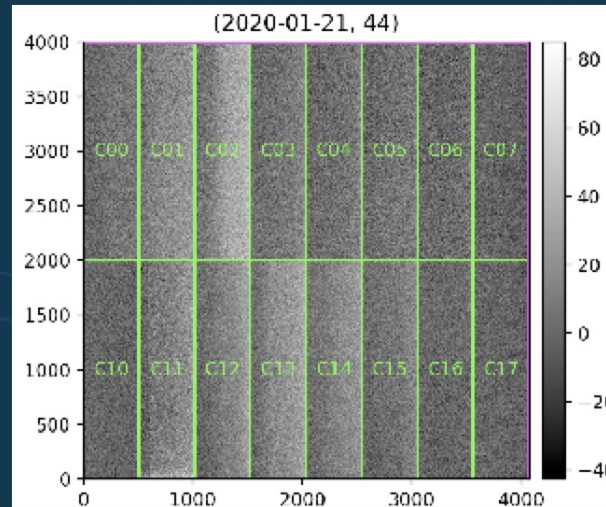
NSF
Vera C. Rubin
Observatory



AuxTel Spectrograph arrives in Chile and is ready for installation



AuxTel Spectrograph installed



Liveness tests of spectrograph on telescope has been successful with the support and coordination from many people spanning all three technical subsystems

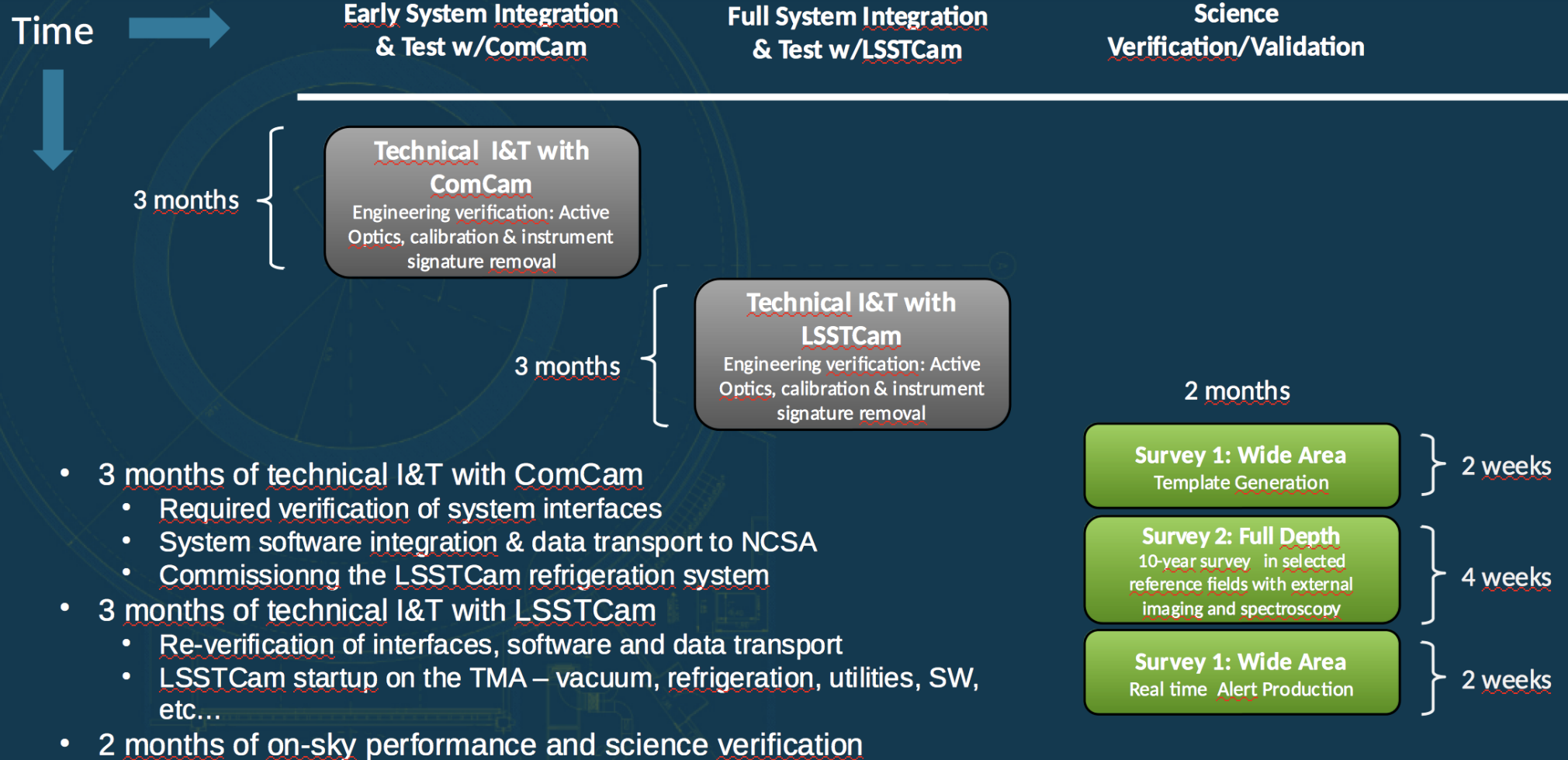
The image at left demonstrated key system functions including:

- Coordination of control between subsystem elements from T&S, LSSTCam and DM
- Command through the Observatory Control System (T&S) requesting the Camera Control System (LSSTCam) to take an exposure from 4k x 4k ITL CCD
- Receiving image data and ingested into the LSST data system (DM) and transferred to NCSA
- Data access to the SIT-Com team through the Science Platform (DM) for analysis

RUBIN OBSERVATORY CONSTRUCTION STATUS * 22 JANUARY 2020 * DESC TUCSON AZ



SIT-Com Plan: Post LCR-2045

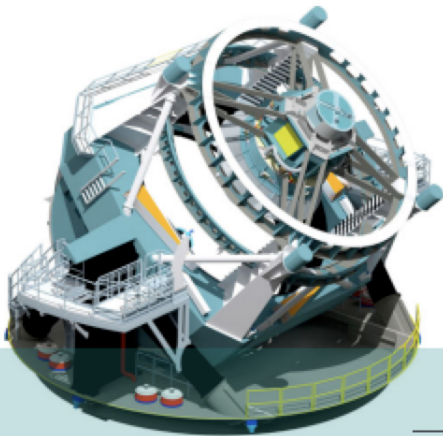


Data Management is increasing form and function

Raw Data: 20TB/night



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



Prompt Data Products

Alerts: up to 10 million per night

Results of Difference Image Analysis (DIA): transient and variable sources

Solar System Objects: ~ 6 million

Data Release Data Products

Final 10yr Data Release:

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



via nightly alert streams



via Prompt Products Database



via Data Releases



LSST DACs
(Chile & NCSA)

Independent
DACs (iDACs)

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

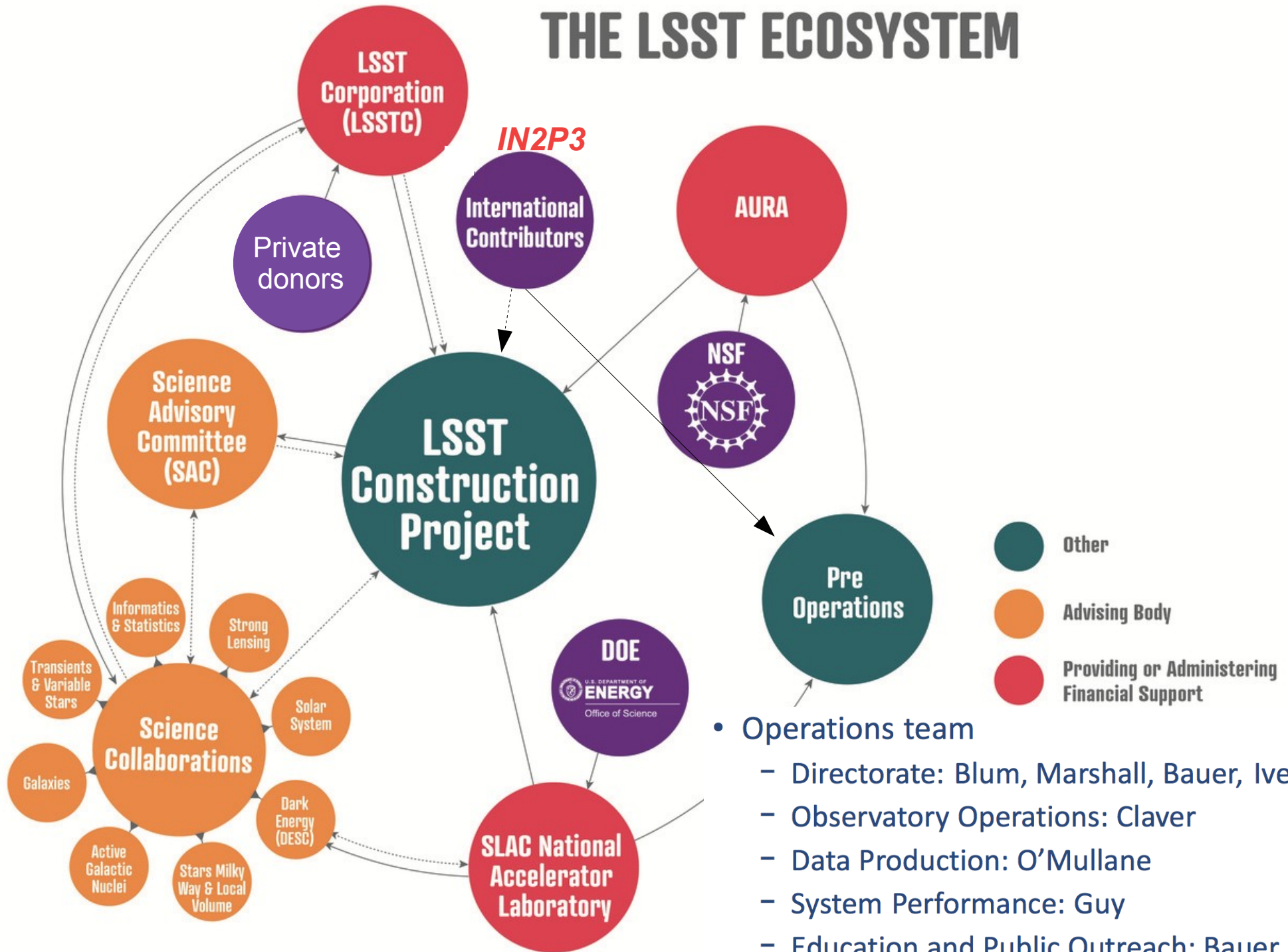
LSST Science Platform

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



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THE LSST ECOSYSTEM

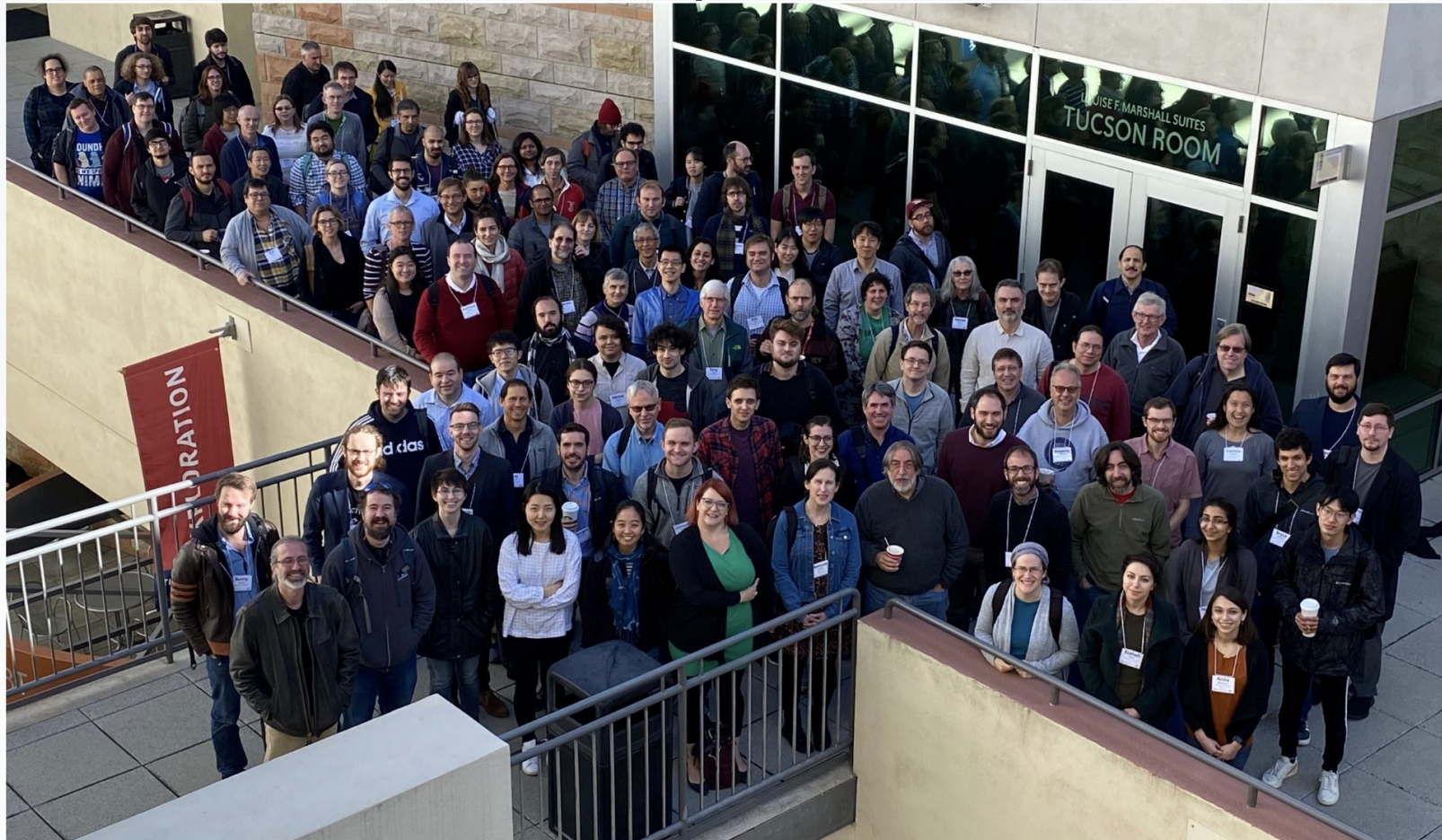


LSST data rights

- Non-US institutions are expected to contribute “in kind”
 - Chile, France, Brazil: unchanged
 - Note : MoA still to be rewritten...
- Contribution Evaluation Committee examines proposals
 - 15 members, 5 still to be nominated
 - 40+ letters of interest submitted (500 PI)
 - Full proposals due 31th March 2020`

→ Note the “LSST in France” meeting **March 23rd**
With participation from IN2P3, INSU, (CEA)

Rubin Observatory LSST DESC News



DESC meeting at U Arizona,
Jan 20-24, 2020

All info on [Confluence Pages](#)
More on this tomorrow

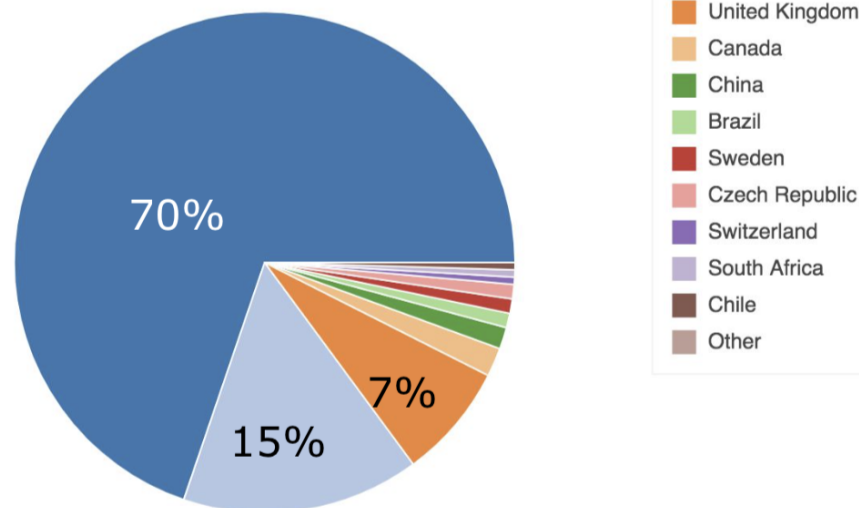
DESC is preparing to do high accuracy & precision cosmology with data from the Vera C. Rubin Observatory Legacy Survey of Space and Time (LSST)

The collaboration has 222 Full Members as of 2020-01-24. *Full Members have committed a significant fraction of their research time to the DESC, and have voting rights.*

UK and France hold key DESC roles:

- 34% of the Working Group conveners
- Operations staff: 3 out of 10 pipeline scientists, 1 Computing Infrastructure team member, 1 Mgmt team member

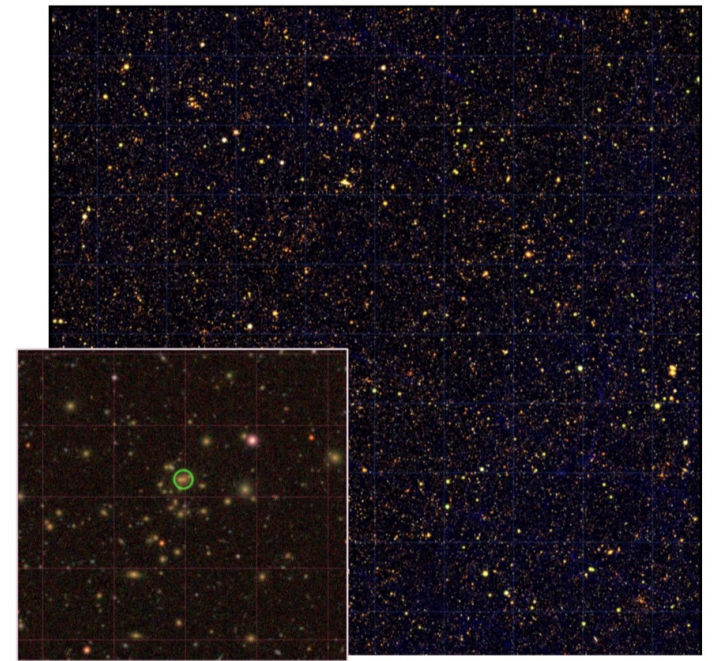
LSST DESC Full Members by country



The diagram illustrates the organizational structure of the LSST Collaboration Council. At the top is the **Collaboration Council**, which oversees the **Membership Committee**, **Publications Board**, and **Advisory Board**. Below these is the **Management Team**, which includes the **Spokesperson** and **Deputy Spokesperson**, supported by the **Operations Committee**. The **Spokesperson** is also connected to the **Advisory Board** via a dashed line. The main body of the organization is divided into three color-coded regions: a light blue region for technical and simulation work, a light green region for data and validation, and a light red region for analysis. The light blue region includes **Blending (BL)**, **Observing Strategy (OS)**, **Photometric Corrections (PC)**, **PSF**, **Sensor Anomalies (SA)**, **Computing (CO)**, **Cosmological Simulations (CS)**, **Survey Simulations (SSim)**, and **Commissioning (COM)**. The light green region includes **Dark Matter (DKM)**, **External Synergies (ES)**, **Photometric Redshifts (PZ)**, and **Theory and Joint Probes (TJP)**. The light red region includes **Clusters of Galaxies (CL)**, **Large Scale Structure (LSS)**, **Strong Lensing (SL)**, **Supernovae (SN)**, and **Weak Lensing (WL)**. Arrows indicate the flow of information and data from the technical and simulation groups to the analysis groups. At the bottom, four coordinators are listed: **Technical Coordinator: Connection to the LSST System**, **Computing & Simulation Coordinator: Simulations, Image Processing**, **Data Coordinator: Data Products & Validation**, and **Analysis Coordinator: Final Stages of Science Analysis**.

What does DESC put forward ?

- DC2
 - 1/6th of LSST year-1
 - High recognition of CC-IN2P3 role for processing +UK/France grid resources
 - But: needed resources underestimated
 - Still and ever plan to do everything at NERSC
- Next step : Science Readiness ; Early science



Multi-color rendering of DC2 tract 3828 and zoom-in on galaxy cluster. Image credit: Cohen-Tanugi et al. (CC-IN2P3) and DC2 Team.

+ Clusters by Marina Ricci

		LSST DESC Pre-commissioning Activities																				LSST System Commissioning							
		FY16				FY17				FY18				FY19				FY20				FY21				FY22			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
LSST DESC Pre-commissioning Activities	Data Challenge 1 (DC1)	RQ	Production			Analysis																							
	Data Challenge 2 (DC2)					RQ				Production				Production & Analysis				Analysis											
	Science Readiness (SR)																	Collection of SR Activities											
LSST DESC Commissioning	ComCam Analysis																									ComCam Analysis			
	SV Analysis																									SV Analysis			
LSST Facility Commissioning	Early Commissioning, ComCam																	I&T				Obs							
	LSSTCam Commissioning																					I&T				Obs			

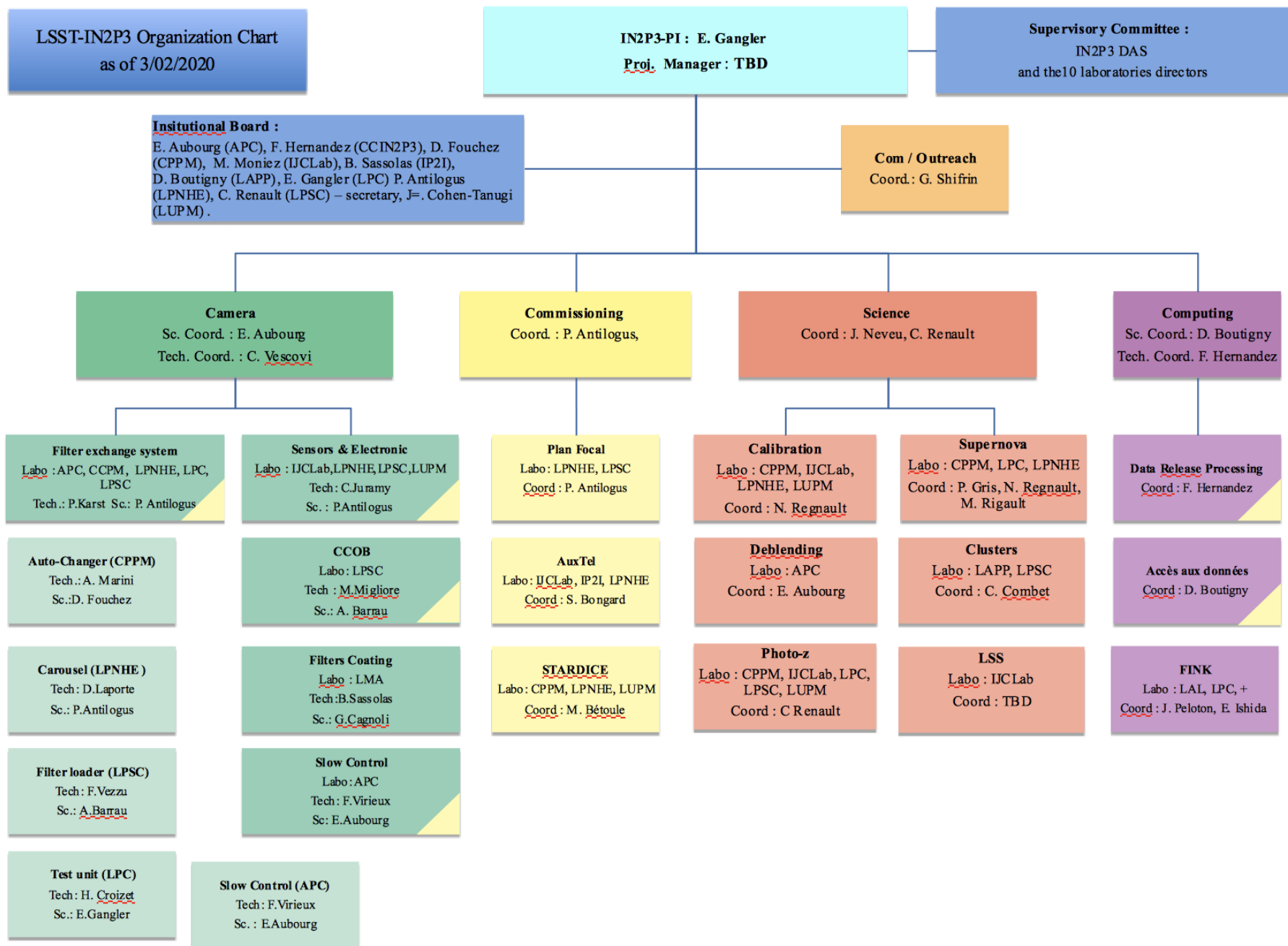
(now)

Science progres highlights

(DESC management view, as deciphered by me)

- Progresses on key tools
 - **PIFF** (new PSF fitter, see PF Leget wednesday) → applied on DC2 ; collaboration with LSST DM
 - TXPipe (the 3x2 pt pipeline) → reanalysis of DES Y1
 - Strong Lensing pipeline (on DC 2)
- And for the supernovae ?
 - **RESSPECT, Observing strategy**
 - Nothing on calibration :/
 - still some pedagogy to do...
- Other area where progress due:
 - Commissioning plan, data access

LSST-France organization



Remarks 1/3

- *Construction* is almost over ; let them work !
- **Commissioning :**
 - **Focal plane** is where everything starts...
 - Understaffed for now
 - How to ramp up manpower/expertise ?
 - Cf. tomorrow morning.
 - *AuxTel* and *StarDICE* are part of Calibration effort
 - AuxTel goal is to extract atmospheric transmission
 - Spectrator is the priority (J. Neveu, S. Bongard, Y. Copin)
 - Promising R&D on holograms (M Moniez, S. Dagoret-Campagne)
 - should not undermine Spectrator effort.
 - StarDice has received dedicated budget this year
 - Official support from LSST-France !

Remarks 2/3

- **Computing**

- Project structure clarified (see wed.)
- DC2 has shown how difficult this will be !
 - *Data access* is still fuzzy.

- **Understaffed:**

- We have a strong case to hire IT engineers !
- Where are the physicists ?
 - All relies on Dominique, Johann and Fabio+Bastien behind the scenes...
- What is the plan for 2020 ?
- *FINK proposal* due by this semester

Remarks 3/3

- Scientific coordination/organization needs to be revisited
 - Scientific interests (from IN2P3 prospective White papers)
 - **Supernova** Hubble Diagram
 - & Peculiar velocities
congratulations from the DAS for the quality of the submission on these 2
 - **Clusters**
 - Large Scale structure
 - & machine learning and survey synergies → **WL & 3x2 pt**
 - **Broker** (multimessenger astronomy)
 - **Dark Matter** (dark matter and neutrinos)
 - How do we turn this into a successful scientific program ?
 - What should be the respective role of LSST-France and DESC ?
→ **Discussion tomorrow**

Key dates

- March 17-19: RO/LSST Algorithm workshop
- March 23: LSST en France (LPNHE)
- April 27-29: RO/LSST Supernova workshop
- June 8-12: [LSST@Europe](#) 4
- July 20-24: DESC meeting
- Fall 2020 : Next RO/LSST-France