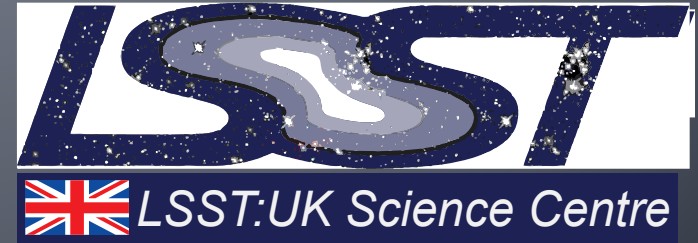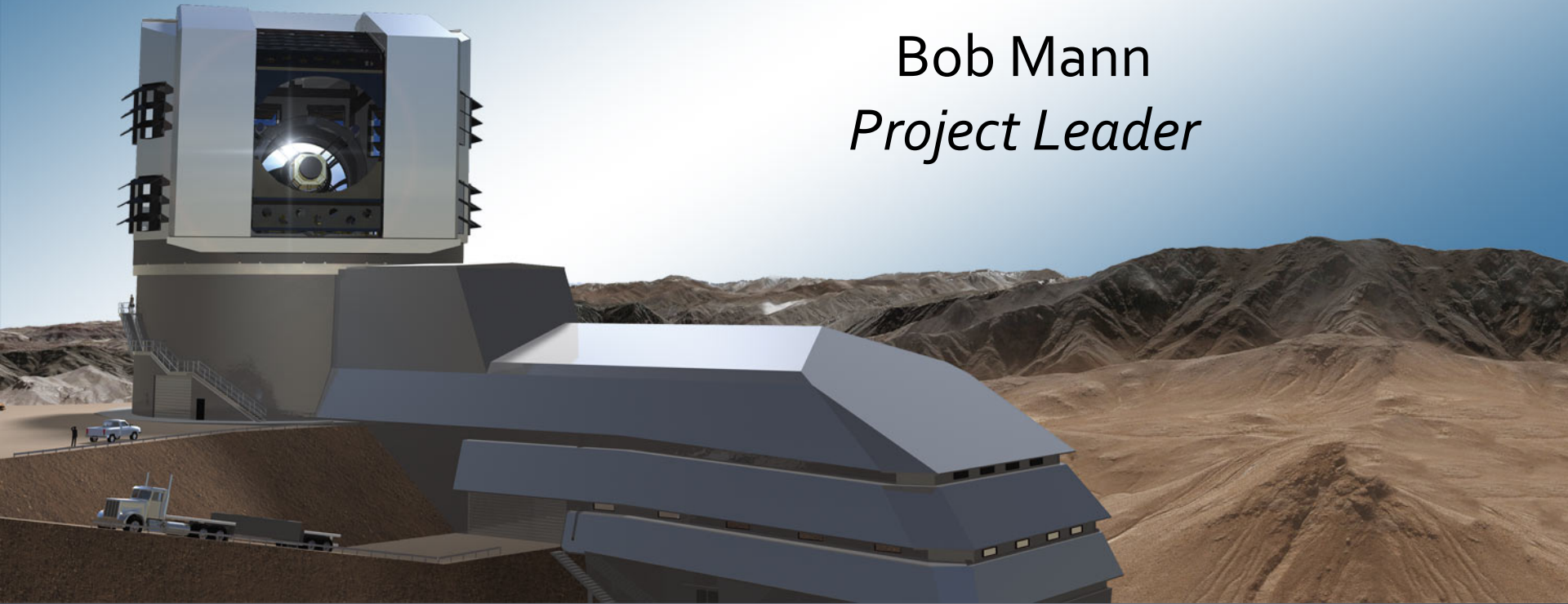# Introduction & overview

Bob Mann
Project Leader

Outline

- Administrivia

- Brief overview & status of LSST and LSST:UK

- Look ahead to the rest of the meeting

Thank you to the organisers

LOC

- Erminia Calabrese
- Tim Davis
- Cosimo Inserra

- George Beckett

SOC

- Stephen Smartt (Chair)
- Alastair Edge
- Cosimo Inserra
- Bob Mann
- Tim Naylor
- Graham Smith
- Aprajita Verma

Code of Conduct

- All LSST:UK meetings operate under CoC
  - You should all have signed up to it…

- *"Behave professionally. Communicate Appropriately. Be kind."*
  - Obvious stuff, but important nonetheless

- Meeting Points of Contact & Skype Numbers
  - Michelle Collins – 0131-618-6287
  - Steve Warren – 0131-618-9772

LSST and LSST:UK

LSST:UK Consortium
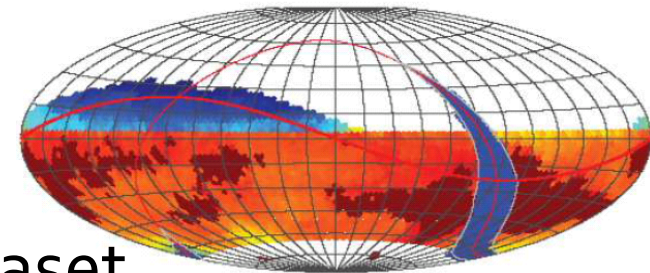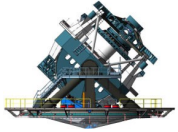

LSST:UK Science Centre

LSST Basics

April 17th

- Survey telescope in Chile
  - 9.6 sq. deg Field of View
  - annular primary 6.5m effective

- Large étendue: can map **"wide**, **deep** & **fast"**

~800 visits per field

- Ten year survey from late 2022
  - Different kinds of analysis from the same multi-colour, multi-epoch dataset

LSST:UK Consortium

LSST:UK Science Centre

LSST Data Product Categories

PROJECT

Prompt
Formerly "Level 1" data products

Real Time Difference Image Analysis (DIA)

- A stream of ~10 million time-domain events per night (Alerts), detected, characterized, and transmitted to event distribution networks with 60 seconds of shutter close.
- A catalog of orbits for ~6 million bodies in the Solar System

Data Release
Formerly "Level 2" data products

Reduced single-epoch & deep co-added images, reprocessed DIA products

- A catalog of ~37 billion objects (20bn galaxies, 17bn stars), ~7 trillion observations ("sources"), and ~30 trillion measurements ("forced sources")
- Produced annually and accessible through online databases.

COMMUNITY

User Generated
Formerly "Level 3" data products

User-produced added-value data products

- Deep KBO/NEO, variable star classifications, shear maps, etc
- Enabled by services and computing resources at the LSST Data Access Centers (DACs) and via the LSST Science Platform

More details in the **Data Products Definition Document**
https://lse-163.lsst.io/

# LSST status

- Detailed status update from Steve Kahn (Project Director) tomorrow

May 11th

- Construction going well
  - M1/M3 mirror at summit
  - Contingency ~6 months

- Some problems, but expect to meet all specs in Science Requirements Document

LSST:UK Consortium

LSST:UK Science Centre

LSST:UK Consortium

Every astronomy group in the UK

LSST:UK Consortium

LSST:UK Science Centre
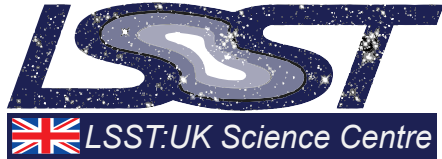
UK participation in LSST

LSST:UK Consortium

Defines the programme of work for…

Works on behalf of…

LSST:UK Science Centre (LUSC)

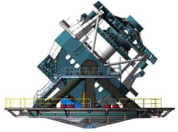LSST:UK Consortium

LSST:UK Science Centre

LSST:UK Science Centre

- Distributed entity, with two main components

- LUSC-DAC: UK Data Access Centre
  - Curating LSST data products and other datasets
  - Providing access to analysis resources
  - Implemented within IRIS (www.iris.ac.uk)

- LUSC-DEV: developing software, and preparing non-LSST data, for use in LSST science

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PROJECT

COMMUNITY

LUSC-DAC

LUSC-DEV

- **LUSC: infrastructure investment to enable science**
  - DEV: domain-specific data analysis software
  - DAC: manage data and support DEV operations

Timeline for LSST

UK	Phase A: Development					Phase B: Commissioning				Phase C: Early Ops.				Phase D: Standard Operations						
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
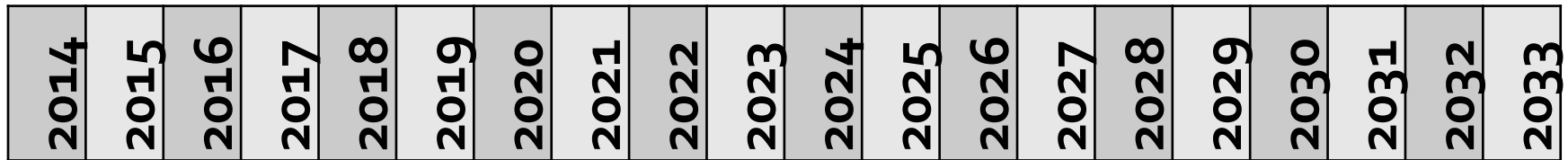
- 1 August 2014: start of construction project

- October 2019: telescope First Light

- October 2022: start of main survey operations

LUSC Phase A

- Phase A award
  - £15M: Operations Contribution
    - Secure data rights for 100 faculty + 400 postdocs/PhD students
  - £3.4M (100% FEC): DAC and DEV programme
    - DEV: tackle hardest problems in top priority science areas, using precursor survey data and simulations
    - DAC: prototype technologies selected by Project DM team; provide computational support to DEV activities

- Wider Phase A goals for LSST:UK Consortium
  - Set up structures & processes for ~18-year project
 - Get integrated into Science Collaborations

LSST Science Collaborations and Chairs

- **Galaxies** (M. Banerji, S. Kaviraj)
- **Stars, MW and Local Volumes** (J. Bochanski, J. Gizis, N. Kallivayalil)
- **Solar System** (M. Schwamb, D. Trilling)
- **Dark Energy** (E. Gawiser, P. Marshall)
- **AGN** (T. Almeyda, N. Brandt)
- **Transients/variable stars** (F. Bianco, R. Street)
- **Strong Lensing** (C. Keeton, A. Verma)
- **Informatics & Statistics** (T. Loredo, C. Schafer)

LSST:UK Consortium

UK has the only 5 non-US Science Collaboration chairs

LSST:UK Science Centre

LUSC Phase A DAC

- Project developing LSST Science Platform for DACs
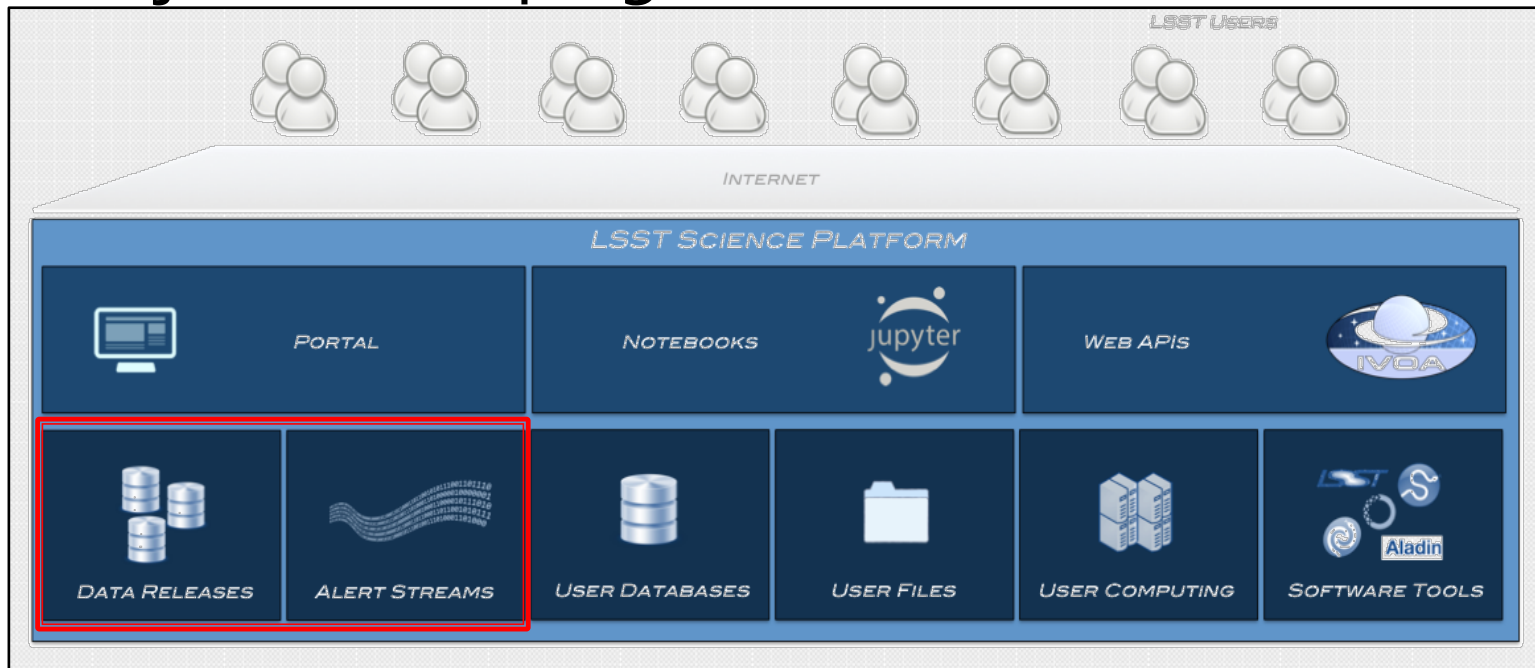
- Identify most challenging technical topics
  - Prototype for deployment within IRIS

More details from George Beckett

LUSC Phase A DEV

- Technical problems in high priority science areas with long development lead times, e.g.
  - Milky Way: test star/galaxy separation algorithms with DES
  - Milky Way: detecting tidal streams at LSST scale
  - Weak lensing: sensor characteristics & image systematics
  - Transients: SN lightcurves for survey cadence optimisation
  - Transients: prototype broker handling ZTF transients
  - Transients: photometric classification of Supernovae
  - Comet & asteroids: test image stacking with ATLAS
  - Detector characterization: PSF & other image systematics

LSST:UK Consortium

Talks on most of these

LSST:UK Science Centre

LUSC Phase B programme (£5.1M)

- DAC: move to operational DAC on IRIS
- DEV:
  - Lasair: transient broker
  - LSST and near-infrared data fusion
  - Morphology & low-surface-brightness science
  - PSF and sensor characterization
  - UK contribution to DESC operations
  - Cross-matching catalogues at LSST depth

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Talks on all of these

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1ˢᵗ LSST:UK All Hands Meeting

Why now?...and what is it for?

LSST:UK Consortium

LSST:UK Science Centre

AHM now: important milestones

- LSST
  - Crucial final stages of construction
  - Detailed planning of Commissioning and Operations

- LSST:UK
  - Transition from Phase A (R&D) to Phase B (production)

- Important decisions to influence and plan for

Important decisions for Project

- Details of survey strategy `TODAY`
  - Cadence of Wide-Fast-Deep survey
  - Deep Drilling Fields and other special surveys

- Commissioning `TOMORROW`
  - Choice of fields for commissioning observations

- Operations model `TODAY`
  - Open Data Framework

Important decisions for LSST:UK

- Detailed end-user science requirements, e.g.
  - DEV: what filtering of the alert stream do you want the Lasair broker to support?
  - DAC: what non-LSST datasets do you need to have integrated into the DAC?
  - DAC: what kinds of analysis job will you run through the DAC?
- How can we engage with Commissioning?

Discussions tomorrow and Wednesday

LSST:UK Consortium

LSST:UK Science Centre

Summary

- This is a crucial time for LSST & for LSST:UK

- Phase A has been a great success
  - Solid technical achievements & SC engagement

- Phase B represents a step-change for us
  - Moving from R&D into readiness for operations

- We need your input on many important issues
  - *Please take the opportunities offered in this meeting*