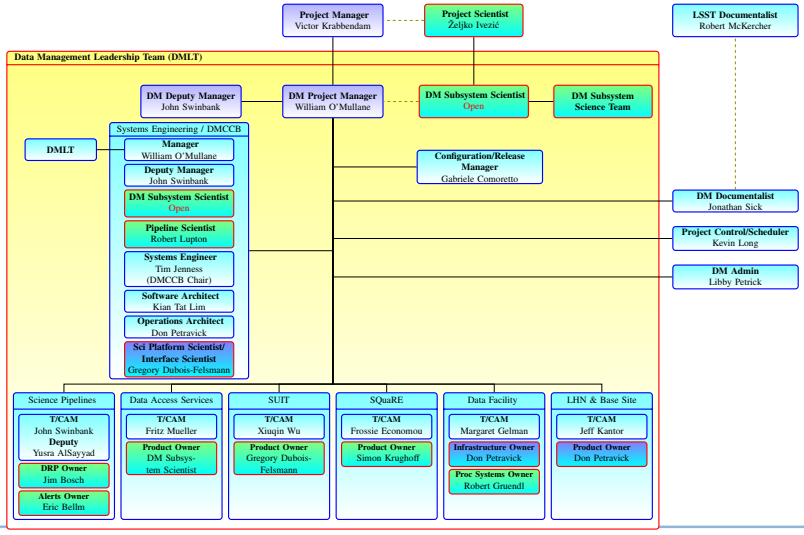
LSST Data Management Status

William O'Mullane, AURA/LSST
DM Project Manager

DM All Hands
6th March 2018

Outline

Organization



Welcome Leanne Guy and thanks to Mario (who stays with us)!!

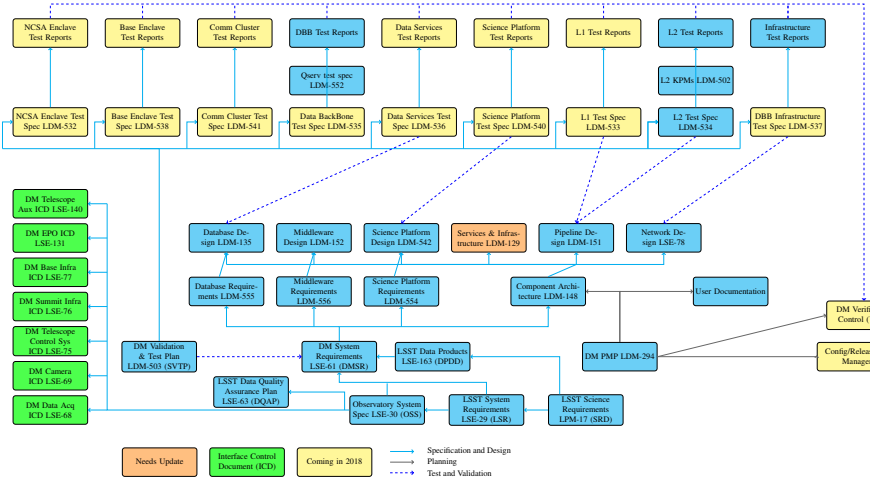
Welcome Michelle Butler and thanks to Don

Welcome Gabriele Comoretto.

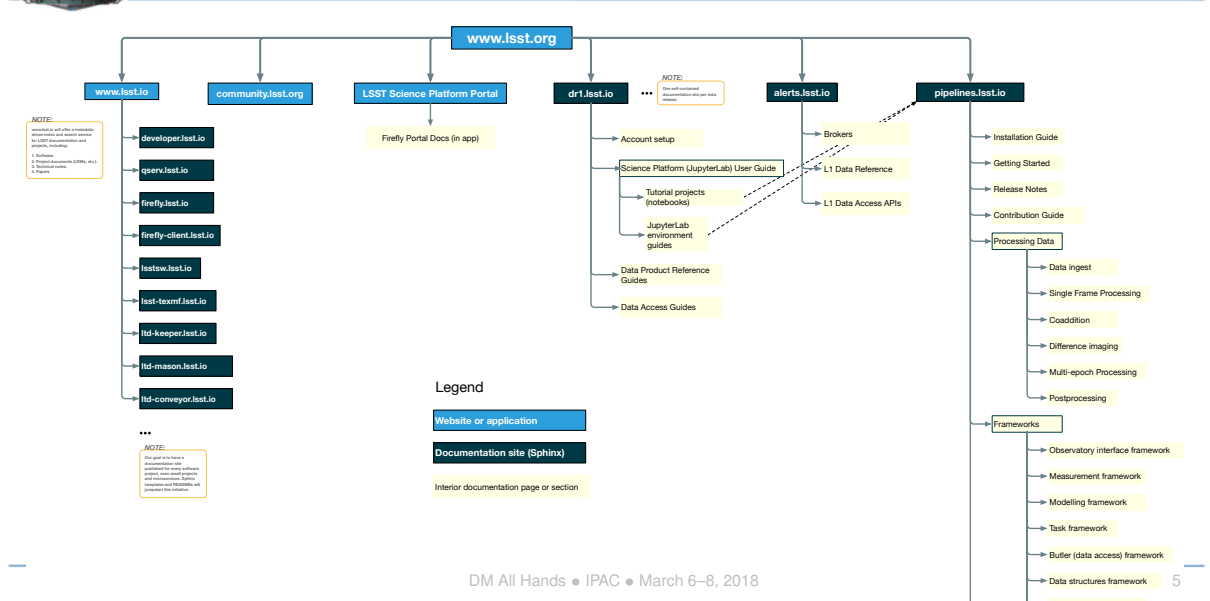
Deputies John Swinbank (PM) and Yusra AlSayyad (Pipelines)

Toughest thing in any project is communication.

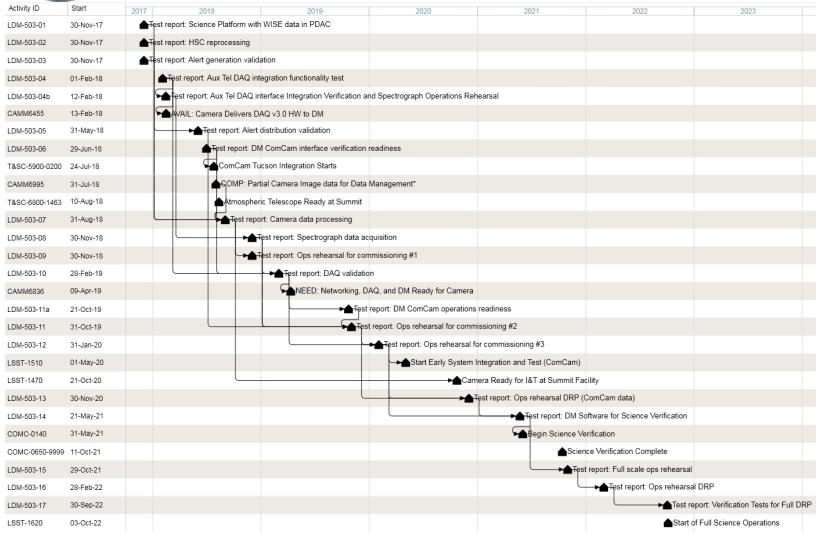
DM Document Tree



End-User Documentation on the Web



Verification is a Priority



Across all of LSST verification is a big topic right now.

DM is adopting a test driven schedule to better address this.

Verification and Validation

Verification: Have we built everything we are supposed to build?

- In line with the Project's System Engineering approach
- Demonstrate that we cover all requirements on DM
- **?** shows the DM verification matrix

Validation: Have we built the right thing and does it work as expected?

- Must tackle *both* Scientific *and* Operational Validation
- Talking with with Commissioning Team: some *rehearsals* will be joint

? addresses DM's plans for verification & validation.

High level status

- The DM Basline is now the reviewed plan (LCRs processed)
- S18 detail plans submitted
- Milestones inow being reported monthly
- Level 2 milestones achieve in December
  - LDM-503-2ÂăÂăÂăTest report: HSC Reprocessing -DMTR-51
  - LDM-503-3ÂăÂăÂăTest report: Alert Generation Validation -DMTR-53
- Level 2 milestones delayed in December
  - LDM-503-1ÂăÂăÂăTest report: Science Platform with WISE data in PDAC
    - Instability PDAC hardware lack of personnel,
    - Testing commend last week

High Level Goals

- 2017: Prototyping data access and first access to hardware
  - Jun: Prototype Data Access Center with SDSS + WISE Data
  - Aug: Working with camera test stand data
  - Dec: Prototype notebooks, private databases for Science Platform
- 2018: Prototypes for various processes and databases - “Minimum Viable System”
  - Jun: Calibration Products accessible through Butler
  - Aug: Mountain base network up
  - Oct: Spectrograph data acquisition
  - Dec: Prototype QA/Commissioning Environment
- Dec 2019: ComCam L1, L2 Production
- Dec 2019: Base Center Integration Complete
- Jun 2020: Camera L1, L2 Production
- Jul 2021: US Data Access Center Integrated

Test plans to confirm milestone completion are under development.

Commissioning Start Requirements

November 2019: DM for Commissioning (minimum required for start of commissioning with ComCam): **(See ? §3.3 and table 8)**

- Pipeline: single-frame measurement including ISR, ghost masking, cosmic ray detection, PSF estimation, astrometric and photometric calibration, background estimation, single-frame deblending, master calibration image generation, atmospheric characterization
- Services: archiving, EFD transformation, Data Backbone for files (Base/NCSA), telemetry gateway, OCS-controlled batch, offline processing
- LSST Science Platform on Commissioning Cluster: Notebook Aspect, image access, user file storage, batch computing

Milestones:

- LDM-503-9 – 2018-11-30: on the right track with beta software.
- LDM-503-11 – 2019-10-31: verification of ComCam commissioning requirements.

Outline

Realized Risks

As part of the replan three risks were realized:

- DM-062 Programming team productivity below estimate due to geographical distribution/competing priorities.
- DM-085 SUI workload underestimated.
- DM-087 SUI requirements change.

These risks are being addressed in the new DM plan and the associated request to draw on contingency.
New management and organization allowed us to reduce exposure on some other risks. This plus assessment of exposure on other risks reduced our risk exposure at the level of ∼$12M (to ∼$12M).

Top risks

DM-018 Computing power required for Data Release Production exceeds estimates
- Lots of verification testing (e.g. HSC processing)

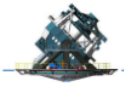
DM-023 Unanticipated characteristics of real data result in poor MultiFit performance (computational)
- Lots of verification testing (e.g. HSC processing)

DM-042 Loss of key personnel
- Management structure reducing ‘single points of failure’
- Focus on written design documentation & verification plans

DM-021 Object counts exceed expectations, leading to insufficient compute
- Improved modeling: work in progress (Jurić)

DM-032 LSST DM hardware architecture becomes antiquated
- Core algorithmic code is flexible and hardware-agnostic
- Actively tracking and anticipating the state of the art

Outline



Pipelines

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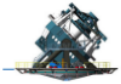

Architecture

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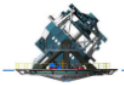

Data Access Services

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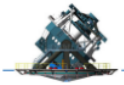

LSST Data Facility (NCSA)

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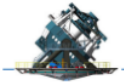
Base & Network

– The Network Engineering Team completed the first successful transfer of digital data over LSST/AURA fiber optic networks from the Summit Site on Cerro Pachon to the Base Site in La Serena and on to the Archive Site at NCSA in Champaign. A set of 6 x 10 Gbps Network Interface cards on Data Transfer Nodes (DTN) configured with iPerf3 generated a sustained data rate of approximately 44 gigabits per second, over a period of 24 hours, exceeding the target of 40 gigabits per second.



SQuaRE

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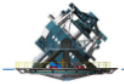

SUIT

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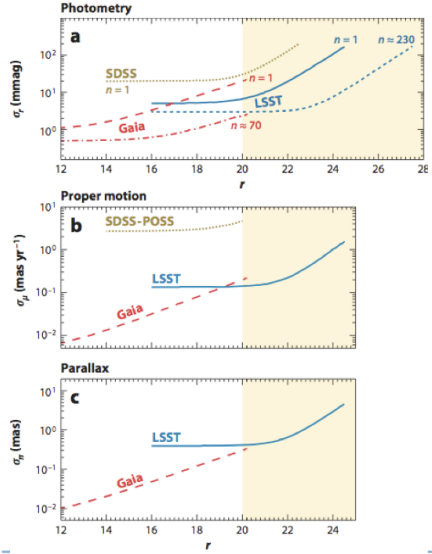
Outline

Outline

Conclusion

- New DM Project Management is in place since April 2017.
- Organization, prioritization and specification have been the first priority.
- To date encountered a real willingness to cooperate on DM and *get the job done*.
- Will make pragmatic and timely decisions to see DM works.
- We had a successful NSF/DOE Review in July. Got some recommendations on how to make an *even better* DM.
- LSST has the potential for a *huge* impact in astronomy; DM is fundamental to this.
- Looking forward to the first LSST images!

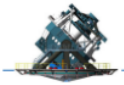
The END



The Milky Way disk *belongs* to Gaia, and the halo to LSST (plus very faint and/or very red sources, such as white dwarfs and LT(Y) dwarfs).

Željko Ivezić

Questions ??



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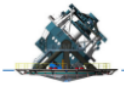
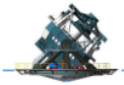
Reference material



Acronyms I

Acronym	Description
IPAC	Infrared Processing and Analysis Center



References I