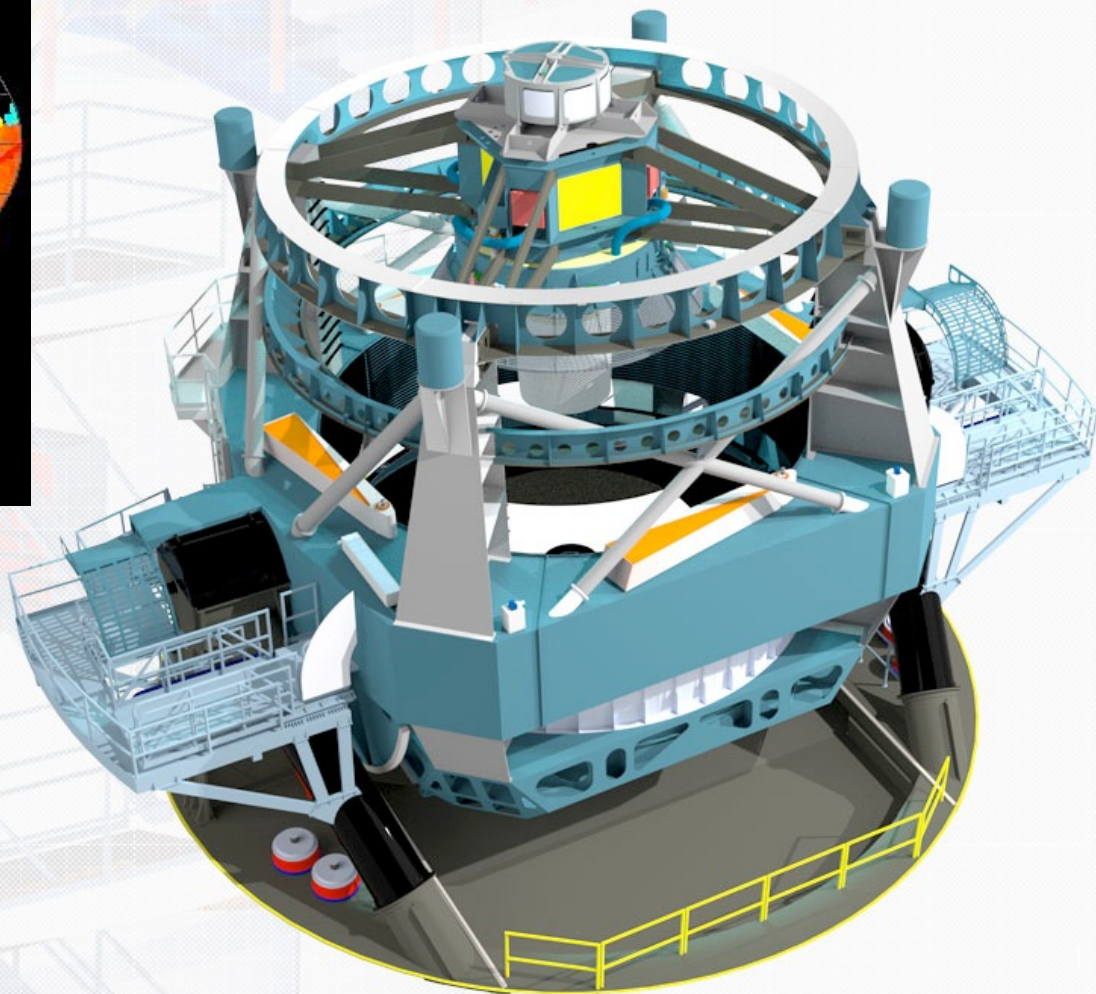
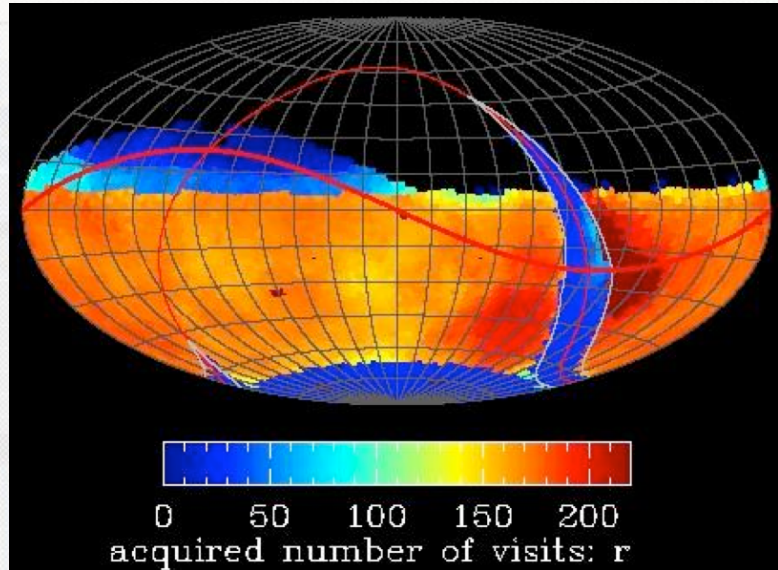


# LSST Observing Strategy

Željko Ivezić, University of Washington

LSST Project Scientist

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LSST: a digital color movie of the Universe...

**LSST in one sentence:**

An optical/near-IR survey of half the sky in ugrizy bands to  $r \sim 27.5$  based on  $\sim 1000$  visits over a 10-year period:

A catalog of 20 billion stars and 20 billion galaxies with exquisite photometry, astrometry and image quality!

More information at  
[www.lsst.org](http://www.lsst.org)  
and [arXiv:0805.2366](https://arxiv.org/abs/0805.2366)

# Main points



- 1) The ultimate deliverable of **LSST** is not just the telescope, nor the camera, but the **fully reduced science-ready data** as well. No classical TAC.
- 2) The fundamental basis of the LSST observing strategy is to **scan the sky wide, fast, and deep**, and to obtain a dataset that **simultaneously satisfies the majority of the science goals**.
- 3) The LSST Science Advisory Council (with **community input**) is advising the Project on cadence-related questions. Also, a community white paper on observing strategy is in prep.

# Observing Strategy: baseline



- 1) The main wide-fast-deep survey will use **about 90%** of the observing time and will be simultaneously optimized for the homogeneity of depth and number of visits, and for time-domain science (e.g., asteroids, supernovae, variable stars).
- 2) The remaining observing time will be used to obtain **improved coverage of parameter space** such as very deep observations, observations with very short revisit times, and observations of “special” regions (e.g., the Ecliptic, the Large and Small Magellanic Clouds).

**For more details, see [arXiv:0805.2366](https://arxiv.org/abs/0805.2366)**

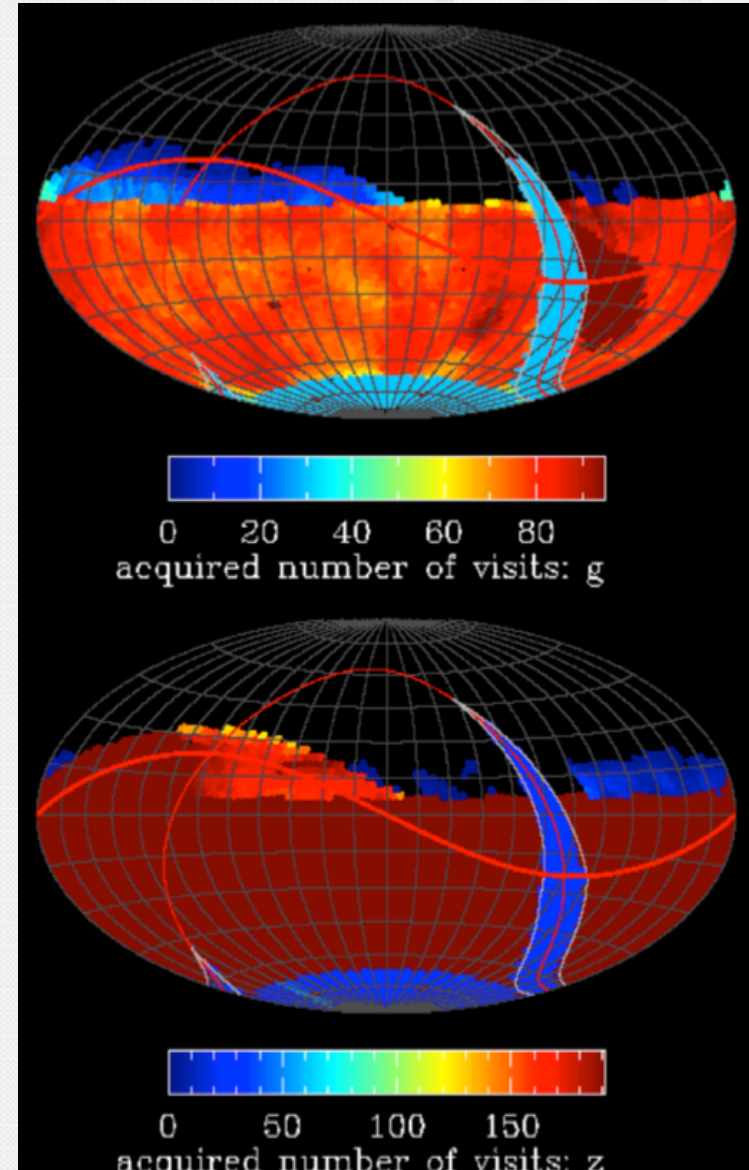
# Operations Simulations

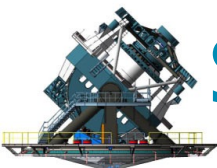
Observing constraints are provided by the astrophysical properties of the site (e.g. sky background), engineering models (e.g. settle time) and science requirements.

Operations simulator generates sequences of LSST observations together with their properties (seeing, sky brightness, depth, filter). **About 2.5 million visits (30 sec exposures) over 10 years.**

For more technical details about observing strategy, simulations and cadence optimization, see talks by Connolly, Yoachim and Ivezić at

<http://ls.st/kaq>





# Simulated surveys are public



Setup	Simulation Name	Description of the Survey Setup
0	<a href="#">enigma_1189</a>	<u>Modern Version of the Baseline Cadence</u> A candidate replacement simulation for the current Baseline Cadence (opsim3.61) produced with the latest version (v3.2.1) of the Operations Simulation (OpSim) code. The following adjustments have been made: includes Science Council approved Deep Drilling fields; Wide-Fast-Deep (WFD) design specification for areal coverage (18,000 deg) & WFD "boosted visits" = 75, 105, 240, 240, 210, 210 for u, g, r, i, z, & y filters where g, r, i and z visits are collected in pairs separated by about 30 minutes; includes revised scheduled downtime as well as random downtime; <u>minAlt</u> = 20 deg; <u>MinDistance2Moon</u> = 30 deg. Note that SRD design visits = 56, 80, 184, 184, 160, 160 for u, g, r, i, z, & y filters.
1	<a href="#">ops2_1098</a>	Uniform cadence (WFD), which asks for visits in pairs, and no other proposal.
2	<a href="#">ops2_1093</a>	Only uniform cadence (WFD), but does not require pairs of visits.
3	<a href="#">kraken_1033</a>	As the baseline cadence (Setup 0), but does not require pairs of visits.
4	<a href="#">enigma_1271</a> <a href="#">enigma_1266</a>	As the baseline cadence, but requests 3 visits per Wide-Fast-Deep field chosen instead of 2 visits, using the same window function for both 1-2 visits and 2-3 visits. As the baseline cadence, but requests 4 visits per Wide-Fast-Deep field.
5	<a href="#">kraken_1034</a>	As the baseline cadence, except that the u-band exposure time is 60 sec instead of 30 sec.; <u>Nvisit</u> for the u-band remains the same.
6	<a href="#">kraken_1035</a>	As the baseline cadence, except that the u-band exposure time is 60 sec instead of 30 sec.; <u>Nvisit</u> for the u-band is decreased by a factor of 2.
7	<a href="#">kraken_1036</a>	As the baseline cadence, except for a shorter visit exposure time: 20 sec instead of 30 sec. Deep drilling proposal has visits based on 30sec exposure due to code issues.
8	<a href="#">kraken_1037</a>	As the baseline cadence, except for a longer visit exposure time: 60 sec instead of 30 sec.
9	<a href="#">ops2_1092</a>	<u>Pan-STARRS-like Cadence</u> This is the uniform cadence, and no other proposal, keeping pairs of visits, but increase the area to include everything with Dec <+15 deg (about 27,400 deg <sup>2</sup> ), and keeping the default <u>airmass</u> limit of 1.5.
10	<a href="#">kraken_1038</a>	As the baseline cadence, except for the more relaxed <u>airmass</u> limit of 2.0 instead of 1.5.
11	<a href="#">ops2_1096</a>	As Setup1 (uniform cadence with no other proposal), except for the more relaxed <u>airmass</u> limit of 2.0 instead of 1.5.
12	<a href="#">ops2_1097</a>	As Setup 1 (uniform cadence with no other proposal), except for the more stringent <u>airmass</u> limit of 1.3 instead of 1.5.

**For each visit:**  
**RA, Dec**  
**Filter**  
**MJD**  
**ExposureTime**  
**Seeing**  
**Airmass**  
**Sky brightness**  
**5-sigma depth**  
**and ~100 more...**

<http://ls.st/p1r~>

# Ongoing optimization work



- minimizing the impact of read-out noise (mostly in u band)
- optimizing sky coverage (Galactic plane, south celestial pole, LMC/SMC, Ecliptic)
- **temporal sampling** (SNe, variable stars, asteroids)
- interplay between sky coverage and temporal sampling
- **deep drilling fields**
- dynamic cadence (in response to expected SNR)
- evolving cadence (in response to changing science drivers)

## LSST Science Advisory Council (SAC)

- the main mechanism for officially collecting and delivering community (your!) input to the Project.

For existing input from the community, see <http://ls.st/smg>

**A white paper by the community: on arXiv by August 2016**

**Go to [community.lsst.org](http://community.lsst.org) to participate!**