



SCOC

status and discussion for SAC
PCW 2022

Federica B. Bianco



U.S. DEPARTMENT OF
ENERGY

SLAC

CHARLES AND LISA SIMONYI FUND
••• FOR ARTS AND SCIENCES •••



A huge thank you!

Committee Members:

Franz Bauer, Universidad Católica, Chile (AGN SC)

Sarah Brough, University of New South Wales (Galaxies SC)

Renee Hlozek, University of Toronto (TVS SC)

Mansi Kasliwal, Caltech (TVS SC)

Knut Olsen, NSF's NOIRLab (SMWLVS SC)

Hiranya Peiris, University College London (DESC)

Meg Schwamb, Queen's University Belfast (SSSC)

Dan Scolnic, Duke University (DESC)

Colin Slater, University of Washington (TVS SC)

Jay Strader, Michigan State University (SMWLVS SC)

Non-voting Committee Members:

Lynne Jones, Rubin Observatory, ex officio (SL)

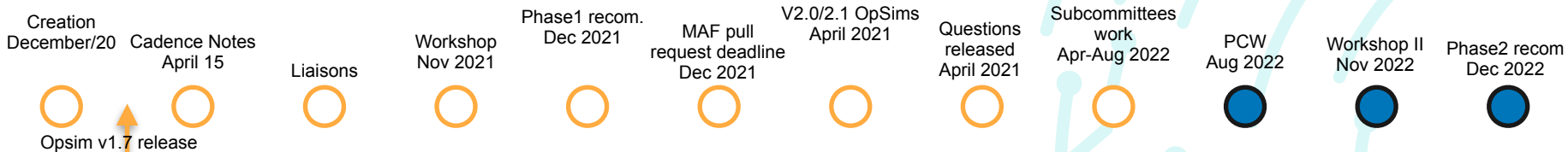
Federica Bianco, Rubin Observatory, Chair (ISSC)

Observing Strategy Team:

Lynne Jones, Peter Yoachim, who

The Rubin LSST SCOC

- Created in early 2020 to parse, synthesize, and analyze the community input on survey cadence
- Charged to make recommendations to the Director of Operations
The SAC is charged with putting together a “Survey Cadence Optimization Committee” (SCOC) which will review these OpSim results and make recommendations for the default observing plan (10/18/2019)
- Its a standing committee of LSST that will review the survey strategy on an ongoing basis
- First set of recommendations due December 2022



2019-2022 February | February 2022-now

- I came onboard in February 2022
- What I can bring is a community perspective and a close connection with the Science Collaborations as a whole
- Transition: the transfer of knowledge took some time, and some patience, mostly for me to learn the ropes and understand how the committee had been functioning and how that can be adapted to my leadership and vice versa

Opsim V2.0/2.1

- Address rolling strategies
- Includes triplets - “long time gaps” and “presto color” strategies: strategies that include a third visit to support hours-days time scales and discovery/characterize rapid transients (including KNe)
- Vary exposure time
- Microsurveys
- Refinement of the overall footprint including Galactic footprint and NES
- Deep Drilling Fields implementations (V2.1)

- V2.0 released in Nov. 2021
- V2.1 released in April 2022 ([Notebook](#))
- The v2.0 and v2.1 simulations include 265 runs.

8 questions for Phase 2 review

- Reflect the earlier recommendations: what was still to be answered and what was to be parsed by the new simulations
- Organize 8 subcommittees to address review the questions
- After initial subcommittee review the full SCOC converges on recommendations
 - we collaboratively edited the questions (google doc) resulting in <https://community.lsst.org/t/scoc-v2-0-and-2-1-simulations-review-timeline/6712>

1. Footprint
2. Rolling cadence
3. Dithering patterns
4. Use of ~10% of observing time
5. Filter distribution/Nightly filters/Repeat visits in a night
6. Exposure time allocation per band

1. Filter Distribution
2. Nightly Visits pairs and triplets
3. Footprint
4. Rolling Cadence
5. DDF Strategy
6. Early Science
7. Time allocation for ToO
8. Micro-surveys

Phase 2 questions

1. **Filter Distribution**
 1. Should the survey cadence skew towards bluer filter observations (compared to the current baseline)?
 2. Should the same filter balance be applied to all sky (e.g. EG vs Galactic)
 3. What is the exposure time for the u-band observations? (1x30 and 1x50s or exposures)
 4. Should the survey use variable exposure times or set exposure times in each filter?
 5. Should the survey use a different exposure than 2x15s (or possibly 1x30s) for non-u-band filters? (see the shave filters v2.1 simulations)
2. **Nightly Visits pairs and triplets**
 1. Should there be a third visit all the time, or on only some observations?
 2. Should we add a third visit everywhere in the sky (e.g. Gal vs EG or by Ecliptic Latitude)
 3. If there is going to be a third visit on a night, what is the spacing between the 2nd and third visit?
 4. If there is no third visit, what is the time separation between visit pairs (33 minutes versus 2-7 hours)?
3. **Footprint**
 1. What should the exact Declination and dust extinction limits for the WFD region,
 2. What should the definition of the Galactic bulge region be (e.g. should we add the Virgo cluster to WFD)
 3. How much time is spent observing the Galactic Plane?
 4. How much time is spent observing the NES?
 5. How much time is spent covering the South Celestial Pole?
 6. How much time is spent on pencil beam surveys?
4. **Rolling Cadence**
 1. Should a rolling cadence be adopted in the WFD?
 2. Should a rolling cadence be adopted in the special regions of the WFD (NED, GP, SCP) and also in the minisurveys?
 3. Which scheme for rolling should be adopted? (number of bands, other spatial region splits)
 4. How aggressive should the rolling be in the WFD or non-WFD footprint?
 5. When should rolling start (end of year 1 or at 1.5 years)?
5. **DDF Strategy**
 1. How much survey time should be spent on the DDFs?
 2. Should all DDFs be observed for the entire 10 years?
 3. Do some DDF fields get more observations in certain years and none in others (rolling DDF strategy)? If so, which ones and how many years do those fields get observed?
 4. Should the Euclid South DDF be finalized as the 5th field (what else do we need to know about observing and co-observing needs)? Should the Euclid South DDF be observed differently to other DDFs?
6. **Early Science**
 1. Should the LSST cadence run in the first year or should some other cadence be executed for part of year 1?
 2. Should incremental template generation be prioritized in Year 1?
 3. What community feedback do we need to help decide the early science strategy?
7. **Time allocation for ToO**
 1. How many ToOs per year should be observed?
 2. How should time be allocated for ToOs with respect to the Ligo-Virgo runs?
 3. How should ToO observations be coordinated with other groups?
 4. Should ToO observations be discovery-night only or follow up on days scales?
8. **Micro-surveys**

What are our priorities for Micro-surveys?
Should any microsurveys occur in Year 1? If so, which ones?
What should happen to the even smaller sub-percent micro-surveys (nano surveys) proposed?

Franz Bauer : 3,4,5,7

Sarah Brough : 1,2,5,6

Renee Hlozek : 1,4,5,7

Mansi Kasliwal: 2,4,7,8

Knut Olsen : 1,3,5,6

Hiranya Peiris : 3,4,5,6

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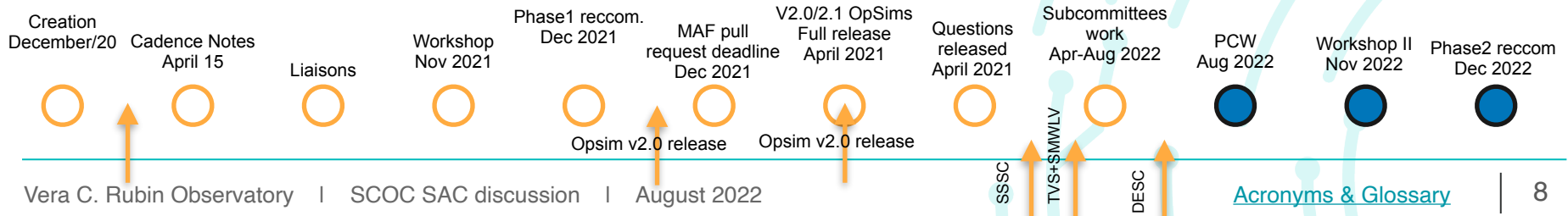
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Community input

- Early in 2022 the SCOC decided unanimously that asking for additional white papers or reports would be too significant a burden on the SCs and on the community
- The 2021 Cadence Notes had led to an influx of metrics (MAFs) now largely integrated in the workflow of the Survey Strategy team and SCOC (meaning that they can be run against new OpSims and are routinely run by Lynne for us)
- The MAFs, however, are not the whole story: still need review by technical (Lynne+Peter) and support in the interpretation by domain experts (liaison)
- ... Report came even if we did not solicit them! (SSSC and following their lead TVS, SMWLV, DESC)
- Eventually we released a [statement](#) disclosing that we were receiving and considering reports



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At the 2022 PCW the SCOC will share its current considerations and organize a workshop in Fall 2022 (note that the original timeline stated Summer 2022), and we continue to request feedback from the community and the Science Collaborations in particular. Please be aware that the next two months will see intense SCOC activity so any feedback should be provided as timely as possible! The SCOC is happy to continue communicating with the SCs via their liaisons and to receive memos or reports from the SCs if they want to share their considerations this way.

Lessons learned: - we need to better set boundaries; we need to standardize interaction with the liaisons

Current MAF issues

- missing MAFs -
 - DESC KN was incomplete
 - we are using the TVS KN metric with DESC parameters
- missing SN metric
 - TVS metric is too computationally expensive/relies on external parameters
 - SN Ia metric from DESC... still work in progress. At this pint we just have to use the input from DESC without being able to run their MAF

Questions update

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- We will have family advanced considerations for questions 1-5 + 8
- We have preliminary considerations on DDF
- Lots of ongoing work on the technical side for ToO
- Early Science: our input is minimal but its intertwined with several of our questions (Rolling, Minisurveys, ToO)
- Recommendation to the Directors expected in December 2022

Committee membership

- keep ~1/2 of the committee for 1 year for institutional memory
 - ensure all science domains remain covered
 - ensure we have strong candidates to serve as liaisons (leveling the playing field)
 - ensure perspective members are aware of the workload
- The SCOC will be a standing committee in Rubin Operations.
 - The new members of the committee after the will see the results of commissioning and have to compare them with the recommendations made
 - We expect that of the 8 questions we will try to answer in Phase 2 recommendations Early Science and ToO will require more refinement after December 2022.
 - Microsurveys will be recommended only or primarily for Y1, a longer term plan (for selection and solicitation) should be implemented