

**The Rubin Science Advisory Committee meeting
at the 2022 Project and Community Workshop
August 7, 2022**

SAC members attending: Franz Bauer, Will Clarkson, Michael Strauss, David Kirkby, Rachel Bean, Niel Brandt, Márcio Catelan, Charles Liu, Meg Schwamb, Josh Simon, Stephen Smartt, Risa Wechsler, Anže Slosar

This meeting was open to all PCW attendees, and was held in a hybrid fashion, with a number of people taking part remotely.

In what follows, findings and recommendations for Rubin leadership are highlighted in ***boldface italics***.

Many of the topics raised in the SAC meeting were mirrored and further discussed in later sessions at the PCW; occasional reference is made to those discussions.

The slides that were presented at this meeting may be found [here](#) and [here](#).

Communications and website

We heard presentations from Ranpal Gill about the results of the communications survey distributed to the Rubin community last year, and from Lauren Corlies about the plans for the Rubin website. The SAC is happy that this survey was carried out, and finds the results insightful.

A feature (and challenge) of the Rubin communications effort is the large number of ways for Rubin Project personnel, operations team, and members of the scientific community to receive and convey information: the website, regular e-mails (official and otherwise), the community forum, Slack, Confluence, github, Isst.org, and so on. This great variety of ways of communication reflects the fact that different communities are used to receiving their information in different ways. However, it does mean that information can be hard to find: any given piece of information is not necessarily promulgated in all these different forums, and there is no way to search across multiple platforms for any specific source of information, even if you know what you are looking for.

With this in mind, the SAC recommends: ***The Project develop a unified,***

semi-curated “Rubin Search” capability that does a Google-quality search through the community website, Rubin News, official emails, the project website, and other forums.

The community forum (community.lsst.org) does have the advantage that its site is searchable, but it is not really meant to be an archive. The communications team sees the community forum as the way for the Rubin science community to communicate with the Project, but in practice, it is not fulfilling that role. The community forum is underused, with most people preferring to ask questions via Slack. This leads to several concerns:

- Slack is really designed for synchronous communications between teams working closely together on a daily basis. It is not designed as an archive of information;
- Slack is not easily searchable, and material can be spread out over many many channels;
- The model whereby individuals directly ask Project personnel specific questions in private messages (on Slack or e-mail) is not sustainable for the type of asynchronous discussion and crowd-source approach to solving issues that will be needed as the user community grows dramatically.

There is also a concern that there are communities, especially those involved in K-12 education, that communicate via channels that are not part of the education team’s remit, such as Facebook.

The SAC recommends that: ***construction and development of the Rubin website and communications plans keep in mind those channels that are used by the education community.***

The model is that information/material that is really important and should be archived should be placed on the Rubin website. However, the SAC finds: ***it is difficult to find information on lsst.org, and it is not clear that the information that is there is up-to-date.***

The SAC was impressed by Lauren’s presentation on the status of the updated Rubin website, <http://rubinobs.org>. However, this website is designed primarily for the lay public, and we heard only vague plans for the portions of the website directed meant for professional astronomers and physicists. The SAC recommends:

A detailed plan be developed for the scientist-facing website, including a timeline and a description of its contents. Each page on this website should have an identified individual responsible for keeping it up to date.

The SAC is of course happy to give detailed feedback on the website; the User's Committee is another body that can help.

The information that the community is eager to learn about reflects the current state of the project development, with lots of people interested in commissioning plans. In this context, the SAC recommends:

The Rubin communications team develop a plan to keep the community up-to-date with the status of commissioning: what's being worked on, what the path forward is, what the challenges are. That is, we need a plan for communications during commissioning. The JWST team did an exemplary job on their [website](#): the world was able to follow in some detail how the telescope was progressing following launch, which helped bring attention to the telescope and build excitement for first light and beyond.

Survey Cadence Optimization Committee (SCOC)

Federica Bianco summarized the work of this committee. The SAC finds: ***Under Federica's leadership, the SCOC has made impressive progress towards defining a recommended cadence for the 10-year LSST.***

In December 2022, the committee plans to release a report containing a series of recommendations for what will be, in essence, an update of the baseline cadence for the ten-year LSST, based on a large number of outputs from the Operations Simulator (OpSim), and their analysis with the Metrics Analysis Framework (MAF). The committee prepared a list of 8 questions to address, ranging from the specific footprint of the Wide-Fast-Deep survey to the detailed cadence of the Deep Drilling Fields; they are close to convergence on 5 or 6 of them. This process has moved forward with a great deal of input from the community and science collaborations, in the form of cadence notes, feedback from the science collaborations, the development of metrics, and so on. The recommendations will not be the end of the story, however: once we have quantification of system performance from commissioning data, OpSim will need to be run again with as-delivered parameters, and the cadence will

need further refinement.

Much of the discussion focused on the SCOC plans and schedule following the December meeting. The SAC remains unclear on several issues:

- What exactly are the remaining to-dos for the SCOC from January 2023 until the start of the survey in mid-2024;
- What is the timescale for making decisions and delivering recommendations to the Rubin operations team;
- How the plans for Early Science (see below) mesh with the SCOC recommendations, and whether the SCOC is responsible for planning the Early Science effort.
- There are plans for a November 2022 workshop, in which many of the remaining questions for the December recommendations will be made. However, it was unclear whether there will be enough time to incorporate the results of this workshop for the December report.

With this in mind, the SAC recommends:

The Rubin leadership develop a specific timeline and set of goals and tasks for the SCOC between now, the November workshop, and the beginning of the LSST survey itself, and publish the timeline to the broader community. This timeline should be published on the Rubin website and on community.lsst.org; it should be accompanied by a description of the decision-making process, and who has authority to make the final decisions on cadence.

The SAC understands that a detailed timeline will have uncertainties, given uncertainties about how the commissioning will proceed, and what the system performance will turn out to be. But it would be very valuable indeed to give the community some sense of what commissioning milestones would resolve these uncertainties, and when those milestones will be met. We return to related issues below, where we discuss Early Science.

The SAC also finds: ***Many of the ideas for metrics have been presented in the form of white papers, cadence notes, and similar documents from the community. The OpSim team and community members have done an exemplary job of turning many of these ideas into code in the MAF, given the limited available resources, but we are concerned that***

this effort has been incomplete because of limited manpower, meaning that the coded metrics represent an incomplete and likely biased subset of all the good cadence ideas. The SCOC should be cognizant of this overarching issue when making cadence decisions.

The current members of the SCOC were appointed about two years ago (it was the SAC's job to recommend individuals to serve on the SCOC). The term of membership is two years (i.e., ending in December 2022, following the release of the report), but terms are renewable. The SAC has asked each SCOC member whether they would be interested in staying on for another term. 4 of the 10 current members are willing to stay on (one of the original members stepped down early); the SAC is having a separate meeting to discuss candidates to invite to join the SCOC. The SCOC will be a standing committee through the 10-year LSST; its work is likely to continue well after the survey begins.

Early Science

Closely tied to the SCOC discussions above are the plans for Early Science, defined as scientifically useful data enabled by Rubin LSST before and including Data Release 1 (DR1). The data previews will be in three stages: simulated data from DESC DC2 (DP0), data from ComCam (DP1), and data from LSSTCam (the full camera) taken during commissioning (DP2). DR1 will include data from the first six months of full survey operations. There is a document, [RTN-011](#), which is a roadmap to the Early Science process; it is in the process of being updated. There is a strong desire in the community to get alerts as early as possible, even if the templates that they are based on are not of the quality that will be possible later in the survey. One of the commissioning science verification plans is to choose a few regions, totalling perhaps 100 deg², to observe to 10-20 year LSST depth. It may also be possible to generate 3-visit templates over modest areas both in science verification and during early operations. [The Rubin Early Science Program](#) indicates that this will allow the early generation of templates and the generation and release of alerts early in the survey planning. The SAC supports this effort, and recommends that:

The Project further explore ways to generate alerts even from imperfect templates, both from the full-depth regions observed during commissioning and from early science operations, and release those alerts to the community throughout the first six months of full

operations.

The plans for the first six months of full operations depend on what is accomplished in the way of System Validation during the commissioning period. The Operations team have described what they call Plans A, B, and C, in which the 10-year survey observing cadence as recommended by the SCOC starts either immediately at the start of full operations, or is delayed somewhat to allow time for special early science observations to be done if there is validation remaining to be done after the commissioning finally ends. It was unclear, however, how the plans for this affects the 10-year plans: the formal start of full operations is defined by the verification of all system requirements, but that need not be synonymous with the start of the “routine” observing program. While the distinction between the Construction Project and Operations is of great importance to the management of Rubin and to the funding agencies, the scientific community cares much more about when routine observations will start. With this in mind, the SAC recommends:

The Construction and Operations Teams prepare a description for the community of the transition to routine observations, de-emphasizing the specifics of whether the activities are under the purview of the Project vs. Operations teams, but rather clarifying the uncertainties, process, and timeline by which the routine survey will get underway. In addition, the Operations Team should work with the SAC and the SCOC to get feedback from the community on the Early Science plans.

The uncertainty in the Early Science timelines leads to challenges in planning for follow-up: how do you write a proposal for the Gemini telescopes, for example, if you don't know when LSST will start generating alerts? Following this meeting, a discussion on this topic led Dara Norman (Deputy Director of Community Science at NOIRLab) to post a detailed policy suggestion, whereby NOIRLab will include a detailed description of Rubin data availability with each semester's call for proposals, just as they do for instrument availability. The SAC recommends that: ***the Rubin Operations team work with Gemini Observatory and NOIRLab on the wording of the 2023 Large and Long Program call for proposals on how LSST-related follow-up proposals would be handled.***

Community Event Brokers

Leanne Guy summarized the current status of the Community Event Brokers. On the recommendation of the SAC, the Project has accepted all 7 event broker proposals that requested direct access to the alert stream (plus two additional brokers that will work with the results of the upstream brokers). MOUs are in progress with each of the brokers; they will be drafted over the next few months. There have been preliminary connection tests with the brokers, using data from the ELAsTICC challenge; apparently, those went well. The SAC finds that: ***the simulated DP0 releases from the DESC-produced simulations have provided an excellent opportunity for the Rubin user community to gain experience using the Rubin Science Platform (RSP) and developing analysis tools for Rubin data products/databases. We applaud the Community Engagement Team for their efforts developing the DP0 delegate program.***

Note that the ELAsTICC simulations do not include solar system objects, meaning that one of the core science pillars of LSST is not being exercised, and a core science community is left waiting. This is true also for the DESC-produced DC2 simulations, which is the basis of the DP0 releases. The SAC finds that: ***the lack of simulated moving objects in the DP0 means that planetary astronomers cannot prepare for Rubin data products in the same way as researchers studying the other key science LSST science drivers, and will only be able to start using the RSP a few months before the start of operations, at best.***

The SAC thus recommends that:

The Rubin Project and Operations Team explore avenues to include simulated Solar System data products/databases into the RSP, and in the tests of the Community Event Brokers. If these cannot be accommodated in DP0, the Community Engagement Team should develop a clear strategy to support the Solar System user community well before the start of operations.

It had long been planned that the Rubin Project itself would provide an opportunity for pre-defined alert filters proposed by the community. We learned that the Project is exploring the possibility of partnering with NOIRLab's ANTARES broker to deliver this functionality. The SAC would like to know more details:

- What is the capacity of this aspect of the ANTARES broker, and how

- will it be distinguished from the rest of what ANTARES is delivering?
- How will the funding of this aspect work, and to what extent is it guaranteed for the full ten years of the survey?

The SAC has some concerns about the seeming descope of a core aspect of the alert production. In addition, since there may be other brokers that are capable of providing such alert filters and might have been interested in doing so, we want to make sure that they will not be placed in a competitive disadvantage relative to ANTARES in funding opportunities. The SAC recommends that:

The Rubin Operations Team prepare a full description of the plans for using the ANTARES broker for community-defined alert filters, and explain its capacity and plans for support throughout the full 10-year survey.

International Contributions

Bob Blum and Phil Marshall described the process by which Rubin has engaged with international partners. There are proposals for in-kind contributions from 43 programs and institutions from 30 countries, including 153 different proposed contributions. These have been vetted with the Contribution Evaluation Committee (CEC), which then passed them on to the NSF and DOE, who have approval authority. There will be a separate data rights agreement for each team; these agreements are being drafted now. In each case, these agreements are with AURA or SLAC, depending on the specifics of the contribution. ***The SAC applauds the operations team and the CEC for their significant effort to create these agreements, and the progress on the in-kind contributions.***

The SAC has several straightforward recommendations to make:

- ***A list of all proposed/likely to be approved contributions should be made available. The science collaborations would find this valuable.***
- ***Similarly, there were requests from the science collaborations for software contributions from international contributors, but the results of these requests were never distributed. It would be useful to see that list, as well as a summary of the process to inform similar calls in the future.***
- ***We would also like guidance on the role of the science collaborations, if any, in the management of the in-kind contributions: are they at all responsible for confirming that the***

contributions are actually being made?

Community Contributions to Commissioning Activities

Keith Bechtol and Chuck Claver gave an update on the call to the community to join the commissioning activities. 30 teams have signed up to do so; they are now being onboarded. Most of these teams plan to contribute to Science Verification, going beyond the formal requirements of the Rubin Science Requirements Document (SRD). The SAC finds: ***It is clear that a lot of thought has gone into the development of the commissioning activities, and involving the community will be of benefit both to the Project and to the broader scientific community.***

Again, the SAC recommends:

A list of all approved teams and the title of their proposed contribution be made available to the community.

There are no plans for additional calls for people to join the commissioning teams, but another call has not been completely ruled out.