# 2020-12-23 Meeting notes

## Date

23 Dec 2020

## Attendees

Julie McEnery, Christopher Hirata, Dara Norman, Dmitri Mawet, George Helou, James Rhoads, Jason Rhodes, Jeff Kruk, Jessica Lu, Jessie Christiansen, John MacKenty, Jonathan Hargis, Keith Bechtol, Olivier Dore, Rachel Akeson, Roeland van der Marel, Ryan Hickox, Sangeeta Malhotra, Saurabh Jha, Yun Wang, Neil Zimmerman

## Agenda

- Design Reference Mission - Jeff Kruk
- High latitude imaging and spectroscopic survey - Chris Hirata

## Minutes

### Julie - Roman project update

Project recently passed the Telescope CDR - significant milestone. Preparing for AAS meeting, will send around summary of activities.

Roman observing program discussion: work has been done to show how the core community surveys meet the mission success criteria.

The DRM is not the actual observing program. It is an example of a set of observations that would meet our needs.

### Jeff - Design reference mission

A DRM is a required product at mission reviews. It is an existence proof of meeting mission objectives, NOT the actual observing plan.

It's a tool for exercising the ground system & flight software. Assess overheads and efficiency versus simulations.

Examples:

- High Latitude Survey has wide (2000 deg^2) and deep (20 deg^2) components, 5*sigma point source sensitivity AB ~ 26.5 and 28.2 respectively.
- SN 1a survey (5-day cadence) imaging in 4 filters, also wide and deep components
- Mircolensing surveys monitors 2 deg^2 on a 15-minute cadence. Exoplanet detections, time-domain astronomy, precision astrometry (tens of microarcsec).

HLS sheduling constraints - the spectroscopic survey benefits from opposing dispersion directions. This drives to 6 month intervals between revisits

Also prefer either one or a small number of contiguous survey regions, not many regions.

The supernova survey wants continuous coverage of a particular field for ~2 years. Long time baseline is essential.

Microlensing seasons - cover both fall and spring of first and last years.

A notional observing program was presented at Mission PDR

In real life the programs are distributed in a more fine-grained fashion.

Present best estimates of efficiency and overheads show 86 days of margin to accomplish the 5-year mission.

The actual observing program will not look like the DRM, only some parts will be similar.

**Questions**

Ryan: what provisions for ToO?
Jeff: Yes, the ground system supports ToO. We don't yet know how many we will support, this is mostly limited by the operations budget. Response time will not be faster than 1 day, then we hit engineering constraints.

### Chris - High latitude survey

Survey design considerations

- survey constraining power - depth, resolution, wavelength coverage, area.
- cross checks - weak lensing shear vs wavelength, survey conditions, redshift survey with multiple lines
- data quality - dithers, rolls, tiling
- observatory characteristics - pixel scale, viewing constraints, backgrounds.

Main science driver is weak lensing. Basic needs are wide area survey with angular resolution, depth, near IR

We chose to do the shape measurements in the NIR, so we optimized the pixel size for J & H bands.

Additional data: Deep fields to understand noise effects, spectroscopic data to calibrate photo-z.

HLIS reference survey covers wavelengths from Y band (LSST) to 2 microns.

Dither to compensate for slightly undersampled pixels (0.11 arcsec corresponds to 0.5*lam/D at 2.52 microns), and cosmic ray losses and cosmetics.

Depth vs area trade - 2015 SDT report

Want to avoid ecliptic plane with zodiacal background, and also avoid galactic plane - this leads you to two regions, one in North and one in South. For Rubin, we would prefer South. Alternative is a northern cap for Subaru HSC at 20 deg N.

For the high latitude spectroscopic survey (HLSS), different considerations

Multiple rolls for spectral de-contamination; baseline is 4 rolls.

Wavelength range trade - SITs extended the wavelength range

Sampling is less a priority, less dithers

Some authors have suggested to cover the Rubin footprint (Eifler, Simet, Krause, et al., 2020). By itself this does not do all the internal cross checks, or help with redshifts at z > 1.

**Questions**

Jessica: Is there a scientific requirement for a contiguous field?
Chris: Apart from operations efficiency, with more footprints you have boundary effects.

Jessica: reason for 3 dithers?
Chris: Different for each filter. For J filter with poorer sampling, need 4 dithers. F184 does 3 dithers. 2 positions is minimal.

Keith: Is the HLS Deep Field related to the SN survey, or are these distinct.
Chris: They are treated separately for reference purposes. THe SN fields will be deep fields. Challenge is the supernova fields need to be in continuous viewing zone, this means they cannot intersect Roman & Rubin & observable from the North.

Megan: interested to hear more about the (very wide) 18,000 sq deg concept
Tim: happy to present this in the future.

Jessica: Compare Roman HLS and Euclid? Coordination / collaboration?
Chris: The Roman HLIS has pushed more on weak lensing in the NIR, versus Euclid using CCD. Different depth and resolution. The internal checks of the Roman reference survey could be enhanced by combining with Euclid coverage. In terms of coordination,
Jason: a lot of coordination in the sense that Roman has been designed to be complementary to Rubin and Euclid. They will not have the flexibility to do the things that Roman can. The strategy for how the Roman survey operates can be changed based on what we learn from Euclid. Some overlap in science team membership.

Jessica: Would like to hear about the ancillary that is enabled by these reference missions.
Julie: Would like this group to come up with a process for getting community input to maximize total science.
Jessica: What has already been tried

Megan: some GO science will not be able to use a wide field survey
Julie: The GO observations will be competed closer to launch. Still would like this group to learn more about what has been thought of. The project can organize the decadal white papers that address these topics.