National Optical Astronomy Observatory
Kitt Peak National Observatory • Cerro Tololo Inter-American Observatory • NOAO System Science Center

TO: **Anthony Gonzalez, Katelyn Allers, Mark Brodwin, Elizabeth Buckley-Geer, Karen Meech, John Moustakas, Casey Papovich, Armin Rest, Christy Tremonti**
FROM: **Robert Blum**
CC: **David Silva, NOAO Executive Committee**
SUBJECT: **NOAO Response to Users Committee 2015 Report**
DATE: **March 31, 2016**

Dear Anthony, Katelyn, Mark, Elizabeth, Karen, John, Casey, Armin, and Christy,

Thank you for your time, effort, and recommendations. We very much appreciate your input on behalf of the NOAO users. Please find below NOAO's responses to your recommendations.

As a reminder, NOAO asked the UC to comment on the following high-level areas within our program.

1. Please comment on the overall NOAO transformation plan/vision. NOAO seeks to provide excellence in open access to telescopes, data, catalogs, and tools for the US community. Most helpful will be comments on NOAO's engagement with the community and the new mission.

2. Please comment on current operations and community engagement with DECam at CTIO. The committee should comment on current scheduling of community time including surveys to ensure the highest productivity.

3. Please comment on the current plans for development of DESI on the Mayall including the imaging surveys that are related to DESI targeting.

4. Please comment on the NNEXPLORE program as appropriate.

5. Please comment on the ongoing infrastructure and science capability modernization programs at KPNO and CTIO including the deployment and early use of KOSMOS and COSMOS and soon TripleSpec.

6. Please comment on current NOAO concepts and plans for the NOAO Data Lab and associated catalog-based research services, with particular emphasis on desired user tools (both basic and advanced) to be deployed.

7. Please comment on the current level of usage and scientific productivity of the NOAO share of SOAR. Suggestions about "quick wins" to improve scientific productivity would be particularly welcome.

8. Please comment on how US observers can best exploit the Gemini telescopes. The Committee should comment on near term capabilities needed by the US community, and specifically what priorities are seen for future Gemini instruments (for example to exploit surveys and LSST science).

9. Please comment on the Gemini Next Generation Instrument concepts as appropriate to US community needs and desires.

NOAO has reviewed carefully the full report of the UC that addresses all of the above charge items. The UC further commented on US community feedback and several other areas in their comprehensive report. Below, NOAO responds directly to the UC recommendations under each charge item.

1 Overall Transformation Plan and Vision

Recommendation 1: We recommend that NOAO stay the course that they have charted for transformation of the organization, continuing to place an emphasis on maintaining productive open telescope access when possible.

Thank you. NOAO will continue to support users with access to front line capabilities of a range of apertures. See the NOAO Strategic Plan[1] that identifies access as a key strategic goal for NOAO for the foreseeable future.

Recommendation 2: We recommend that NOAO continue to organize workshops, as well as summer schools, focused upon Big Data and training the next generation in utilizing the forthcoming large databases and Data Lab tools. We also recommend that summer school lectures and tutorials be made available online to increase the reach of these efforts.

NOAO is proposing to NSF to continue the La Serena Data School. The Data Lab will be presented publicly in June 2016 at the AAS 228th meeting in San Diego. NOAO also plans to host a Data Related workshop as soon as possible in Tucson to follow up the successful Big Data and DECam Community Workshops of 2015.

Recommendation 3: We recommend that NOAO explore new avenues for effectively communicating with the full US astronomical community and undertake an update of the NOAO website.

The NOAO web site was reviewed and (modestly) revised during 2015. Our current objective is to ensure that all content is up-to-date and clear. In terms of "push" communication, NOAO has increased the frequency of its e-newsletter Currents. Recently, the NOAO Strategic Plan was pushed out to our broad community (more

[1] http://www.noao.edu/dir/strategic_plan/NOAO_Strategic_Plan2016.pdf

than 5000 email addresses). NOAO understands that communication is a constant challenge and will seek ways to raise its visibility with the entire community.

2 DECam

Recommendation 1: We encourage NOAO to establish a remote observing capability for DECam at a number of geographically distributed US centers, as well as to advise and assist individual users to set up this capability at their home institutions.

Given resource constraints and other activities with higher priority, the broad project envisioned here is not achievable. However, more limited may be possible and will be investigated. Remote observing from Tucson for DECam has been done and could be used to accommodate other users, for example (see also response to recommendation 5.3).

Recommendation 2: We encourage NOAO to continue to work with the DESDM and DECaLS teams to keep the DECam Community Pipeline updated with the latest algorithmic improvements and bug fixes.

NOAO and DESDM worked in late CY15 to study and deploy the latest enhancements to the CP based on DESDM reductions:

1. *Candidates from the current DESDM software stack were considered for the NOAO Community Pipeline (CP).*
2. *Two components will be added to the CP: a correction for electrostatic effects on the PSF ("brighter-fatter" effect) and better cosmic ray and satellite trail detection and masking.*

Independent of DESDM the CP execution framework will be updated to remove the now deprecated DESDM/NCSA framework and use the NOAO framework. This will improve efficiency but not change the science components. Finally, the DECaLS team includes members of the NOAO pipeline development team and improvements are continually considered for the CP based on DECaLS experience.

Recommendation 3: We recommend that NOAO explore the possibility of periodically re-reducing the entire DECam database (from all projects) using the latest pipeline to produce a uniform set of images.

NOAO agrees such a project would significantly enhance the potential science impact of our DECam data holdings, and will actively seek resources for this project in the next few years. However, until such resources are found, this project is on hold.

3 DESI

Recommendation 1: NOAO should advocate for public release of DESI data on as short a timescale as is feasible.

NOAO will continue to work with its DESI colleagues and NSF to push for public data releases on as short a timescale as possible. The DESI targeting image datasets are being released as soon as images and catalogs are available.

Recommendation 2: Because NOAO is a major partner in DESI, NOAO should continue to explore how the US community can carry out PI science with DESI. This could include access during bright time and/or the allocation of community fibers during the DESI observations, or through other means.

NOAO is actively discussing a DESI Bright Time Program with NSF and our DESI partners. Unfortunately, the concept of "community fibers" during the DESI prime mission observations has not been accepted by our DESI partners, but the bright time program itself does represent a significant opportunity (perhaps 400 hours per year) for community surveys that NOAO will continue to pursue.

4 NN-EXPLORE

No recommendations.

5 KPNO and CTIO Modernization

Recommendation 1: Well-calibrated exposure time calculators (ETCs) are critical for users to effectively plan observations, and for the efficient operation of NOAO instruments. We strongly encourage NOAO to provide these tools to the user community for the K/COSMOS and TripleSpec4 spectrographs as soon as feasible, and to continue to validate the accuracy of existing ETCs using the most up-to-date data.

NOAO agrees this is important and will consider deploying new ETCs as resources allow. At present, we are working on a web based ETC for K/COSMOS, and on an update to the Mosaic ETC incorporating the red-sensitive LNBL CCDs. A first generation, excel based ETC for ARCoIRIS (previously known as TS4), based on sensitivity measurements made on sky during commissioning is available at http://www.ctio.noao.edu/noao/sites/default/files/ARCoIRIS_Sensitivity20150608.xls and will be kept up to date as further sensitivity data is obtained. The excel based ETC for DECam is also regularly maintained and checked against reality with the latest update made in March 2016

Recommendation 2: We encourage NOAO to use the CP as a model for developing modern, well-documented, well-validated data-reduction tools and cookbooks for additional NOAO instruments. The new generation of spectrographs should be the highest priority in this regard. NOAO should also facilitate community access to data reduction tools which have been developed by observers and instrument teams in a single, centralized location.

NOAO has gratefully accepted the assistance of UC member Katelyn Allers to adapt Mike Cushing's triplespectool, which is in turn a modified version of SPEXtool, for use with ARCoIRIS. This program is written in IDL. It has been deployed on a machine at the telescope and was successfully used by the observers to reduce their data at the telescope during the first science run of ARCoIRIS in March 2016. A user's guide is being worked on. We intend to make it available as an installable package for IDL users, but will also have it up and running on one or more machines at NOAO, for those who don't have IDL. Details of this are being worked out and will be posted on the instrument web page once everything is in place and tested.

Recommendation 3: NOAO should strive to provide a remote-observing option for experienced observers for all facilities operated by NOAO.

NOAO continues to support more remote observers. For 2016B, the NOAO Call for Proposals says, "NOAO is committed to maximizing the accessibility of astronomy to all qualified proposers. Many of the telescopes available through NOAO support remote observing, and we are happy to discuss ways in which this mode can be employed to address specific issues of accessibility."

Remote observing is available at SOAR for all instruments and modes and for most modes and instruments at Mayall and WIYN. At the Blanco, DECam remote observing has been done from NOAO HQ in Tucson and could be made available in special cases for non-NOAO scientists. Work continues to further develop the Blanco DECam remote observing capability, in particular by adding improved tools to support data quality evaluation by the remote observer, with further testing remotely from Tucson planned. Work will also begin to provide support for remote observing at Blanco with COSMOS and ARCoIRIS once we have a little more experience with on-site use of these instruments.

A new additional remote observing room has been set up in Tucson for use during the MzLS survey being conducted on the Mayall telescope. This room and the existing room could be extended to community users who need special accessibility.

Recommendation 4: We recommend that NOAO continue to pursue time trades which provide community access to high-value telescopes and instruments. High-priority options include the Magellan and Keck telescopes, and the PanSTARRS PS1 telescope, which can be operated in queue mode and yields high-fidelity reduced, photometrically calibrated data. However, these time trades should balance the high demand for community use of existing NOAO facilities, such as CTIO/DECam.

NOAO agrees access to non-federal facilities is valuable for its community. As opportunities arise, NOAO will pursue them consistent with NSF guidance.

6 NOAO Data Lab

Recommendation 1: We encourage close interaction with the community to ensure that desired science is enabled. Being able to access specific high-priority databases (PanSTARRS1 in MAST, SDSS, WISE) will be highly desirable.

NOAO agrees that the development of the Data Lab, its services, tools, and data sets needs to be done in collaboration with the community to ensure we are delivering things the community needs and will use. Our first public demonstration will be at the June 2016 AAS where we hope to elicit significant feedback from (potential) users. As the Data Lab is deployed, one of the first priorities will be access to and exploration tools for currently available data sets. First priority will be given to NOAO "produced" data sets like DES and DECaLS/MzLS. If opportunities arise to serve other high quality data sets, NOAO will pursue them as part of its new data mission. Serving SDSS data is a possibility.

Recommendation 2: NOAO is encouraged to develop query builder and footprint server tools, and to, on a short timescale, enable web based access to an image cutout tool.

NOAO welcomes this recommendation and will prioritize these tools within the initial set of features to be released for public use in FY17. NOAO expects to have a mock up of a query builder and footprint server to show at the June AAS meeting.

Recommendation 3: Consider changing the name/acronym NSSDC for the NOAO Science Data Center, because this will be very confusing with the NASA Space Science Data Coordinated (NSSDC) archive which is the national archive for space science mission data, which was established in the 1980s.

NOAO is considering possible names to brand its new data mission and program, and expects to formalize a change of name within the FY17 program plan.

7 SOAR

Recommendation 1: In order to identify what obstacles limit scientific productivity at SOAR, NOAO should immediately survey the user community to identify these obstacles. The anonymous survey should be short and easy to fill out, in order to encourage maximum response.

NOAO believes the path forward on SOAR will rely heavily on synergy with LSST or other mission follow up (e.g. K2, TESS). As such, NOAO is working with its partner institutions to develop the science case for this era as recommended by the SOAR Board convened external review committee of 2015

The SOAR Director has completed a targeted survey of all "major" users of SOAR defined as those who obtained more than 10 nights during the period 2011-2014 through the NOAO or Chilean TACs. This accounts for somewhat less than half of all

NOAO/Chile time during this period. Responses were obtained from 10 of 14 PI's in this category. Three of the respondents had completed publication of all of their data, and one more had a publication in an advanced stage of preparation. Five had not yet obtained all the data needed for publication, with three of these waiting for observations from facilities other than SOAR to complete their work. One reported that the data proved to be unusable due to a technical problem (fringing in far red spectra obtained with the Goodman spectrograph which could not be corrected). The respondents made a broad range of suggestions for improvements, some of which have since been made, but there was no issue consistently identified as source of inefficiency. A follow up survey of all SOAR users is planned.

Recommendation 2: It is recommended as an experiment that partial night requests be entertained. This would enable proposers to request the equivalent of a typical observing run spread over the semester.

This is a potentially useful mode, however NOAO cannot support queue or service operations at this time. Remote observers could potentially take advantage of this scheduling mode.

8 Gemini Capabilities and Priorities

Recommendation 1: NOAO should continue to work with Gemini to overhaul the documentation for Gemini instruments. Effort should be made to assist Gemini in moving away from IRAF-based data reduction tools to pipelines or data reductions tools on modern platforms (e.g., python).

A new GMOS cookbook produced by NOAO will be released soon. NOAO does not have sufficient resources at this time to assist Gemini with the development of new data reduction tools.

In response to the NSF's charge to NOAO for optimization of the U.S. OIR system in the era of LSST, NOAO is currently developing concepts and determining necessary resource levels to support future activity in the areas of Gemini support and software-pipeline development. NOAO expects that the outcome of an ongoing study and workshop process on "Maximizing Science in the Era of LSST" will inform this question.

Recommendation 2: NOAO should evaluate whether a rebalancing of time between the regular, Gemini LLP, and Fast-Turnaround allocations would better serve the US community given current user demand. Based on current oversubscription, allocating more of the US time for LLP may be in the community's best interest.

NOAO will work with Gemini to understand the current demand for various Gemini proposal modes.

9 Gemini Next Generation Instrument

No recommendations.

10 Other Recommendations

Recommendation 1: We recommend that NOAO establish a presence at the annual AAS Division for Planetary Sciences meetings to better engage the planetary community, including advertising of NOAO's new data capabilities, facilities, and workshops.

NOAO will consider this recommendation within its limited resources in staff and time. It may be that this meeting could be prioritized above some other meeting NOAO is currently supporting (e.g. the summer AAS).

Recommendation 2: We recommend that NOAO prioritize restoration of non-sidereal guiding on the Blanco telescope, and work towards implementation of non-sidereal guiding with SAM on SOAR.

Non-sidereal tracking is now available on the Blanco telescope. The possibility of implementing non-sidereal guiding is being evaluated. Different solutions are required for each instrument because of the different guiding systems used. The addition of non-sidereal guiding to SAM has been evaluated and found to be unfeasible (it would require a radical redesign of the guider system which is beyond NOAO's resources right now).

Recommendation 3: We encourage NOAO to keep issues related to moving objects in mind when developing new capabilities and in development of the archive.

NOAO agrees with this recommendation.

11 Community Feedback

NOAO thanks the UC for its out reach to the NOAO user community and for providing feedback. NOAO will continue to be responsive to the community's needs and to continually improve communication with the community.