Chandra Users Committee Preliminary Report

Committee Meeting of September 27, 2016

Preamble

The CUC very much appreciated the reports from members of the CXC on the observatory status and activities of the past year. The consensus among the members of the committee members was that the observatory is in good shape, the instruments are performing well, and the CXC is doing a good job taking care of business. We commend the CXC staff for the efforts and we hope that they will continue performing at this level. We give below our more specific comments and recommendations, focusing on areas where we feel some improvements can be made and on several topics where we feel we can make useful recommendations.

CXC Manager's and Director's Reports

The CUC heard reports from the mission manager Dr. Brissenden and the director Dr. Wilkes about the status of the mission. The committee was happy to hear that the spacecraft and instruments are performing well and that the NASA Senior Review has endorsed extending the mission. The CXC has begun the contract extension process which would result in a 3-year baseline mission starting in 2019 with two possible 3-year extensions and a 3 year closeout period. Next steps include the formation of an Integrated Acquisition Team with a goal of SAO submitting the proposal to NASA in July 2017. The CUC is satisfied with the proposed timeline for the contract extension process.

The Senior Review Committee Report also noted that the second release of The Chandra Source Catalog was extremely important. The CUC has some concerns about the rate at which progress is being made. These concerns are described below in the relevant section.

The director reported on the process of allocating Director's Discretionary Time (DDT). Of particular note are: (1) a broad range of source classes and data types (e.g., gratings versus non-gratings data) have been observed this year and (2) a considerable amount of time, about 900 ksec, has been saved up from past cycles.

The director also reported on the feedback from the NASA Senior Review. Six action items were given to the CXC, with the bulk of the rest of the report being positive statements about the mission without associated action items.

Recommendations:

1. *Transfer of archive to HEASARC.* – This should be done eventually after the mission ends. The total closeout of the project is likely to take significantly longer than a year.
2. *Release of the second source catalog.* – The goals are to further expand the Chandra community, making it easier for non-experts to work with Chandra data. (It is expected

to be completed before the next senior review in 2018). The CUC offers additional recommendations on this item in dedicated section of the report, below.

3. *Reallocation of time for various programs.* – The CXC, in consultation with the CUC, will continue assessing the allocation of time to different categories over the upcoming years.

4. *GO budget.* – The CUC is concerned that this is falling behind relative to inflation. There will be a proposal for increasing it. We should point out new Fair Labor standards as they apply to postdocs/other over-time exempt employees in terms of the increase in the need for higher salaries despite the lower inflation rates for workers as a whole. We also note that health insurance costs have been rising much faster than the general inflation rate, and also represent a large fraction of GO budget spending.

5. *GTO time.* – There have been concerns from the Senior Review about the large continued allocation of guaranteed time. However, there is an agreement between Headquarters and the mission teams. The CXC and the MSFC Project Office stand ready to assist with any re-assessment that NASA chooses to pursue. The CUC feels the GTO time represents an added value for the Chandra science, because it can cover scientific projects whose data analysis is particularly complex, and/or programs that require multiple cycles to be completed.

6. *Primary Mission Objectives (PMOs)* – The Senior Review panel asked for a higher level of detail within the PMOs of observatory management, enabling science, and observatory health and safety. The CXC has formulated a response giving specific new PMOs with well defined metrics that will serve as a tool for strategic planning. For example, the Chandra Source Catalog and the CIAO analysis package are now specifically referenced within the "enabling science" PMO.

Mission Planning

The CUC heard a report from Dr. Pat Slane on the thermal balance requirements and thermal management strategies. As we have heard in similar reports in previous years, the temperature of the spacecraft needs to be managed because of the degradations in thermal insulation. Management entails selecting the the sequence of targets and pitch angles so that different parts of the spacecraft can take turns facing away from the Sun so that they can cool sufficiently. As we heard in this report, there is a continuous evolution in the tolerance of the different components; some can become more prone to heating over time and/or in response to changing thermal balance strategies. A new development is that the pointing accuracy is affected by degradation of the thermal insulation. A thermal model was created to generate corrections for thermal drift for each pointing, which is working very well so far. As a consequence of the pointing constraints, the ecliptic plane (including fields such as Stripe82, the Galactic Center and antiCenter) is a good target zone for cooling the spacecraft but the Magellanic Clouds are not (although long exposures are possible with interrupted observations). Programs with

exposures > 1 Msec are limited to exposures of less than 2Ms in directions less than 30 degrees of the ecliptic poles. Nonetheless, the observing efficiency in the past year has been very high, around 70% of wall-clock time, and the observatory carried out exposures amounting to approximately 22 Ms, included some (constrained) multi-observatory calibration observations. The mission planning team is continuing to meet observational constraints requested in proposals. The main challenge is the required pitch angle, which may interfere with thermal constraints. Although the number of requested constrained observations has decreased, meeting such requests is becoming increasingly difficult because of thermal constraints.

In the response to recommendations from the CUC in the 2015 September report, the mission planning team has expanded an existing procedure (Initial Proposal Parameter Signoff, IPPS) to make sure that the proposers have specified observing constraints in the observing forms. The team is also developing and testing strategies to maintain the temperature of the aspect camera or increase its temperature limits. The team does not foresee any difficulties in maintaining a high level of observational efficiency in the near future. Mission planning constraints will become increasingly difficult to deal with, but at the same time the team will gain experience and develop more and more sophisticated tools that arguably will compensate for the increased level of complexity. In the longer term additional personnel needs can be accommodated by internal re-assignments.

Two issues that can complicate mission planning in the future were discussed. The first issue is that targets in favorable locations for cooling the spacecraft may be observed early in the cycle, leading to a deficit of cool target later in the cycle. This is not a critical problem yet but it may become necessary to give preference to targets in certain areas of the sky during the peer review process. The second issue is that the frequency and amplitude of thermal fluctuations of the spacecraft are increasing with time. This is will eventually begin to affect the health of the spacecraft.

Recommendations:

1. The CUC commends again the mission planning team for the diligence and dedication and endorses the steps that they are taking to manage the thermal balance of the spacecraft. The CUC also endorses the expanded IPPS procedure that is now part of the observation planning and approval for flight process.
2. The CUC endorses the advance planning that the mission planning team is carrying out to prepare for the (apparently inevitable) possibility that targets in certain parts of the sky will have to be preferred so as to allow efficient cooling of the spacecraft and the possibility that constrained observations will have to be limited for the same reasons. We encourage the mission planning team to continue their work in this direction and prepare for these possibilities. The CUC will gladly offer support to help this process.

CXC Response:

We thank the CUC for their input regarding Mission Planning activities and efforts to manage the thermal constraints on the observatory. We have incorporated the latest thermal models into our planning of the long-term schedule for Cycle 18, and are proceeding towards its completion. For Cycle 19, we have recommended that time awarded to VLP programs be limited to no more than a total 2 Ms for targets within 30 degrees of the ecliptic poles in order to limit the amount of time for targets that are always at hot attitudes for the -Z side of the Chandra spacecraft. This is the same limit that was introduced for XVP programs in past Cycles.

Proposal Cycle Updates and Plans

The peer review process ran smoothly. In Cycle 18 there were: 403 GO and 49 LP proposals. The drop in LP was expected as a result of the re-definition of the Large Proposal category. There were also 56 archive and 38 theory proposals.

The oversubscription rate is falling gently but is still quite high (oversubscription in time is currently 4.6). Time awarded to LPs increased from 4 to 5.7 Msec. LP is still the most oversubscribed category by time and by number of proposals, but the number of proposals shrank to a manageable number for the panels with the change likely due to moving the threshold for LPs from 300 to 400 ksec. One additional LP was accepted because of an allocation of time from the panel to which is was proposed, in lieu of doing standard GO proposals.

Archive and theory are similar in oversubscription rate to normal programs, but the typical accepted archival proposal was ranked significantly more highly than the typical accepted GO proposal. The oversubscription/proposal success rate is not a function of gender. This was an issue prior to Cycle 10, but has not been for quite some time now. The fraction of female PIs on proposals has also risen steadily.

For Cycle 19, NASA has asked the mission to shrink the amount of time between submission and official notification. This will take place with a separate email informing PIs (and now also Co-Is) of acceptance, with a delay before notification about budgets. In other words, the official letters will now be sent approximately within a week of when the target lists are posted (typically in mid-July in recent years).

All emails reporting the peer review results will go to all Co-Is now, and the CUC has recommended that this be the case at submission as well. It will be the responsibility of PIs to ensure that the email addresses are up to date, but the CXC will explore whether there is a simple means of informing PIs when they have a bad email address in their forms.

Information for future calls

Following a case raised during the review process last year, there will be plagiarism policies. The comparison will be to published literature (not to previous proposals). “Self-plagiarism” will be acceptable. The details of how to respond to plagiarism should be discussed by the peer review panel. Pay attention to PI-s or Co-Is with changed names.

An ALMA joint program is under negotiation.

The panel discussed, at the request of the director, three issues.

1. Allocating more time for joint programs to make large multi-observatory projects more practical. – The committee is strongly in favor of this.
2. Adding more time to the DDT program in order to allow for fast turnaround observations of non-transient sources. – The committee believes this is appropriate, but would like to see some monitoring of the implementation so that the program does not turn into a path to avoid the standard peer review process. We recommend a 1 Ms limit on the DDT program, regardless of any changes in how the DDT is used. Also, for proposals not requiring rapid turnaround, external reviewers could be consulted.
3. Bringing back a possibility that programs larger than > 1 Ms (VLPs) would have a reasonable chance to be supported. – The panel agrees that some possibility must be given, but does not recommend that the Project mandates that time in such a program is accepted in every cycle. The panel recommends that some time be added to the Big Projects Panel, and that the panelists are asked to consider programs asking for at least 1 Ms very carefully. The CXC staff should develop a process for spreading time across cycles to ensure that small numbers of VLPs do not overly affect the Large Project acceptance rate.
4. Increasing the allocation of funds for archive projects compared to GO projects. – The CUC is in favor of this proposal.

It was briefly mentioned that the RPS forms may need to be re-designed. There are problems with both the Chandra RPS and other RPS systems for handling extremely long lists of targets, an issue which may become more important to deal with properly going forward. Some members of the CUC expressed a desire to ensure that the fast responsiveness of the forms remains, if it all possible.

The web forms for submitting Stage 2 cost proposals also have some problems when proposers try to save and share (with sponsored project offices etc) such forms. The user community would highly appreciate improvements in this aspect of the form.

CXC Response:

We thank the CUC for their input. For Cycle 19 we plan the following changes, in line with the committee's recommendations:

1. *Go ahead with plans to expand joint programs to include LPs*
2. *Increase DDT to a maximum of 1 Msec per year and allow proposals for non-transient science. These proposals will be evaluated by experts outside the CXC as well as CXC scientists and Project Science.*

3. *Issue a call for VLPs in Cycle 19 and increase the time allocation to the Big Project Panel (BPP) to 6 Msec, with a minimum of 4 Msec devoted to LPs. In addition, the BPP may allocate up to 1 Msec of Cycle 20 to outstanding VLPs.*
4. *The Archival funds will be increased to $1,500K.*
5. *The rewrite of RPS will improve the handling of large target lists and eventually will be extended to the cost proposal RPS.*

Calibrations: Goals, Priority and Plans

The CUC *congratulates the calibration teams* for their continuous efforts to monitor the scientific performance of the *Chandra* instruments and telescopes, and to deliver timely updates of the publicly available calibration files. The range of activities presented by Dr. David in his presentation[1] is impressive. The CUC *is pleased to see that important improvements are underway* in areas as scientifically important as the ACIS gain and CTI corrections, ACIS spectral resolution, HRC Quantum Efficiency (QE) and gain. In all these areas instrument aging and the availability of a longer data baseline has revealed hitherto unknown trends with time, space, and operational temperatures. These trends require careful modeling. Calibration is an intrinsically complex, multi-dimensional problem. The results presented by Dr. David in his presentation are only the more commendable in light of this complexity.

Recommendations:

1. The CUC *applauds the release of a new ACIS contamination model*, scheduled for October 2016. The new model has been shown to improve the accuracy of the *relative* effective area calibration in in the 0.5-2 keV energy band from ~5% to ~3% (in terms of standard deviation of the Abell 1795 fluxes measured over the mission). If confirmed on a wider set of independent data during the CALDB file validation process, this update pushes the area calibration accuracy to unprecedented levels.

2. The CUC, as already expressed in its *2015 Recommendation #1*, shares the CXC's concern for ACIS contamination being the potentially most threatening issue for the future Chandra science return due to the loss of soft X-ray effective area. (The effective area decreased by a factor of about 10/4/2 at 0.3/0.5/1 keV since launch). The CUC *encourages the CXC to continue monitoring the ACIS contaminant evolution, and agrees devoting a substantial fraction of the calibration program to this goal.* The CUC asks the CXC to continue providing regular updates on the evolution of the contaminant properties at future CUC meetings, using always the latest observational data.

3. As far as the *absolute* calibration of the effective area is concerned, the CUC is pleased that the *Chandra* calibration teams have taken concrete steps to address its *2015 Recommendation #3*. The novel "concordance method" described by Dr. Marshall in his presentation[2] defines a statistical framework to inform possible future calibration

[1] http://cxc.cfa.harvard.edu/cdo/cuc/cuc_file16/sep27/presentations/DavidL_CUC_2016.pdf

[2] http://cxc.cfa.harvard.edu/cdo/cuc/cuc_file16/sep27/presentations/HETGSupdate2016_finalV2.pdf

changes addressing this issue. The fact that this approach is being applied in collaboration with calibration teams of all operational X-ray observatories ensures that its future results reflect the state-of-the-art understanding of both the technical and the scientific aspects. The CUC understands that future calibration changes cannot be solely driven by cross-calibration discrepancies, and that a validation against a physical model of each individual instrument and telescope will be required before delivering results to the community. However, the CUC *strongly encourages the "concordance project" to be pursued*, with the ultimate goal of providing Chandra users with ways to deal with discrepancies in the fluxes and spectral shapes measured by different instruments, or at the very least an accurate quantification of the associated systematic errors. Future extensions to uncertainties in the redistribution matrix files, and a link to the Monte-Carlo and Bayesian methods already implemented in *Sherpa* (e.g., pyBLocks) would be also crucial steps.

4. The CUC thanks Dr. Marshall for addressing the issue of the supposedly inaccurate calibration of the 1st order HETG Line Response Function reported in Liu, 2016, MNRAS, in press (arXiv:1608.07351). The CUC *urges the Project to take concrete steps to amend the incorrect statements in this paper:* a communication in the *Chandra Newsletter*, a rebuttal paper, or a request of errata by the author are possible options.

5. The range of future instrument monitoring, calibration and X-ray tracing activities presented by Dr. David in his presentation is extensive (no less than 20 items, cf. Slide #22 and #23). The CUC feels that it has not been provided with all the information to fully understand the science impact of all and each of these activities. While the current share of calibration time allocation seems to be adequate: 76% for ACIS contamination monitoring; 12% for HRC, primarily QE monitoring; 12% gratings calibration, including the inter-calibration program on Mrk 421 and the yearly cross-calibration on 3C273, the CUC *asks the Project to provide a detailed assessment of the scientific priorities underlying future calibration plans* at the next meeting.

6. As far as *2015 Recommendation #2* is concerned, the CUC acknowledges that a discussion has started in the *Chandra* Project to evaluate the possibility of ACIS annealing (baking-out) to ameliorate the contamination issue. The CUC understands that this option is not devoid of risks, and should be therefore carefully studied. The CUC *confirms its endorsement of the ongoing ACIS annealing study*, and asks that a report on the possible outcomes and risks of this operation are presented to the Committee as soon as the Project considers that a contribution from the community would be useful.

7. As far as *2015 Recommendation #4* is concerned, the CUC *confirms that it would like to see the implementation of the "calibration documentation single entry point"* along the lines described in the 2015 Report.

CXC response:

1 We appreciate the words of encouragement from the CUC about the new ACIS contamination model.

2. We will continue to provide updates at the annual CUC meetings regarding the latest trends in the ACIS contamination.

3. Several CXC calibration scientists are involved with the IACHEC calibration concordance project and the development of pyBlocks. The CXC calibration team shares the same views as the CUC regarding absolute calibration and the inclusion of Chandra calibration uncertainties in pyBLocks.

4. Dr. Marshall's rebuttal to the above mentioned paper will be included in the HETG section of the next Chandra newsletter.

5. The calibration team will present a more concise list of future activities at the next CUC meeting with an emphasis on how these improvements will impact user's science.

6. Work continues on a variety of fronts concerning the possibility of an ACIS bakeout. A project wide meeting is scheduled for Jan., 2017 to discuss this issue. After this meeting the calibration team will be in a better position to assess what additional studies, including possible lab work, need to be completed before a decision can be made regarding an ACIS bakeout.

7. The calibration team has almost completed work on a "one page summary and entry point" to all Chandra calibration uncertainties. This page will become public in the next few months.

Chandra Source Catalog

The CUC heard a report from Dr. Fabbiano about the progress towards completing version 2 of the Chandra Source Catalog (CSC2), including data up to 2014. As per the 2016 NASA Senior Review recommendation, the release of the catalog has now become a mission legacy priority. CSC2 is expected to include data up to 2014, totaling 350,000 sources and including moderately extended objects. Parameters will be based on co-added data, as opposed to averages.

The first preliminary release (240,000 detections) dating back to 2015 (see the following link http://cxc.harvard.edu/csc2/preliminary/), includes positions from stacks only, and does not include fluxes. The labor-intensive quality assurance (QA) phase, which entails visual inspection, is ongoing, with 250,000 detections cleared, and 100,000 awaiting confirmation (particularly time consuming for moderately extended sources with multiple/deep epochs having different aimpoints, accounting for about 2% of the total numbers of sources).

The final release of 350,000 sources with full parameter characterization is expected 10 months from now, though 98% of the sources, along with their parameters, should be available within 6 months (March–April 2017). The current plan for completion of the project also includes (i) updated releases at 2–3 yr intervals, plus a final release after end of mission; (ii) the creation and public release of specific tools and interfaces to enable the community to fully exploit CSC2, with particular emphasis on mining/multivariate analysis synergies to enable novel discovery methods and or efficient source classification diagnostics.

The CUC has learned from the report and ensuing discussions that 10 FTE equivalent positions have been allocated to the completion of this project for approximately the past 1.5 yrs. We also note that the last presentation for the CUC cited Fall 2016 as the expected deadline for the catalog release. This has now slipped further by 10 months. Considering the large amount of resources allocated to this project, the sustained and repeated pressure from the CUC towards completion, and the high-demand from the community, the CUC is seriously concerned about the lack of progress and the continuous slipping of the expected dates for releasing the catalog. As we also noted in our April 2016 report, a paper was published earlier this year in the Astrophysical Journal Supplement Series reporting on approximately the same number of sources as expected from CSC2 (arXiv:1603.08353v1). Even if the extent of the information provided in that paper – mainly in terms of source parameter characterization – were of lesser quality with respect to the final product that official CSC2 aims to achieve, this reinforces the CUC's concerns about the timescale of the CSC project being problematic.

The presentation also described how CSC2 can be accessed by the community, in combination with multi-wavelength databases from other telescopes, using data mining algorithms and multi-variate analysis techniques that are already available in or being developed by the wider community. The CUC is concerned that in-house development of such tools in advance of the release of CSC2 would result in further delays. Thus, it was re-assuring to hear from the CXC director that the CXC does not intend to divert any CSC resources to such development at this time.

Recommendations:

1. *The CUC reiterates in the strongest terms that the completion and public release of CSC2 should be a top priority for the mission.* Despite multiple recommendations and input from the CUC, the projected completion dates keep slipping, which is a serious cause for concern. In order to avoid further delays, we recommend that a special oversight committee, consisting of 2-3 community members with appropriate expertise and a stake in the outcome, be appointed to closely monitor progress and oversee completion.
2. In order to focus on the above goal, we strongly recommend that, in the coming year, *no effort be expended towards the creation of sophisticated software and analysis tools for use with the catalog*. Many such tools are already available in the Astronomy and Statistics community, and many groups are already actively engaged in the development of such tools. Once the catalog is available the catalog users can take advantage of the available tools.

CXC Response:

We agree with the CUC recommendation that first priority is completing and releasing the CSC2. We are monitoring progress against schedule closely.

No development of catalog analysis tools is planned before the CSC2 release. We agree that several tools are already available. Future planning will start with a review of these existing tools. The CXC will discuss the outcome with the CUC, to avoid duplication of effort.

CIAO updates

Dr. Jonathan McDowell provided updates on the CXC-developed suite of Chandra and multi-mission analysis software tools CIAO and SHERPA. These include updated documentation (e.g. a new interface to PSF information called "PSF Central" and a new quick start guide), a new helpdesk system, fixing bugs, and the release of CIAO 4.8 and Sherpa 4.8.0 in Dec. 2015. Work is ongoing towards a new release of CIAO 4.9 anticipated for Dec. (2016).

The team continues to provide community support through the helpdesk, social media, and participation at meetings including the Jan 2016 AAS meeting. The CUC commends the team for their continued and dedicated community support. In particular, a 1.5-day hands-on CIAO workshop was held just before the Chandra Science for the Next Decade meeting (Aug 2016). The workshop was attended by students and scientists from around the world, in addition to postdocs and faculty members, and received very positive feedback.

In addition, a lunchtime panel was held during the Next Decade meeting to discuss future analysis challenges. The panel outcome identified demands for compatibility with astropy and for parallel processing.

Other requests or current team thoughts on future developments include tools for multi-observation spectral analysis, multi-resolution analysis, scripts for grating analysis, multi-wavelength analysis and sensitivity calculations from different surveys (i.e. developing tools beyond Chandra). Although the CUC believes these are potentially useful tools, we strongly recommend that the software development effort is focused on tools that are immediately relevant and useful to the Chandra mission.

Different PSF simulation tools were described and are now summarized at the PSF Central pages (http://cxc.harvard.edu/ciao/PSFs/raytracers.html). These tools are developed together with the calibration team. The CUC makes a recommendation that the new empirical PSF library based on the reanalysis of the ARLac data be included in MARX, subject to the usual caveat, i.e. not to interfere with the CSC2 schedule.

Work is also ongoing with R. Smith's group to integrate his wrapper to ATOMDB (originally conceived as a XSPEC add-on) in Sherpa. This is a very positive development that the CUC supports.

Last year (*quoting the Sep 2015 report, recommendation #2*), the CUC recommended that Sherpa run PyBlocks as the default mode for ACIS spectral analysis, outputting the confidence intervals on the spectral model parameters due to the systematic calibration uncertainties on the effective area besides the purely statistical uncertainties. The CUC reiterates its interest in seeing this enhancement implemented, although as a lower priority item with respect to work related to the CSC2 production.

Dr. McDowell stressed that the release of Sherpa 4.8.2 (Sep 22, 2016) is the first compatible with Python 3 (v3.5) as well as with the more standard Python 2.7. Review and updates are ongoing. Sherpa doesn't currently include "cumulative" statistics, but the scipy package (scipy.stats) includes them and actions will be taken to document how to use them with Sherpa. CIAO 4.9 will also have beta support for Python 3.

The Sherpa code is also now on github (since April 2015), allowing an easy build into the user's' Python environment, as well as contributions to the code from outside the Sherpa team.

The ds9 developer is now integrated in the Chandra software team. ds9 is heavily used by the astronomical community at large, and beyond. A new version (v7.5) is to be released with CIAO 4.9 that includes improved support for CIAO regions, new contour file format, etc.

These are all positive developments that the CUC very much approves of.

Recommendations:

1) Continue to support the community, especially through hands on sessions at workshops and meetings.
2) Pursue the Python implementation, particularly for the statistical analysis tools.
3) We strongly feel that the development of tools in support of activities and data analysis needs beyond Chandra should be put on hold.

CXC Response:

We concur with the CUC's comments and will follow their recommendations in terms of focussing data analysis developments on Chandra-specific needs. We hope that resources will become available to pursue improved interfaces to PyBlocks so that it can become standard for Sherpa analysis, and this remains high on our priority list.

Einstein Fellowship Program

The committee heard a presentation by Dr. Paul Green on the status of the Einstein Fellows program. The current 2016 Fellows are a diverse group of young scientists with a broad range of interests in high energy astrophysics, star and galaxy formation, and gravitational astrophysics. Overall, the program is very successful with a large over-subscription ratio. The mandated change to allow employee status for Fellows appears to have gone successfully. At the discretion of the host institution, incoming fellows now have the option of being designated as an employee or as a stipendiary fellow at their host institution. We welcome the alumni-Fellow mentoring program and look forward to a future report on the status of this effort. Overall, we highly endorse the continuation of the Einstein Fellows program in its present form.

The CUC learned of a recent proposal by the NASA Astrophysics Division (APD) to significantly decrease the size and cost of the NASA Named Fellows (NNF) program. The stated goal is to rebalance the existing funds within the APD from the NNF program to R&A. One possible implementation that was proposed as part of this change is to combine the three NNF (Sagan,

Einstein and Hubble) into a single application and review process. The proposal has been presented in July 2016 to the NASA Astrophysics Subcommittee.

The CUC considers the Einstein program as an essential element of seeding a healthy and vibrant community of US university researchers in high-energy and gravitational astrophysics. In addition to making sure that the new generation of expertise is cultivated for continued success of NASA programs, the CUC notes that the fellows have been crucial and extremely productive contributors to the utilization and analysis of the data from current and developing tools for upcoming NASA missions. These are demonstrable contributions to the R&A program, the very program that the reallocated funds are proposed to strengthen.

While we do accept that the NASA APD has to make tough choices from time to time, the CUC has many of the same questions as the APS about this proposed change. In particular, the CUC was concerned about how this reallocated money would be used within R&A and the impact it would have on ensuring a balanced research portfolio within the APD. The CUC might be somewhat more sympathetic to the proposal if the redirected funds were funneled into related areas that are career-focused such as junior faculty, especially those getting a start in instrumentation (though the committee recognizes that the Roman Technology Fellowship program is supposed to serve a similar purpose). The CUC did not object to a single application process – the previous merging process to create the Einstein program has been positive. However, it would be important to set up separate topical committees with appropriate expertise to evaluate applications in the various areas covered by this program.

The CUC communicated its thoughts on this matter to Prof. Scott Gaudi, chair of the NASA Astrophysics Subcommittee (APS), in advance of the subcommittee meeting of October 3, 2016.

CXC Response:

We appreciate the CUC's input on this matter. As of this writing, the NASA APD has allocated a final full year of funding to SAO for the 2017 Einstein Fellowship competition. We expect to award 12 fellowships. Funding to SAO will continue at the level required to support current and new 2017 fellows through completion of their tenure. The following year it is expected that management of the 3 NASA Named Fellowships will be moved to STScI with a lower budget which we estimate will allow award of ~5-6 Einstein fellowships in future years. The 3 NASA Named Fellowships (Hubble, Einstein and Sagan) are tasked with consolidating their application and review process. Discussions are currently underway to determine the implementation.