

REVIEW OF HST TELESCOPE ALLOCATION COMMITTEE (TAC) ACTIONS AND PROCEDURES BEING COORDINATED BY STScI

I. Introduction

Observing time with the Hubble Space Telescope represents an invaluable resource to the astronomical community. In the early 1980s, NASA took the bold step of charging a community-based entity -- the Space Telescope Science Institute (STScI) -- with implementing, managing and maintaining a process for selecting proposals and awarding observing time. This approach has proved highly successful over the first decade of HST operations, and indeed has served as a model for time allocation on other major space observatories.

With HST now in its second decade, it is timely to review this process, to ensure its integrity, and to explore enhancements or improvements aimed at optimizing the scientific return of HST to the international community.

The TAC Review committee was informed by (1) detailed presentations by STScI staff and management regarding current and past TAC procedures; (2) teleconferences with TAC and panel chairs from Cycles 10 and 11; (3) responses to an open Web survey; (4) unsolicited letters; and (5) presentations by cognizant NASA officials. The committee met at STScI during 10-12 June 2002; it was provided with substantial material prior to the meeting concerning TAC structure, actions and programs selected, particularly for the more recent Cycles 8 through 11.

The committee panel was impressed by the efficacy of the process for awarding time on HST, and the role of the STScI in organizing and supporting complex and challenging TAC procedures that we judge to be fair and unbiased. We found no fundamental flaws in the process or unwarranted influence by STScI staff or management. Indeed the STScI Director has exercised his authority and responsibility for the proposal selection in exemplary fashion.

In what follows, we provide recommendations regarding (1) the TAC process and feedback to proposers and (2) the Treasury Program. We emphasize that these recommendations are intended to improve an already sound process. We also attest to the overall integrity of the TAC process and briefly address the balance of allocations between the STScI and the external community.

II. Membership of HST TAC Review

The Space Telescope Institute Council (STIC) selected the following committee to conduct this review of TAC procedures and approaches. The charge to the committee as provided by STIC, including a brief discussion of background issues, is included as Appendix A. The open Web-based survey seeking community advice and comment dealt with questions that broadly paralleled the charge.

Jacqueline Bergeron	Institut d'Astrophysique, Paris
Alan Dressler	Observatories of the Carnegie Institution of Washington
Sandra Faber, Co-Chair	UCO/Lick Observatory, University of California Santa Cruz
Stephen Strom	National Optical Astronomy Observatory
Harvey Tananbaum	Chandra X-Ray Center; Harvard-Smithsonian Center for Astrophysics
Juri Toomre, Chair	University of Colorado
Piet van der Kruit	Kapteyn Astronomical Institute, Groningen

III. The Review Process for Regular Proposals

Starting with Cycle 9, the Institute altered its previous panel structure for TACs, moving away from a large number of narrowly specialized panels to a smaller number of panels each covering a wide scientific scope. On balance, we believe that the broader panels are a significant improvement over the older system. Preallocation of observing time to specific areas of science is avoided, and, by having multiple panels addressing similar topics, there is more flexibility to distribute proposals among the panelists to minimize conflicts of interest.

We learned that the multiple panels are not exactly identical; for example, the Extragalactic panels are divided into pairs with different scientific foci. Nevertheless, given the great breadth of the panels, on occasion it still happens that there are few or even no experts on a panel for a particular proposal. This committee believes that each proposal should be reviewed by at least one expert, where an "expert" is defined as someone who has actually done research in that field.

With reasonable modifications, the present system can meet this requirement. For example, panels that are particularly challenged in a given sub-field or two might have their membership increased by one or two members. Also, panels that are lacking expertise can and should solicit advice from members of other panels at the TAC review, consistent, of course, with conflict of interest guidelines. A mechanism for facilitating and tracking such dialogue would be developed by STScI. Third and fourth options are to consult with members of the Institute staff and to obtain expert advice in advance from members of the astronomical community at large. The final ranking of proposals should rest in all cases with the panel members, and outsiders would act as consultants only. Every effort should be made to bring expert advice to bear on every proposal.

For this process to work, each panel must thoughtfully appraise its ability to competently review each proposal. Again the Institute would develop a standardized procedure. In one possible scenario, chairs could facilitate this self-appraisal by asking the primary and secondary reviewers, at the time that proposals are distributed for review, to assess whether they are expert, familiar, or unfamiliar with the subjects of their assigned proposals. The chair would then have time to confer with Institute scientists to locate any missing expertise in time for the TAC review.

To the extent that present panels are occasionally lacking proper expertise, the problem is exacerbated, in our opinion, by a too stringent application of the conflict of interest rules. The Institute is to be complimented overall on its dedication to minimizing conflicts of interest, which were of considerable concern in early cycles, but the policy now adversely impacts the quality of the reviews. Conflicts of interest rules as currently employed by STScI fall into three classes. The first is participation by a PI or Co-I in the review process, which is clearly to be disallowed and is carefully and properly screened out by the current process. The second is judging a proposal by a close collaborator or competitor, which, although a cause for concern, by necessity must be left to the judgment of the individual reviewer, as it now largely is. The third is judging a proposal by a colleague at the reviewer's institution. This rule, as currently applied, effectively eliminates a large number of possible experts from participating in the review of many proposals. We feel strongly that the disadvantages of this practice outweigh the benefits and recommend that application of this rule also be left to the judgment of the individual reviewer, and overall be invoked sparingly. Final decisions about conflicts of interest should continue to rest with the TAC and panel chairs.

Another current practice is that membership of the TAC and panels turns over nearly completely between cycles. It is our opinion that this "absence of memory" handicaps the process with little discernible benefit. Even a modest percentage of returning panel members, or the promotion of panel members to panel chairships in the next cycle, would provide highly valuable information to each new TAC, as well as improve TAC performance through the participation of more experienced reviewers. Another strategy is to emphasize participation by the most active users of HST.

It would help, we think, to provide additional information to reviewers about the efficacy of previous HST programs carried out by proposers. Currently, PIs are required merely to list all relevant publications based on previous HST allocations, but changes to sharpen this requirement are contemplated for Cycle 12. We suggest that the list of papers be shortened to represent just major ones, that proposers include a sentence or two describing the significance of each paper, that related publications based on theory and/or data from other telescopes be added, and that the number of scientific citations to each paper be included.

Finally, we suggest that a procedure be developed to evaluate the effectiveness of the award process at regular intervals.

IV. Feedback to Proposers

Feedback to all proposers is essential; it is an integral part of the review process. Feedback provides: (1) evidence to proposers that their proposals have been properly reviewed; (2) information to proposers to allow them to improve the scientific, technical

or management content of their proposals for subsequent cycles; and (3) tangible evidence for NASA and ESA of the integrity of the review process. Poor or inaccurate reviews undermine the community's confidence in the review process. However, preparing good feedback is time-consuming and difficult; we appreciate the magnitude of the task.

In Cycle 11, the STScI decided to provide detailed written feedback automatically only for large and Treasury proposals, and to make available such feedback to smaller programs only upon request. This change in procedure followed consultation with relevant Institute advisory bodies.

As a result of this decision, the Institute did not charge the panels to provide detailed written comments. Consequently, the formal review comments for smaller programs lacked the specificity expected by proposers.

The STScI has recognized the deficiencies of this aspect of the feedback process both in Cycle 11 and occasionally in earlier ones, and is thus developing procedures that endeavor to ensure informative and uniformly prepared comments for all proposals in Cycle 12.

Among the most important process steps we support are:

- (1) systematic preparation of comments by primary and secondary reviewers prior to panel and TAC meetings -- possibly aided by a standard template;
- (2) editing of those comments by panel/TAC members following the panel/TAC discussion of each proposal;
- (3) appointing Vice Chairs for each panel and TAC to assist the Chairs in compiling and editing these comments;
- (4) charging the Panel and TAC Chairs with the responsibility for ensuring uniformity and adherence to specified common standards;
- (5) retaining ultimate responsibility for final review of TAC/panel comments at STScI.

V. Treasury Programs

We commend the efforts of the STScI to initiate the Treasury Program in Cycle 11. We believe that there is an opportunity at this point to refine the program as plans for Cycle 12 are developed by drawing on some of the advice of the Hubble Second Decade Committee.

We encourage the STScI to take an active role in organizing and catalyzing the participation of the larger community in this new program. We endorse the recommendation by the Second Decade Committee to form a community-based group (called the Hubble Treasury Program Committee -- HTPC) to advise the STScI Director in areas involving the Treasury Program. The HTPC should be a standing committee. A major function of the HTPC is to stimulate community awareness of and involvement in

the Treasury Program and to advise the STScI Director on how to encourage and enable formation of partnerships.

An initial activity for the HTPC should involve the identification of topics for workshops to bring together interested parties. The purpose of these workshops is to promote wide-ranging discussion of science objectives, targets, and observing strategies for possible Treasury programs. The STScI would organize this series of workshops. An important outcome would be the establishment of collaborations involving many (or even all) of the interested parties for a given topic. The workshops should be an ongoing process with updates folding in relevant developments.

We make several suggestions for refinements in the evaluation of Treasury Programs, still to be carried out within the framework of the existing Peer Review/TAC process. We suggest that the panels review Treasury proposals before the TAC in order to evaluate science merit and technical feasibility, in a manner similar to their evaluation of GO (and Large) projects. Their findings should be forwarded in writing to the TAC. This step should identify the most promising Treasury proposals and also effectively triage the weakest.

The TAC evaluation should identify the strongest areas for Treasury Programs and recommend those which comprise an optimized science program. As part of this TAC evaluation process, an element of flexibility should be introduced, allowing the TAC to recommend portions of competing proposals including possible combinations. In the process of selection, the STScI Director may consult with the HTPC, members of the proposal teams, and outside experts, as appropriate. Before finalizing arrangements and selections, the Director should also ensure that combinations of teams suggested by the TAC have a clear sense of their roles and responsibilities and a firm commitment from all of the PIs to deliver relevant products.

To the extent that the revised selection process for Treasury proposals represents a significant change from current practice, we recommend that a full description be included in the Call for Proposals. This would include criteria and other guidelines given to the TAC and panels in judging the proposals.

To enable broad scientific use of Treasury data sets, the STScI should issue a Special Call for Archival Research following the selection of Treasury Programs for a given Cycle. This call and subsequent review and selection of Archive Researchers should be scheduled so as to enable immediate access to the data sets as they become available.

To assist potential new Treasury proposers and Archival researchers the STScI should promulgate relevant information on previously selected Treasury Programs, including science objectives, pointing directions, numbers of orbits, instruments and modes. With the help of the HTPC, the Institute should consider means of identifying and disseminating examples of key features in successful Treasury proposals to assist the community in generating the strongest possible future proposals, which after all are primarily intended for the use of the community at-large.

VI. Integrity of TAC Process and Balance of Allocations

The committee considered the unusually large allocation of Cycle 11 orbits to STScI-led proposals. We learned that the award of a Treasury Program was the main reason for a significant increase in the fraction of orbits granted to STScI scientists compared to previous cycles, and that, excluding this Treasury Program, the success rate of STScI proposals is commensurate with the strongest US astronomy departments. Considering this statistic, and after reviewing the policies that the Institute has put in place to prevent undue influence in the TAC process by or for STScI scientists, we conclude that the total amount of HST observing time and funding garnered by STScI in recent cycles (including Cycle 11) was won through a selection process that was not tilted in any way towards STScI. In fact, the high acceptance rate of STScI-led proposals attests to the Institute's success in assembling a high quality scientific staff, which we regard as very beneficial to its operation. That said, HST is the most powerful astronomical instrument in the world, and the proximity of STScI scientists to its central workings may give them an advantage (whether real or perceived) in launching new scientific endeavors, especially large ones. Such familiarity enables the Institute to play a unique role as a facilitator of large community-based observing projects, a function that should continue to be strongly encouraged.

APPENDIX A

BACKGROUND AND CHARGE TO TAC REVIEW PROVIDED BY STIC

BACKGROUND:

Each year the Space Telescope Institute Council (STIC) hears extensive presentations from the Institute Director and the managers responsible for the HST Time Assignment process. This occurs at the first meeting following the TAC review. The STIC has felt that the process is, broadly, as fair and sound as such a large complicated process involving some ~100 community scientists can be, but periodically identifies subcommittees to carry out a more extensive evaluation.

One such subcommittee reviewed the outcome of the process in 1999, being charged, in particular, with establishing whether any biases appeared to be present in the allocation of time and/or funding to STScI scientists. The subcommittee found that this aspect of the process was unbiased (in fact, STScI scientists may have been funded at a slightly lower level than others for comparable programs).

It appears, however, that it is now appropriate to set up a broader review. The approach to proposal evaluation and selection was changed substantially three years ago, with fewer, broader Panels. It is time to review how that has worked, particularly since the Cycle 11 TAC results generated substantial controversy. A number of changes and developments characterized the Cycle 11 TAC process which may have contributed to this controversy.

For example, the likely availability of new instruments (the powerful Advanced Camera and the recovered NICMOS), as well as the introduction of the very large "Treasury" programs, led to very heavy oversubscription (~10:1), and hence a very large pool of negative outcomes. The continuing use of a broader review process with panels whose membership draws from many subfields (loosely characterized as "non-expert") raised concerns again for some proposers. The decision to only provide comments from the panels if requested (for all but large and treasury programs) proved to be an issue for many.

The very large fraction of the time (30%) that was awarded to PIs who are STScI scientists also has arisen as an issue. There are reasons to believe that this was the result of "small number statistics", but it has raised concerns that there may be biases in the process, presumably subtle, that may need to be countered.

As a result of concerns expressed to AURA, NASA, STIC, and the Institute, STIC recommended that a review committee be established to evaluate the TAC process, keeping in mind that the goal is to produce the best scientific outcome.

CHARGE:

The committee is requested to evaluate the following issues, to identify changes that might be needed, and to recommend to STIC and AURA improvements that could be instituted by STScI in later Cycles:

1) Is the TAC and Panel process scientifically effective and broadly responsive? Is the level of expertise and experience lacking? If so, what might be done to alleviate this? Are the Panels and TAC structured so as to minimize "conflict-of-interest", i.e., ensure that they are free of any biases (even subtle) towards STScl proposers? or towards Panel and TAC members? or others?

2) Is the overall TAC/Panel approach maximizing science? Three Cycles ago the structure of the TAC and its Panels was changed so as to help constrain the growth in the number of Panels and to minimize conflict-of-interest. The adopted approach resulted in more broadly-based Panels that have been criticized for lacking depth (not enough "expert review"). Has this change introduced problems? Is a different approach preferable? Or is the balance about right.

3) Questions have arisen about the process. Are the instructions to the TAC and its Panels clear? Are they consistent with the call for proposals (CP)? Was the review process consistent with the CP selection criteria? Is the internal note-keeping and reporting sufficient? What would constitute a "reasonable" level of supporting documentation for the final rankings? Should the Director actually be more proactive and modify the TAC rankings to satisfy other constraints (the traditional practice has been to follow very closely the final TAC ranked recommendations)?

4) Is the process used to select Treasury proposals effective at meeting the goals of the Treasury program? A different approach was used for the original "Key Projects". The HST Second Decade Committee recommended a different approach to that used by STScl for Cycle 11. Is a different process desirable? Workable? Should additional "experts" be used for Large and Treasury proposals?

5) Is the written feedback to proposers appropriately balanced between usefulness to proposers and realistic workload on Panel members? While the Institute has decided to give written feedback from Panel members to proposers in future Cycles, the brevity, the usefulness and even the "quality" of the feedback in the recent past has left many proposers very unhappy. What could be done to improve the "quality" of the feedback?