SPACE TELESCOPE USERS COMMITTEE
REPORT - OCTOBER 2000

The Space Telescope Users Committee (STUC) met on 5th and 6th October 2000 in the Board Room of the Space Telescope Science Institute.

Attended: Bruce Balick, Marc Davis, Debra Elmegreen, Chris Impey, Suzanne Hawley, John Kormendy, George Miley (Chair), Sergio Ortolani, Dave Sanders, Hal Weaver.

Unable to attend: Jay Frogel, Felix Mirabel

1. STATUS OF PROJECT

Since the last STUC meeting there were two critical developments for the HST project, (i) a NASA budget crisis that almost caused the cancellation of the WFC3 instrument and (ii) the postponement of deployment of the Aft Shroud Cooling System (ASCS) from the SM3B to SM4 servicing mission. The series of events that led up to each of these events was presented to STUC.

In addition to the above crises, budget problems caused considerable problems for the Institute, including a large layoff of staff. Most of the budget problems that have occurred over the years have been caused by delays to shuttle launches, outside the control of the project. We therefore regard taxing the Project for such problems as unjustifiable.

1.1 WFC3. We reiterate our concern about the proposed cancellation of WFC3 expressed in the letter sent by the acting chair of STUC to Dr. Kinney on 19th July 2000. Our thanks and congratulations go to all concerned in ensuring continued funding for this key astronomical facility. It was a great surprise to us that such an action was advocated. Cancellation of WFC3 would have jeopardized one of the most successful astronomical projects ever, introduced a serious gap in the tools of the astronomical community for several years and seriously impacted scientific public outreach.

The discovery potential for the WFC3/HST combination is large. The UV capability of WFC3 will be unique, even in the HST era and in the infrared WFC 3 will be a factor of ~ 15 more sensitive than NICMOS. The UV channel with its large field of view, UV-optimized detectors and rich selection of medium and wide-band filters will allow unique photometric studies of stars, galaxies and clusters of galaxies in the crucial spectral region between 200 and 400 nm. The IR channel provides a key bridge to NGST and will play a central role in studies of topics such as old stellar populations and photometric redshifts that are of key importance to the formation and evolution of stars and galaxies. Further, WFC3, with its complement of more than two-dozen emission-line filters, is the only such facility for studying nebulae and the ISM on the scale sizes of shocks and jet widths for at least another generation. With WFC3, the HST will continue to be a major driver of astronomical progress for several years to come.

As stated in our March 2000 report:

"The dual optical/IR channels of WFC3 and the unique panochromatic imaging capabilities provided by the combined power of the ACS and WFC3, extending from the far UV to the near-IR will guarantee the scientific and inspirational importance of the HST for the forthcoming decade. The dual-channel WFC3 will contribute in areas as wide-ranging as studies of the early Universe to the search for extra-solar planets The HST facility as presently planned will continue to be a vital tool for the NASA Origins Program."

The cost effectiveness of providing new instrumentation for Hubble is incontrovertible. Without new-generation instrumentation, the HST will lose its present leading role in astronomy and the rationale of keeping Hubble operational would be questionable. Given the small incremental cost of the new instrumentation to keep the HST as a forefront facility, such a decision would in our view amount to irresponsible stewardship of public funding.

1.2 THE SM3B MANIFEST. During the summer it was became clear to the Project that the power control unit (PCU) would need to be replaced during the upcoming SM3b refurbishment mission. Because of the fixed time available for orbital work, a decision had to be made to either defer fitting the Aft Shroud Cooling System (ASCS) until the SM4 mission in 2003 or to cancel plans to retrofit NICMOS. Failure to retrofit NICMOS would result in the lack of an IR capability for the two years between late 2001 and late 2003, whereas deferral of the ASCS would result in postponement of a low-noise mode for STIS until after this period. The Project, in consultation with the Institute and the relevant IDTs, decided to defer the ASCS. We concur with this decision. However, while recognizing the need to act speedily when such matters arise, we regard it appropriate to solicit the STUC perspective on future decisions of this type.

1.3 SCIENTIFIC EFFECTIVENESS OF HST. STUC recognizes that outreach by STScI and NASA has been extremely successful in communicating the priority and excitement of HST to the public. But it is apparent from the events of the last months, that besides public outreach, it is important to provide data about scientific effectiveness of the HST that can be presented to scientists, scientific administrators and government officials. The HST results that are most accessible for the general public are not necessarily the ones that are most important scientifically. We are therefore pleased that the Science Division of the Institute has begun preparing regular reports on the scientific highlights of HST.

We believe that these reports would be more effective if complemented by quantitative and objective metrics of the scientific productivity and impact of the HST. STUC therefore recommends that the STScI make such an analysis of HST productivity and impact. It is desirable to do this separately for the different scientific instruments. One relevant metric is the number of publications of various kinds, such as refereed journal papers, conference contributions and invited reviews. However, a more incisive measure of impact is provided by the citation indices. STUC would be happy to consider the results of such a study at a future meeting.

2. SCIENTIFIC INSTRUMENTS

2.1 COS. The development of the Cosmic Origins Spectrograph is on schedule and within budget. We congratulate all concerned. There appears to be an excellent relationship between the

COS Instrument Development Team and the COS support staff at STScI. Not only will this facilitate efficient development of COS data analysis tools, but it should also translate into good user support when COS becomes operational.

2.2 ACS. Many of the ACS problems described to us at the last meeting appear to have been solved and the instrument is proceeding well. We were pleased that good CCDs now exist for the Wide Field Channel and hope that the contaminated surface of the high quantum efficiency HRC CCD can be repaired in time for inclusion in the ACS.

Development of the data pipeline is also progressing well. We regard it as essential that the ability to correct for geometrical distortions be an integral part of the pipeline and are pleased that this is planned. It is important that support for the pipeline development be continued at the current level.

2.3 WFC 3. A detailed report on the progress of WFC3 was presented to STUC. Since our last meeting this project has received excellent reports from a series of high-level review panels that considered its scientific merits, technical progress and the strength of its management, operations and budget. All of the key vendors are under contract, including the detector suppliers. We are delighted that detector chips are expected to be delivered at the end of October and detailed evaluation and characterization will take place on an aggressive schedule. The uncertainties of the past months must have been particularly difficult for the WFC3 team. We compliment them on their continued efforts in support of this project.

3. SOFTWARE TOOLS

3.1 STSDAS - PYRAF. A low-level effort to develop Python as a user-friendly and highly flexible environment for running IRAF/STSDAS has been underway at STSCI for more than a year by Rick White and Perry Greenfield. Python is a widely distributed, free interpretative scripting language that operates on all current computer platforms, and it can be linked to object modules written in C, Fortran, or other languages, including IRAF's SPP. The old IRAF/CL has been replaced by a Python environment, now dubbed PYRAF. The Python environment will not only add convenience and clarity to IRAF (which badly needs it), but also eliminates the need to write future applications in SPP. Most important, PYRAF is backward-compatible with IRAF, allowing continued use of the huge library of IRAF applications software as well as the IRAF syntax. PYRAF should provide a platform for developing astronomical image processing software in a flexible, modern language and should significantly improve the users' ability to reduce and analyze data.

We first considered the PYRAF effort in our meeting one year ago and were extremely enthusiastic. Since then the project has continued to mature and a first version of the CL is likely to become available as an IRAF plug-in for use by the community during the next half year.

The new IRAF platform could be an important element of the "Cheap-ops" mode of operation at STScI. In view of its promise for reducing the time and effort needed to create application software, it could improve the productivity of STScI's software programmers considerably and greatly expand the pool of potential contributors to HST's data analysis tools.

We continue to regard the development of PYRAF as an important service for the whole astronomical community for which STScI and in particular those directly concerned should be congratulated. It is important to obtain feedback on the pros and cons of the CL from external users of its first trial distribution. Another area of attention is the possibility of porting the extensive IDL astronomy library into PYRAF. It is desirable that the PYRAF developers (White and Greenfield) be exempt from other duties in order to pursue these efforts. Although we see few disadvantages at this point, a more detailed evaluation of the implications of PYRAF for users and for the Project is needed.

A sub-group of STUC (Marc Davis, Suzanne Hawley and John Kormendy) will be happy to help with setting priorities for future application software development in PYRAF. We would appreciate brief written progress summaries in advance of each of our meetings so that we can follow this important issue.

3.2 APT. The Institute has continued work on the Astronomer's Proposal Tool, an ambitious next-generation package of software tools to assist astronomers at the various stages of proposal preparation. When completed, this model-oriented graphical approach to the telescope-user interface will not only promote more efficient proposal planning, but also stimulate the development of new observing philosophies and strategies. The APT will have the ability to plan observations with multiple observatories, a capability that will become increasingly important now that joint proposals can be submitted to the Great Space Observatories and some ground-based facilities.

The project had a new start in early 2000 and is now headed by Steve Lubow. Since our last meeting, there has been an initial release of one of the APT tools, the "Visual Target Tuner" (VTT), a powerful and flexible system for interactively examining and optimizing the positioning of HST instruments on the sky. The windows-style interface is effective and functional.

The STUC continues to support and encourage this project. We are glad that additional funding has been obtained from NASA for this activity in the "overguide" program. We recognize that the present funding profile would preclude release of the complete system until the Cycle 12 timescale, but we hope that several APT tools can be released to the user community for use in preparing Cycle 11 proposals. We shall review the APT progress at our next meeting.

4. PRIORITIES IN FUTURE COST CUTTING

The first stage of planning for wide-ranging streamlining and economies in Institute operations is now complete. An account of a meeting attended last summer a sub-group of STUC to consider various issues related to this operation is attached as an appendix to the present report.

We note and regret that since our last meeting budget problems with the HST Project have necessitated unexpected substantial layoffs at the Institute during the past year. So far there has been little impact of these economies on user support, but not enough time has elapsed to judge their effects properly.

5. THE SPACE TELESCOPE EUROPEAN COORDINATING FACILITY

We recognize and applaud the large contributions to the HST project made by the STECF over the last decade and are pleased that an extension of the MOU between NASA and ESA which gives a formal status to the STECF has now been negotiated. Present STECF plans include developing a pipeline for the ACS grism data, providing tools for combining overlapping WFC2 images, investigating ACS field distortions and a more sophisticated reduction of the GHRS dataset. These are all areas for which the STECF expertise is well suited and which would serve important needs of the project and a significant stimulus for archival research. . We endorse and encourage these projects.

The STUC were impressed by the improvement in the pipeline reduction that resulted from a detailed analysis of the complete FOS dataset and encourage the STECF to pursue a similar proposed project on reduction of the pre-SM3B STIS data. We suggest that consideration of whether the needed sophisticated STIS pipeline for archival data might be applied to improving the normal STIS reduction pipeline. If so, there could be substantial benefits for the quality of new data and the resultant "first-generation" research papers. This should only be carried out if it can be done without greatly hampering current data reduction activities. Further, processing of the GHRS data through a more sophisticated pipeline could be useful, provided it can be done without much expenditure of resources.

We were pleased to have a presentation about the STECF efforts and hope that such presentations can be provided for STUC regularly (e.g. once every 3 meetings).

6. GO FUNDING FOR CYCLE 9

Funding for GO proposals in Cycle 9 had not been released until about the time of our meeting (October). This is uncharacteristically late and some GOs have expressed concern that this delay in the release of funds is causing serious problems for the relevant projects. Based on previous presentations we had expected that new software would result in a faster funding process. We hope that the Cycle 9 funds will be distributed soon and that the Cycle 10 funding process will be speeded up.

7. OTHER MATTERS

The dates of the next STUC meeting will be 19 and 20 April 2001. Possible items for consideration include (1) evaluation of the TAC Cycle 10 process (ii) update on APT (iii) progress with PYRAF and application software prioritization, (iv) initial metrics on the productivity of HST and (v) update on the second decade of HST. It is desirable that as much written input as possible be available to STUC members at least 1 week in advance of our meetings, possibly via an FTP site from which STUC members can download relevant material.

Bruce Balick, Jay Frogel, Felix Mirabel, Sergio Ortolani and Hal Weaver will retire from STUC before the next meeting. The Director of STScI and the Chairman of STUC thanked them for their substantial contribution to the Committee.

APPENDIX: STUC SUB-GROUP MEETING - SUMMER 2000

A meeting took place on 31 May and 1 June 2000 in the Board Room of the Space Telescope Science Institute to give a sub-group of STUC insight into the allocation of STScI resources and provide background for determining priorities for future economy measures. Below is the report of this meeting sent to STUC as a whole by the participating sub-group.

Attended for STUC: George Miley (Chair), Hal Weaver.

A.1 Goals. Roger Doxsey introduced the meeting, which was intended to provide STUC with some background through which STUC could participate in eventually defining a level of core support for HST users. We reiterated that the STUC would be happy to help with the prioritization, once the Institute provides us with alternatives. Although we appreciate the opportunity learning about the background and relevant considerations involved, we do not regard it as appropriate for STUC to become involved with detailed management issues.

A.2. Usage of the instruments. Preliminary data was presented on the usage of the instruments and the various observing modes. Such demographic studies are useful both in earmarking rarely-used modes that might be candidates for reduced support and in determining whether some observing capabilities could be communicated better or simplified at Phase 2. (e.g. patterns vs POSTARG). Several modes were identified that were used extremely rarely (<1%).

A.3. Cycle 9 Calibration Plan. In the opinion of the STUC attendees, the calibration plan for each instrument was well thought out, focused and economic. Omitting the SMOV, the proposed percentage of time to be devoted to calibration is ~ 5%. The plan for each instrument was developed in consultation with the relevant IDT and consists of core calibration parameters and a "wish list" of desirable calibrations that would have been done if more time and/or resources had been available.

On our suggestion, a summary of the Cycle 9 plan for each instrument is being distributed to STUC and in planning calibration for future cycles, the Institute will involve the relevant STUC portfolio holders when consulting with the IDTs about the plan.

A.4. Calibration Outsourcing. An experimental outsourcing program is being developed for Cycle 10.. About 5 candidate projects have been identified. The form of the outsourcing will be determined on a case by case basis and will consist of 3 classes of projects:
(i) core calibrations to be funded by the prime contract or ESA (TAC not involved).
(ii) new science-enabling calibrations to be funded by the GO research funds (Budget line # 459) and reviewed by TAC.
(iii) special cases.

STUC will discuss calibration outsourcing when evaluating the Cycle 10 TAC at our April 2000

meeting.

5. Allocation of Resources - Rarely-used HST Modes. A complete breakdown was presented of the present and planned staffing within the HST Division and an account of the assumptions which go into the future planning, e.g. previous evolution in instrument support with instrument maturity. The plan appeared reasonable.

An exercise has begun to examine the cost effectiveness of rarely used modes of the various instruments as a preliminary to identifying rarely-used modes as candidates for calibration outsourcing or discontinuation. Taking account of the usage and cost, there are clearly some modes (e.g. for WFPC2, the UV and linear ramp filters and polarizers) that are more expensive than the core modes by a factor of >30).

We suggest that as a preliminary procedure for future cost-cutting in this area, consideration be given to (i) rarely-used modes of mature instrument that use significant resources and (ii) modes of all instruments that will give a duplicate or superior capability after the SM3b servicing mission.

As a basis for possible decision making in future cost-cutting actions, we advocate compiling the following data for each of the rarely-used modes:

* titles and descriptions of past projects that used them and some measure of the research significance

* alternative modes that could be used for these programs, after installation of the ACS and the NICMOS cooler

* an analysis of the annual cost savings that would result if the modes were discontinued.

As we mentioned in our last report, rarely used observing modes should not be eliminated until after a careful analysis of their use has been made and there has been consultation with the wider user community. After a preliminary decision to discontinuing support for a mode is made it would be appropriate to circulate notice of this by email to the database of HST users, giving interested parties an opportunity to make a science case for its retention.

6. Redesign of Web Pages.

We received an update of the project to redesign the web pages and communicated some suggestions regarding format and accessibility of material to Steve Hulbert. We raised the possibility of providing a mechanism for suggestions directly on the web pages. It would also be useful to have a list of "favorites topics" for each instrument that could be easily reached. We reiterated that all members of STUC were willing to be guinea pigs when the project has reached the relevant stage.

Prompted by some uncertainty whether the users were acquainted with the various possibilities when entering Phase 2 information, we discussed the desirability of linking the Phase 2 input to the relevant parts of the instrument handbooks in the APT.

7. Tools and Documents: Future Priorities.

We were presented with a list of current and planned tools being constructed for each of the instruments, together with resources needed and current priorities. Note that although most tools will become part of STSDAS, they are initiatives of the instrument groups. This is relevant to the discussion about STSDAS priorities and Bruce Balick's note about this, discussed at the last meeting.

The priorities seem to us well thought out and a list of these has now been distributed to all STUC members for comment.

8. Options for Contingency Planning after SM3B.

There are several unpredictable aspects of SM3B that may require internal diversion of resources within the Institute. Hence it is important for the Institute to make informal contingency plans, by earmarking areas from which resources could be taken if absolutely necessary. As well as changing the priority level at which the various planned tools would be implemented, such measures could include reducing support or discontinuation of particular observing modes.