Report of the Space Telescope Users' Committee (STUC) Meeting, April 2001

The Space Telescope Users Committee (STUC) met on 19th and 20th April 2001 in the Board

Room of the Space Telescope Science Institute.

Attended: Debra Elmegreen, Holland Ford, Chris Impey, John Kormendy, George Miley (Chair), Dave Sanders, Karl Stapelfeldt, Alfred Vidal-Madjar.

Unable to attend: Marc Davis, James Dunlop, Suzanne Hawley, John Stocke

1. GENERAL- STUC PORTFOLIOS

The composition of STUC changed substantially since the last STUC meeting. The chairman welcomed 5 new members to the committee, James Dunlop, Holland Ford, Karl Stapelfeldt, John Stocke and Alfred Vidal-Madjar, only 3 of which were able to attend this meeting.

The following is a revised list of allocated portfolios:

(i) Instrumental Issues:

(including observing modes, calibration, performance, capabilities and upgrades),

- ACS/ WFPC2: Elmegreen, Ford, Impey, Stapelfeldt
- COS/ STIS: Hawley, Stocke, Vidal-Madjar
- NICMOS/ WFC3: Davis, Dunlop, Kormendy, Sanders

(ii) Operational Issues:

Proposal Handling and Scheduling: Ford, Kormendy, Stapelfeldt

- Software Analysis Tools: Davis, Impey, Sanders
- Time Allocation Procedures: Hawley, Dunlop, Stocke
- Solar System and Targets of Opportunity: Stapelfeldt, Vidal-Madjar
- Archive: Davis, Dunlop, Impey
- GO Funding: Elmegreen, Stocke
- Users who have relevant input of general interest about any of these issues, should contact the relevant STUC portfolio-holder or communicate directly with George Miley. Information about the portfolios should be clearly displayed in the STUC section of the STScI web site.

2. STATUS OF PROJECT AND SM3B SERVICING MISSION

The telescope appears to be performing well and preparation for the SM3b service mission is proceeding on schedule. We congratulate the Project for making considerable progress in alleviating the budget shortfall mentioned in our previous report.

Although the first scientific priority of SM3b is to install the Advanced Camera for Surveys, an additional activity that should have high scientific priority is the installation of the NCS radiator on NICMOS. The fundamental importance of an IR imaging capability on HST is underscored by the

number of recent major results that are due to observations with NICMOS. We note the investigations of the low-mass populations of star clusters, the discoveries of new brown dwarfs, EROs and distant galaxies, and comparative studies of the IR and optical morphologies of faint galaxies. A major recent highlight that received considerable publicity was the discovery of the high-redshift supernova SN1997ff in the HDF-N and the constraints imposed by the properties of this object and other NICMOS supernova observations on the evolution of the Universe. Complementary observations with NICMOS are essential in fully exploiting the power of the ACS in some areas (e.g. studies of high-redshift supernovae). Although we realize that installing the NCS will be a challenging part of SM3b, restoring NICMOS to health is of great importance for astronomy.

From written material presented to STUC it appears that development of both the WFC3 and COS are on schedule. No substantial problems have been encountered in either case.

3. ADVANCED CAMERA FOR SURVEYS

The users are looking forward to the huge improvement in sensitivity and resolution that will be provided by the ACS. We have no doubt that the powerful combination of the HST and ACS will have a substantial impact on fundamental science. Construction of the ACS appears to be on schedule. Development of the ACS pipeline has also progressed considerably since our last meeting. We are pleased that the geometrical distortion corrections and the drizzle reduction routines are being incorporated into the prototype system. Continued support should be provided to enable them to be included into the definitive reduction pipeline.

A proposal by the ACS Science Team to upgrade the CCDs on the ACS Wide Field Camera was discussed. The STUC formed a recommendation about this question in the absence of one of its new members, Holland Ford, who excused himself to avoid a possible conflict of interest as PI of the ACS.

STUC strongly endorses the proposal to replace the SITe CCDs of the WFC with a Loral/Fairchild 4k x 4k CCD. All available evidence points to the Fairchild device having better DQE and far superior cosmetic properties than presently installed CCD. A particularly important reason for making the change is that the Fairchild CCD has much better tolerance to degradation in the space environment and should therefore have a useful lifetime ~ 50% longer than that of the SITe device. The Fairchild CCD would significantly increase the scientific return by enabling deeper observations and faster surveys with data that are easier to calibrate and characterize. We note that the risk analysis made by the project clearly favors replacement of the CCD. The small additional risk in changing the CCD would be incurred while the camera is on the ground, whereas the worse reliability of the SITe CCDs would increase the risk of in-orbit problems. Redundancy in the 4k x 4k CCD should result in less chance of readout failures. Although we recognize that such a major change so close to launch would be unusual, the benefits would be substantial. In the event that a decision not to change the CCD is contemplated, the STUC would appreciate further consultation on the matter through its Chairman or his representative.

We note that the problems with the SITe CCDs and the success of the new Fairchild CCDs underlines the desirability of building redundancy early into the development of detectors for space instruments.

4. SCIENTIFIC EFFECTIVENESS OF HST.

In our last report, the STUC encouraged the Institute to compile data about scientific effectiveness of the HST that can be presented to scientists, scientific administrators and government officials. We are therefore pleased that the Science Division of the Institute has begun preparing reports on the scientific highlights of HST and we compliment them on an excellent summary of the key achievements of the HST during 1999-2000.

We previously argued that these reports would be more effective if complemented by quantitative and objective metrics of the scientific productivity and impact of the HST. We are pleased that quantitative data now exists to complement our subjective impressions about the success of the HST. We learnt that an independent survey has shown that expressed in terms of the cumulative number of discoveries between 1973 and 2000, the HST is more than twice as productive than any other NASA facility.

The STUC also heard about the progress made by the Institute on using science metrics to evaluate HST productivity and impact. In the past the STScI Library has used its considerable expertise in this area to compile a comprehensive list of HST-related publications and until recently these were the only metric available for measuring the impact of HST research. We applaud the work of the Library in leading this effort. As a result of past STUC recommendations, a more extensive project to measure the effectiveness is now underway led by the SPD and look forward to the presentation of preliminary results of this work at the next STUC meeting.

We suggest that such an analysis be expanded further. Particularly interesting would be a ranked list of the most cited papers and its use to investigate which HST programs and instruments have produced the most fundamental science advances. In carrying out such an investigation, we would advocate taking into account (i) citation statistics as a more robust measure of impact than counts of papers produced (ii) the substantially larger completeness level of the printed volumes of the Science Citation Index and the electronic "Web of Science" server compared with the electronic ISI server.

5. SCIENCE OPERATIONS: GOALS AND BENCHMARKS

The STUC compliments the Hubble division for initiating and leading a study of the various

steps in the HST process from proposal preparation to production of papers. The study aims to develop goals and benchmarks for assessing each of the various steps. We agree that such a detailed examination of the HST process can be used to optimize resources in enhancing the scientific effectiveness of the telescope. For example, if ways can be found to (i) shorten the period between scheduling and observation, or (ii) shorten the time between a proposal and distribution of the associated observed data to the proposer to allow input to a proposal for the next TAC cycle, substantial improvements to the scientific effectiveness of the HST would result and qualitatively new science would be enabled.

We would appreciate updates at future STUC meetings on the progress and implementation of the plan and input on setting priorities, when the situation arises.

In addition, the Institute has instigated a group to Study possible Archive and Reprocessing Enhancements (SHARE) and we also look forward to hearing about its progress in the future.

6. SOFTWARE.

6.1 The Astronomers Proposal Tool. The STUC continues its strong support for the development of the Astronomer's Proposal Tools (APT). As noted in our last report, APT will offer powerful new capabilities for users in developing their proposals. STUC applauds this STScI initiative, and is impressed by the flexible management structure that allows such innovation from modest staff resources. Initial feedback from users has been very positive and constructive. The upcoming release of new versions of the ACS exposure time calculator and the Archival Research tool will be of great assistance in preparing Cycle 11 proposals. The STUC has two suggestions for future work. First, to support the resumption of HST near-infrared observations with NICMOS and WFC3, the STUC recommends that images from the 2MASS survey be incorporated into APT visualizations on an equal footing with images from the optical Digital Sky Survey. Secondly, consideration should be

given to developing a high-level "brainstorming" tool that would allow potential proposers to explore the feasibility of HST observations without having detailed knowledge of instrument capabilities. This feature might expand the pool of HST users and encourage more proposals. Eventually, APT might be mature enough that a combination of the Phase 1 and Phase 2 processes could be considered to help decrease the time from proposal submission to receipt of data. APT is an excellent example of innovation within the Institute that tangibly benefits the user community.

6.2 Grants Management System. The US users are enthusiastic about the new GMS software for managing their HST grants and which replaces the old GATOR system. A considerable amount of feedback was received. Grants are much easier to administer using the new system.

6.3 Multi-Platform Support. Given the escalating use of LINUX within the astronomical community and the stable but large group of Macintosh users, STUC strongly recommends that multi-platform capabilities be incorporated within the development of STSCI software systems such as GMS and APT. We note that other major national astronomical facilities (NOAO, NRAO, SIRTF) have already implemented key user software on the Linux platform.

7. TIME ALLOCATION PROCEDURES

We are pleased by the efficient operation of the Cycle 10 TAC process and gratified that some of the STUC's previous recommendations were successfully implemented in the Cycle 10 TAC procedure. The new proposal categories have enabled several new classes of proposals in the areas of calibration, innovation and joint Chandra-HST observations, but surprisingly no proposal in the joint HST-NOAO observation category was accepted. The new panel composition begun in Cycle 9 continued to be effective in Cycle 10 in minimizing conflicts of interest. The fact that the acceptance fractions were similar for panelists and non-panelists and that the accepted proposals were equitably distributed amongst disciplines was further evidence of the fairness of the process. The method of triage, with the possibility for further discussion of a triaged proposal continues to be an efficient process. We were especially encouraged that the progressive orbit "subsidy" and the TAC Chairs' preliminary evaluation of large proposals appears to have resulted in a proposal acceptance fraction that is roughly independent of proposal size. It is also pleasing to note that observing time requested by proposers was usually allocated in full, i.e. without significant "trimming" of orbits.

Several changes are envisaged in the draft CP for Cycle 11 and the STUC considered these at length. STUC supports the plan to continue and expand the scope of large projects through the new Treasury Programs, recommended by the HST Second Decade Committee. These programs are designed to obtain coherent data sets that will enable the investigation of multiple scientific questions and will have short or no proprietary periods for data rights. We are pleased that the STScI has followed the recommendation of STUC that Treasury Programs should be selected through the normal TAC process. The Treasury Program will produce stronger links between HST observations and those of other observatories, and will encourage the development and distribution of high-level data products and analysis tools for use by the broad astronomical community. The STScI should continue to catalyze the definition of Treasury Program proposals by bringing together astronomers from different disciplines such as was done by the recent successful ACS Survey workshop. There are areas other than deep surveys that would benefit from Treasury programs and we hope that the selected proposals will embrace a wide range of astronomical disciplines. However, the STUC is concerned that Treasury Programs could require funding levels that may stress the resources available to the GO/AR program.

STUC considered the proposal by the Institute to reduce or eliminate feedback to proposers of TAC comments. The goal of this measure is to increase the efficiency of the proposal selection process and reduce the overall time between proposal submission and scheduling. The STUC was divided on the wisdom of this action. Because the comments need not be communicated to proposers until a few months before the subsequent proposal deadline, provision of such feedback should not affect

the speed at which a proposal can be scheduled. Most members of STUC believe that comments about the technical feasibility of proposals are generally useful. However, the usefulness of other comments is less important because the TAC rotates between cycles and has no memory of previous comments. However, some members feel strongly that, particularly for low-grade proposals, GOs deserve some feedback given the considerable effort inherent in preparing proposals. STUC recommends that the plan of the Institute to reduce the feedback of TAC comments be carried out only on an experimental basis for Cycle 11. Information about relative ranking should be communicated to all proposers. Feedback of the comments should still be provided for all proposals for which the technical feasibility is questioned. It is important to alert the community in the next CP of these changes and that feedback of comments will be reduced. The STUC would appreciate being informed about the community's reactions to the experiment and suggests that, on the basis of such reactions, the procedure for providing feedback in future cycles be reevaluated.

8. GO FUNDING

The STUC endorses the idea, expressed both by the STScI and the Second Decade Survey Committee, that increased funding for theoretical work directed towards interpreting or stimulating HST observational research is desirable. There is concern that this effort not compromise support for the telescope's primary observational mission, including archival research. This is a particular worry in view of the uncertainty in the funding that will be needed to reduce and analyze data from the new large-array instruments and the additional funding that will inevitably be required to exploit new categories of HST proposals such as the Treasury Programs.

We believe that interaction between observers and theorists is crucial in producing the most important astronomical results and that anything that encourages separation between observation and theory is undesirable. We note that by stimulating the constitution of joint theoretical-observational teams the present grant system encourages interaction between theorists and observers.

Nevertheless, STUC recognizes that the present grants program does not readily support HST-related research that is primarily theoretical and/or that has not yet stimulated observational follow-up. We therefore agree with changing the guidelines for the grants program to enable such theoretical research to be funded. However, we do not endorse instituting a formal theory grants subprogram that would be allocated a predetermined level of funding. The funding to be awarded to theoretical programs should be determined through the usual competitive review process.

9. OTHER MATTERS

The dates of the next STUC meeting will be 25 and 26 October 2001. Possible items for consideration include (i) updates on WFC3 and COS, (ii) progress with PYRAF and application software prioritization, (iii) metrics on the productivity of HST.