



November 30, 2014

Dr Matt Mountain, Director
Space Telescope Science Institute
3700 San Martin Drive
Baltimore, MD 21218

Re: JSTAC Recommendations on overheads, grant funding, proposal submission & duplications

Dear Director Mountain:

A number of topics that are important for the scientific productivity of JWST during the operational era have come before the JSTAC over the last few years. As always, the JSTAC is very aware of the need for ensuring that scientific returns are maximized during JWST's 5-year required lifetime, given the large public investment made in this forefront mission. JSTAC recognizes the need for NASA, ESA, CSA, STScI and the science community to ensure that the operational effectiveness and efficiency of JWST is as high as practical, and continues to welcome the thoughtful and diligent efforts at NASA, ESA CSA and STScI to do such. In evaluating the policies being developed for JWST the experience with other missions plays a central role, but does require recognition that JWST is different, and more challenging, in many ways. JWST is at least as diverse and complex as Hubble in its capabilities, and probably more so, while having a required lifetime more akin to that of Spitzer and Herschel. This necessitates a careful evaluation of its policies and procedures.

At the JSTAC's last meeting we received presentations and updates in a number of areas that impact on the operations for JWST. These were:

- (1) Overheads: How observing overheads are charged.**
- (2) Grant Funding: How the grant funding levels are established.**
- (3) Proposal Submission: The methodology for reviewing and selecting proposals.**
- (4) Duplications: Developing the duplication policy.**

This letter gives the JSTAC perspective and recommendations on these four topics.

(1) Overheads

In its letter of December 28, 2009 the JSTAC developed a set of recommendations regarding the overheads associated with JWST observing time and how they are charged to users (see: [JSTAC-Overheads](#)). The JSTAC recommendations were developed after presentations and discussion of the constraints imposed by the operational modes of JWST. The recommendations from 2009, and their context, are given in the appendix.

Given that over four years had passed since the original discussion, the JSTAC felt that it was important to hear of the changes that had occurred as a result of improved understanding of the nature of the operational mission. Accordingly, the topic was given further consideration by the JSTAC in discussions with STScI.

The JSTAC re-affirms its earlier recommendations to STScI with some clarifications:

The JSTAC again discussed the overheads associated with the operation of JWST and how they should be accounted for in assessing the GO and GTO “observing time”. The total overheads associated with the operation of JWST remain somewhat poorly understood, but are expected to be approximately between 30-40% when averaged over a typical year (as derived from the Science Operations Design Reference Mission – SODRM). Approximately half of the overhead time is expected to be for “indirect overheads”, i.e., the overhead from the mission-level activities such as wavefront sensing observations, external calibrations, momentum dumps, etc., and half for “direct overheads”, i.e., those associated with the actual observation such as the average slew to position, instrument configuration, filter motions, readout times, dithers, etc. The JSTAC reaffirms the recommendation in its 2009 letter **and recommends that observing time for the GOs and GTOs should be handled in the same way, with GOs and GTOs being charged both overheads.** The JSTAC understands that NASA Headquarters has stated that the overheads should be treated in the same way for all observers on JWST and supports this decision by NASA.

The JSTAC also notes that the overheads need to be accounted for to encourage efficient use of the observatory. Again, as before, to be consistent with the above recommendation, **the consensus and recommendation of the JSTAC is that the indirect (or “observatory”) overheads should be charged off the top to each of the GO and GTO time allocations, while the direct overheads, i.e., those associated with individual observation programs, would be part of the observation planning process.** The JSTAC also discussed with those present from STScI and NASA how this might be implemented and **agreed that the overheads should be accounted for, and shown, in APT (or its equivalent).** The proposer will see both the direct and indirect overheads since APT displays the total estimated time (allowing the TAC, and the proposer, to understand the full “cost” of the proposed observations). The proposer can iterate on the direct overheads, thus both enabling and encouraging proposers to maximize the on-target efficiency of their observations.

The JSTAC also noted that the consideration of the overheads might impact individual programs, in certain cases, as the operations of JWST become better understood. Current examples are (1) overhead charges may be increased for specific programs such as those with tight timing constraints, and (2) certain programs may have unusually large overheads and the TAC, for example, may be alerted by STScI to give special attention to their impact and may even disallow such observations. The JSTAC also felt that STScI, in consultation with the acting HQ Program Director Eric Smith, should develop the details of how the overheads are implemented. The JSTAC recognizes that the overheads will have to be adjusted as understanding of the observatory improves.

Two aspects of this approach were considered to be particularly noteworthy by the JSTAC, namely, (1) having the direct overheads as part of the observation planning process engages the GO and GTO community directly in maximizing the efficiency of the Observatory, and (2) recognizing that the indirect overheads will likely need to be adjusted for both GOs and GTOs periodically, using results gathered from experience and/or revised estimates of the observatory efficiency. **The JSTAC recommends that these considerations regarding overheads be adopted, that the user community be made aware of the gains to be made by careful planning, and that any changes in overheads as a result of better understanding of the operational mission be communicated clearly to the community as much in advance as possible so as to minimize “surprises”.**

(2) Grant Funding

In its deliberations over the last few years the JSTAC has emphasized the importance of a robust GO funding program commensurate with the scale of the mission (see, e.g., the 2013 letter from JSTAC regarding GO funding – [JSTAC-GO-Funding](#)). The need to provide scientific results quickly is a crucial aspect that will allow iterations on key science objectives and discoveries during JWST's required 5-year life. However, the JSTAC has not given consideration to *how* such funding would be established for individual programs. This was discussed by the JSTAC with STScl at its last meeting.

As for Hubble and the other Great Observatories US investigators will receive grant funding to support research associated with accepted JWST observing and archival programs. Different approaches to allocating GO funding have, however, been used by Chandra, Hubble and Spitzer. Chandra and Spitzer adopted a formulaic approach, whereby the funding is determined algorithmically related to the size and complexity of the GO program. Hubble has used, throughout its long life with its changing instruments and capabilities, a process whereby the level of funding received by the GOs is set by a Financial Review Committee (FRC). The Hubble process allows opportunities for the PIs of GO programs to request funding matched to their resource requirements to carry out the program, allows for external oversight and also allows for evaluative adjustments by a committee able to assess inputs both from STScl and the GO users as the operating conditions and capabilities of the observatory evolve. The rapid distribution of funds allowed by the formulaic approach is advantageous, but is offset by less flexibility in dealing with the needs of individual programs.

STScl presented to the JSTAC a plan for funding allocation for JWST. Consideration of the advantages and disadvantages of both approaches, FRC and formulaic, led STScl to a hybrid approach that retained the advantages of both. This approach is also consistent with the efforts to shorten the proposal submission process for JWST (see (3) below) as a result of the effort to maximize the opportunities for rapid follow-up of new results – as outlined in the JSTAC letter from March 27, 2014 – [JSTAC-GO-Time](#). This baseline plan entailed doing a full FRC evaluation of successful proposals in Cycle 1, similar to what is now done for Hubble.

In subsequent cycles the approach used would be more formulaic. PIs in the later cycles will receive a baseline funding allocation that can be disbursed rapidly. The formulaic funding level would be derived from an analysis of funding for Cycle 1 programs to develop a baseline funding model for all JWST GO proposals, taking into account program size, program complexity and data products. Broadly it was expected that the majority of the grants budget might be allocated this way, though the final fraction will likely depend on the experience gained prior to the Cycle 2 proposal activities. An important distinction from the purely formulaic approach is that the PIs may apply for supplemental funding. The supplemental budgets would be reviewed by the Financial Review Committee. The FRC would also continue to provide guidance on questions and issues that arose as the approach was being implemented.

The JSTAC found the proposed “hybrid” approach to offer the advantages of the formulaic approach (speed; ease of handling large numbers of proposals) while still retaining the ability to deal with the likely complexities of many of the programs on JWST. The planned use of a Financial Review Committee for Cycle 1, when there is added time to review budgets before the start of observations, was considered a wise way to gain insights for the JWST mission into the needs of GOs for support and their plans for data analysis and publication. This should position STScl to develop the formulaic approach so as to accommodate the experience gained with a set of real JWST GO proposals in Cycle 1.

Accordingly, the JSTAC recommends that STScI retain a Financial Review Committee approach for all proposals in Cycle 1, but modify it to the “hybrid” approach for Cycle 2 and later cycles wherein the bulk of funding is dispensed by a formulaic procedure for all proposals, small to large, with the FRC being used to review requests for additional funding. The FRC is expected to play a bigger role for large and/or complex programs. The formulaic funding would be dispensed rapidly to successful Cycle 2 (and beyond) GO proposers. The JSTAC also recognized that this approach retained the value of the FRC for giving external oversight and feedback on a large element of the JWST operations budget, and to provide independent input on the formulaic process and assumptions. The JSTAC would though like to consider the policy, and its detailed implementation, at a future date before it is finalized since a number of questions remained unanswered about the details of the formulaic component.

(3) Proposal Submission

As part of maximizing the science return from JWST by ensuring that scientific results could be iterated quickly in future cycles the JSTAC discussed a draft plan proposed by STScI to minimize the duration of the proposal acceptance process in its letter of March 27, 2014 – [JSTAC-GO-Time](#). STScI has now further developed the plans to expedite proposal processing and presented them to JSTAC for its consideration. This plan builds again on the experience of the Great Observatories, and particularly Hubble (the mission with which JWST best compares for instrument diversity and complexity), while recognizing the relatively short five-year lifetime requirement for JWST.

The presentation given to JSTAC was comprehensive and indicated a well thought out policy, though questions remained even after considerable discussion.

The underlying principle for the proposal policy for JWST is that an efficient proposal review and implementation process is crucial for maximizing community access and fully exploiting JWST’s scientific potential. The Hubble two-phase process has served that mission well, and is well understood by the user community, but the duration of the process is long. This impacts on the need for rapid iteration on scientific results for JWST. STScI has developed a hybrid ‘single-stream’ process for proposal submission for JWST observing that incorporates features of the Hubble process, but also is more akin to the single-phase process used by Spitzer and Chandra (and so it is not unfamiliar to proposers for time on the Great Observatories).

The “single-stream” process will require submitted JWST proposals to include all information necessary to accurately estimate the direct overheads for scheduling the program in the JWST long range plan (LRP), much as Spitzer does now. There will be exceptions allowed for programs for which detailed specification is not possible (e.g., observations using the micro-shutters on NIRSpec that require JWST pre-imaging, Targets of Opportunity) or where the burden is exceptionally large. While more detail is required in the single-stream process than currently for Hubble in phase one, even in a two-phase process JWST users would be required to provide much greater detail in Phase I to get the accurate total time (“wall-clock”) estimates needed by the TAC and STScI for allocations.

The JSTAC recognized that there is a very important benefit to this activity in that it cuts 6-8 weeks from the proposal review and implementation period for JWST relative to Hubble. This increases significantly the amount of publicly available data from prior cycles that is available to proposers during the 5-year required lifetime of JWST.

The discussion with JSTAC did raise a number of questions. For example, there was a concern expressed by several members that the “single stream” approach gives those most familiar with the telescopes and instruments (those at STScI; GTOs and instrument teams) a larger competitive advantage than in the two-phase process. It was not yet clear how this would be most effectively dealt with, but it is an important issue for STScI. The JSTAC recognizes that STScI already has developed plans to help ensure a sophisticated and well-informed user community. The JSTAC expects to receive updates on how STScI plans to minimize both the perception and the reality of any competitive advantage at future meetings. While efforts to minimize any advantage are important and should be given attention, the JSTAC felt that the advantages that accrue in data availability from the more efficient and less time-consuming single-stream TAC process outweighed such concerns.

It was also noted that the nature of the programs that will be granted an exemption from full submission of all the information required for a program to be “Long-Range Plan ready” would need to be clearly defined. There was also a suggestion that the “single-stream” process could be tried on Hubble proposals as a precursor to doing so on JWST. While the effort and complexity of the single-stream approach did concern a number of members of JSTAC, it was also recognized that a large number of proposals will be for short observations and that such proposals will not be that challenging or demanding of time. Furthermore, the JSTAC heard that the demands on the proposer from this approach would not be as difficult as doing Phase II on HST. The inputs that APT requires for JWST proposals will be more template-based than the Hubble model.

It was clear from the discussion that this approach had considerable merit, but the use of the “single-stream” approach also raised a number of questions and concerns. Accordingly, ***the JSTAC recommends that STScI proceed with planning for a “single-stream” proposal submission approach, but that its concerns, as noted above, be discussed at a future meeting, and that the JSTAC has the opportunity to review this approach again as the planning develops at STScI.***

(4) Duplications

An important aspect of ensuring high scientific productivity in science missions is to minimize duplications of observations. It has long been recognized that duplications effectively waste a valuable resource – namely observing time. All the Great Observatories have developed duplication policies so as to maximize the overall scientific productivity. The policies being developed by STScI for assessing duplications have been discussed with the JSTAC previously, but have been refined by STScI since the earlier discussion. The current plans for how duplications would be handled for JWST were outlined in the presentation to the JSTAC. The JSTAC was presented with summaries of the policies as they currently stand for Chandra, Hubble and Spitzer. The duplication policies for the three observatories are broadly similar in their objectives, though refined for differing operational and instrument characteristics.

Duplications are defined by instrument mode, and the key aspects as currently developed by STScI are that: (1) observations will be flagged as duplications when they target the same astronomical source, and use the same instrument, the same spectral element or central wavelength, and exposure times within a factor of 4; (2) for imaging instruments, observations are flagged as duplications if the instrument field of view overlaps by more than 50%; (3) for spectroscopy (NIRSpec) duplications would be flagged based on overlap in the field of view and

will be checked for duplication on an object-by-object basis: (4) duplications may be approved by the Director based on the recommendations of the TAC, but must be justified scientifically in the proposal (this is expected to be a rare occurrence based on experience with current missions); and (5), as previously, programs will not be identified formally as duplications if the instrument or its configuration differs, even when the science is similar and the targets are identical, but such observations are expected to be scrutinized by the TAC, with guidance from STScl, for their added value to the overall scientific program.

The JSTAC broadly concurred with the approaches outlined for the duplication policy. The JSTAC would appreciate an update and further discussion before the policies on duplication are finally implemented for Cycle 1. It is expected that further development of the policies will lead to valuable refinements. For example, the suggestion was made that unused NIRSpec slits should be available for other programs. The JSTAC recognizes that the duplication procedures may well evolve in future cycles also, as experience is gained. ***The bottom line from the JSTAC was a broad endorsement of the duplication policy, but that further consideration was needed by JSTAC of both the details and of the final overall policy.***

In summary:

The four policy areas discussed here (*how observing overheads are charged; how the grant funding levels are established; the methodology for reviewing and selecting proposals; developing the duplication policy*) are amongst a number of such important topics that have been brought before the JSTAC over the last few years. The JSTAC appreciated the considerable effort undertaken by STScl to educate us in the nuances of science planning for a mission, and the complexities of the planning processes. The four areas here represent key policy areas for JWST, and we commend STScl for developing them to a significant degree of maturity. We would like to thank all those involved. JSTAC is happy to work with STScl to clarify our recommendations regarding these four areas, and to respond to any questions that may arise during implementation.

Sincerely yours, on behalf of the Committee,



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Chair, JSTAC

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Appendix:

Prior recommendations regarding JWST overheads:

In its letter of December 28, 2009 ([JSTAC-Overheads](#)) the JSTAC developed a set of recommendations regarding the overheads associated with JWST observing time and how they are charged to users:

“The JSTAC discussed the issue of GO and GTO “observing time”. The total overheads associated with the operation of JWST are poorly understood at this time, but are expected to be approximately 30% when averaged over a typical year. Approximately half of the overhead time will be for “indirect overheads”, i.e., the overhead from the mission-level activities such as wavefront sensing observations, external calibrations, momentum dumps, etc., and half for “direct overheads”, i.e., those associated with the actual observation such as the average slew to position, instrument configuration, filter motions, readout times, dithers, etc. The JSTAC recommended that observing time for the GOs and GTOs should be handled in the same way, with both GOs and GTOs being charged both overheads. The JSTAC also noted that the two classes of overheads differed, and probably needed to be handled differently. The consensus was that the indirect (or “observatory”) overheads should be taken off the top of the GO and GTO time allocations, while those associated with the observations (the direct overheads) should be part of the observation planning process. The JSTAC also discussed with those present from STScI and NASA how this might be implemented and recommended that the direct overheads should be accounted for in APT (or its equivalent). The JSTAC also felt that STScI, in consultation with the Program Scientist Eric Smith, should develop the details of how the overheads are implemented.

In addition to the above recommendations of the JSTAC there were two aspects of this approach that were considered to be important by the JSTAC, namely, (1) having the direct overheads as part of the observation planning process engages the GO and GTO community in maximizing the efficiency of the Observatory, and (2) the indirect overheads could be adjusted for both GOs and GTOs periodically, using results gathered from experience and/or revised estimates of the observatory efficiency.”