

ToO and DD Programs in future cycles

STUC

13 April 2010

Background

Target of Opportunity (ToO) and Director's Discretionary (DD) proposals usually target transient events, requiring that additional observations are inserted in the HST schedule at relatively short notice

- ◆ **ToOs are scheduled by the TAC**
 - ◆ Typically 10 "normal" ToOs/cycle (response within 11 days)
 - ◆ 1-2 "rapid ToOs/cycle (response within 2 days)
 - ◆ Phase II proposals (except for target) are in place at start of cycle
- ◆ **DD proposals**
 - ◆ Submitted as Phase I during the cycle
 - ◆ Generally sent out for external review
 - ◆ Phase II proposals submitted after acceptance
 - ◆ Typical cycle sees ~15-20 DD submissions, 8-10 accepted
 - ◆ Response time typically exceeds 10 days

Scheduling HST

Observing opportunities for GO observations are computed for the long-range plan (LRP)

- ◆ Maps out available windows for each visit

Observations are scheduled in one week blocks

- ◆ Goal: combine individual observations from LRP, allowing for target availability, slew time, SAAs etc, to maximise science orbits

Command sequence (SMS) construction

- ◆ SMS construction starts 10 days prior to upload
- ◆ Delivered to GSFC ~Thursday prior to execution
- ◆ Uploaded to HST on Sunday evening
- ◆ Execution starts early Monday morning

Example timeline

Date, 2010	SMS 106	SMS 099	SMS 092
Tuesday, March 30			
Wednesday, March 31			
Thursday, April 1		Start construction	Transfer to GSFC
Friday, April 2			
Saturday, April 3			
Sunday, April 4			Upload to HST
Monday, April 5			Start execution
Tuesday, April 6			
Wednesday, April 7			
Thursday, April 8	Start construction	Transfer to GSFC	
Friday, April 9			
Saturday, April 10			
Sunday, April 11		Upload to HST	Complete execution
Monday, April 12		Start execution	

Changing an SMS

An SMS can be changed at any point in this cycle, but...

- ◆ Inserting new observations requires recomputing the entire SMS
 - ◆ Need to allow for telescope slews, SAA, target visibilities, etc
 - ◆ One-for-one target changes are extremely rare
- ◆ The later the change, the higher the impact in terms of resources and telescope efficiency
 - ◆ Adding a DD/ToO early in the construction increases the STScI workload in recomputing the SMS, but may have little effect on HST scheduling efficiency
 - But other GO observations will be displaced
 - ◆ Changing an SMS at T-3 days demands additional work from both STScI and GSFC personnel
 - ◆ Interrupting an SMS during its execution can lead to down time on HST, plus significant inefficiencies in the residual SMS
 - Hence the 15-orbit surcharge on Rapid ToOs

Issues for the STUC

HST will be operating with diminishing resources in future cycles

- ◆ This is likely to impact our ability to support ToO and moderately-rapid turnaround DD programs
- ◆ DD programs have higher science impact/orbit than other GO programs
- ◆ We need to consider ways of preserving the capability, but reducing the resources required

How can we best focus our resources?

■ Optimise selection

- ◆ Currently, DD reviewers are specialists in the appropriate field, drawn from recent TACs
 - ◆ Predisposed to like the science
 - ◆ Proposals considered in isolation, so no cost/benefit analysis
- ◆ Should a committee (TAC?) set *a priori* priorities for DD topics?

■ Optimise implementation

- ◆ Should some high priority & rapid turnaround DD programs be established as community ToO programs? e.g.
 - ◆ The Galactic SNe (ongoing Bahcall program)
 - ◆ Super-Chandrasekhar mass SNe