

The HST Second Decade Study

presented to

the Space Telescope Institute Council

February 6, 1998

by

Robert A. Brown, Study Lead

- NASA has asked ST ScI to conduct a study of how to optimize the scientific program of HST in its second decade
 - provide a vision for HST in the early years of NGST
 - provide guidance on allocating HST observing resources
 - provide forethought about opportunities, constraints, and issues that will be important for HST's future contributions to science
- Key features
 - three meetings and study completion in 1998
 - community-based (outside members in majority)
 - international (coordination with ESA)
 - ST ScI will lead and support study, and produce the final report
- Additional content of this presentation:
 - overview of logic
 - overview of methodology
 - draft charter

We welcome all comments and suggestions on this study! Send them to rbrown@stsci.edu

- Conceptualize the *opportunities*
 - what developments will set the scientific agenda?
 - what questions will be most important for HST to address?
 - what synergy could, and should, develop between HST and NGST or other space—or ground-based—observatories?
 - (open)
- Understand the *constraints*
 - instrument capabilities as a function of time
 - spacecraft capabilities as a function of time
 - low-cost operations
 - (open)
- Develop the *issues*
 - precursor and/or coordinate programs with NGST or other observatories.
 - optimal mix of large and small observing programs
 - HST uniqueness space as a function of time
 - NICMOS versus ground capability
 - implications for community grant support
 - options with respect to proprietary data rights
 - relative emphasis on archival program
 - (open)
- Formulate *recommendations*
- Prepare and distribute *report*

- Membership (15 ± 3) will represent uv-optical-near ir community at highest scientific and technical level.
- Three meetings are planned
 - 31 March-1 April '98 in Baltimore (tentative)
(develop background; define issues; make writing assignments)
 - Summer '98 (possibly in Europe)
(review status; absorb new material; deliberate issues; make writing assignments)
 - Early fall '98 (probably in Baltimore)
(review draft report by chapter; formulate recommendations; develop production schedule for final report)
- Community outreach
 - coordinate with outside groups
 - AAS (newsletter announcement; lunch forum at San Diego meeting; mailing list available)
 - STUC; AXAF Science Center; SIRTF Science Center; ECF; NGST AHSWG
 - (open)
 - WWW storefront (http://sso.stsci.edu/second_decade/)
 - charter & working papers
 - email drop for comments and suggestions
 - forum for open discussion of issues
 - (open)
- (open)

Draft charter for the HST Second Decade Study

The HST Project is requesting that the ST ScI conduct a community-based study to develop a strategic plan for the second decade of HST that is consistent with the following boundary conditions and objectives, taking account of existing developments and studies. The Project solicits the particular advice of this study group on:

1. observing strategies for the HST that would extract maximum scientific value from the observatory while it is still in operation,
2. other relevant topics that merit investigation.

The HST Project has been authorized by the Office of Space Science to plan for an extension of the HST mission beyond the previous 2005 end-of-mission date. The boundary conditions for the extended mission are as follows:

1. final solicitation for new instruments in 1997
2. final in-orbit servicing and reboost of HST in 2002
3. major reductions in HST budget to create development wedge for NGST
4. low-cost operations to end of mission
5. de-orbit in 2010

This extension is consistent with the recommendations of the "HST and Beyond" (Dressler Committee) study, and will allow synergy between the HST and NGST missions. In its second decade HST will be the premier UV-Optical space observatory, complementing and supporting NGST's extraordinary capabilities in the near-IR.

The HST Second Decade Study will create a strategic plan

for the second decade of HST science addressing the following desired outcomes:

1. continuation of healthy observatory operations (spacecraft and ground system), with graceful degradation, at least to 2010
2. continuation of HST's capabilities at the forefront of world-class scientific research at least to 2010, with emphasis on those areas where HST is likely to remain unique
3. optimization of HST for UV-optical imaging and spectroscopy, assuring both primary and adequate backup instrumentation sufficient to assure its performance to 2010 or beyond
4. achievement of objectives 1-3 within a highly constrained budget, taking maximum advantage of resources that already exist within the HST Project.

Several key elements which would form a basis for the extended mission are already in place, under development or under study, and are consistent with this approach. These are:

1. The Space Telescope Imaging Spectrograph (STIS) - the primary tool for UV-optical spectroscopy; development complete and paid for; 13 years old by 2010
2. Advanced Camera for Surveys (ACS) - the primary tool for UV-optical imaging; under development for SM3/1999; developed at about half the cost of comparable earlier instruments by use of spare hardware, design drawings and other heritage from STIS

3. Wide Field and Planetary Camera 2 (WFPC2) - currently primary imager on HST; after SM3/1999 serves as primary backup to ACS and provides continued unique science because of its filter set; would be 17+ years old by 2010

4. NICMOS Cooling System (NCS) - under study and development for potential flight in SM3/1999; very low cost approach (\$6-10M) to extend HST near-IR capability essentially indefinitely

5. Cosmic Origins Spectrograph (COS) - extends HST faint-source UV spectroscopy beyond any prior capability; selected via AO process for flight in SM4/2002; limited backup to STIS far-UV MAMA channel; very low cost instrument, utilizing returned GHRS flight hardware and design heritage plus detector previously developed for FUSE

6. Wide Field Camera 3 (WFC3) will be the Wide Field and Planetary Camera 1 (WFPC1) refurbished as a facility instrument to fly in SM4/2002; would serve as newer, more reliable backup to ACS and continue to provide unique imaging science complementary to ACS

7. Low-Cost Operations - new HST ground system (Vision 2000) currently under development, with some elements already being phased into operation; exploits process improvements and efficiencies, plus capabilities of new spacecraft 486 computer (flying on SM3/1999), to dramatically reduce costs of HST operations; no further on-orbit servicing.