



Association of Universities for Research in Astronomy

A STRATEGIC PLAN FOR AURA

Adopted by the AURA Board of Directors on June 29, 2005

The AURA Strategic Plan is intended to provide a framework for fundamental decisions and actions that shape and guide what AURA, as an organization is, what it does, and why it does it, with a focus on the future.

THE AURA MISSION:

***TO PROMOTE EXCELLENCE IN ASTRONOMICAL RESEARCH BY PROVIDING ACCESS
TO STATE-OF-THE-ART FACILITIES.***

THIS OVERALL MISSION GUIDES ALL AURA ACTIVITIES AND FUNCTIONAL UNITS. EACH FUNCTIONAL UNIT ESTABLISHES AND PURSUES ITS SPECIFIC ROLE IN SUPPORTING THIS MISSION. THIS STRATEGIC PLAN IS INTENDED TO IDENTIFY FOR EACH FUNCTIONAL UNIT:

- MISSION:** WHAT DO WE WISH TO PRODUCE?
CUSTOMER: FOR WHOM?
CONTEXT: WHAT IS THE CONTEXT WITHIN WHICH WE OPERATE?
ACTIONS: WHAT WILL WE DO TO SUCCEED?
METRICS: HOW WILL WE MEASURE OUR PERFORMANCE OVER THE LONGER TERM?

GOVERNANCE AND CORPORATE OFFICE

MISSION AND ROLES

The role of AURA and its Governance is *“To establish, nurture, and promote public observatories and institutions that can serve the astronomical community.”* In so doing, AURA and its Governance will establish top-level goals for the observatories it operates.

The Member Institutions shall constitute a forum for annual review of, and advisory comment upon, the activities of AURA and other issues that Member Representatives deem worthy of consideration in the management and governance of AURA and the advancement of the astronomical sciences.

The Board of Directors sets policy, oversees the operations of the corporation, and is responsible for the execution of AURA’s contractual and financial obligations. The Board delegates to its Management Councils and subsidiary bodies oversight responsibilities and other administrative matters.

CUSTOMER

As steward of those public observatories operated under contract and cooperative agreement, the fundamental customers for the AURA Corporate Office and Governance are *“Funding agencies as influenced by the astronomical community and the public.”*

CONTEXT

Resource limitations: AURA is increasingly being called upon to carry out its mission with limited resources. AURA will ensure that the operating plans of its Observatories establish clear priorities to carry out their core activities well and reduce those activities deemed to be of lesser priority to the funding agencies and the astronomy community.

Competition: In carrying out its mission, it is recognized that competition exists at all levels—competition which assists AURA in its performance. AURA’s goal is to ensure that AURA-managed facilities lead globally and nationally in their scientific productivity. With respect to other management organizations, AURA will also maintain a competitive posture for its core operating contracts and seek additional such work as fits our mission and strengths. In remaining competitive, AURA will constantly solicit feedback on its performance, and be open to new and alternative approaches to accomplishing its mission at all levels. AURA will maintain a diverse, agile, results-oriented management and workforce that operate in a continuous learning environment.

Strategic strengths: AURA’s core strength is based on its strong roots in the community and the potential to link the goals of the funding agencies to community needs. AURA has also acquired core strength as an established institution with a credible track record,

excellent operating policies and practices, and a notable reputation as a good managing entity and a good community advocate.

External factors affecting future levels of spending by funding agencies: Recognizing that spending levels by the funding agencies are affected by the views and priorities of a diverse array of key players, including the Congress and the Administration, AURA will endeavor to maintain an awareness of and linkages to all of these policy organizations.

Government requirements and stakeholder needs beyond the core mission: AURA will maintain as high strategic priorities the following:

- Education and public outreach
- Diversity of the AURA workforce
- Broader benefits to society that accrue from accomplishing our mission

ACTIONS AND TOP-LEVEL GOALS

The following top-level objectives constitute the desired end points for AURA's strategic plan. These include top levels goals established for the AURA Governance and established by the AURA Governance for its operating units.

AURA Governance: A proactive advocate for the interests of the astronomy community and AURA

- Identify new scientific opportunities that take advantage of AURA's strengths and contribute to its mission. These arise from formal competitions and from unsolicited proposals to funding agencies. Near-term business targets include those arising from the Decadal Survey and include:
 - The Advanced Technology Solar Telescope
 - The Giant Segmented Mirror Telescope, and
 - The Large Synoptic Survey Telescope.

Long-term business targets will be continuously identified and discussed at the governance level.

Corporate Office: Maximize AURA's effectiveness by:

- Optimizing the linkage between AURA Governance and Management
- Enhancing relationships with key policy making organizations such as Congress, the Office of Management and Budget, and the Office of Science and Technology Policy
- Identifying and capitalizing on cross-AURA capabilities to achieve synergistic objectives and "a whole greater than the sum of its parts."

Gemini: Establishing a leadership role in a global effort to define, address, and solve compelling scientific questions by:

- Becoming the most scientifically productive O/IR ground-based observatory by 2009
- Maintaining and enhancing Gemini's performance and competitiveness as a world-class Observatory
- Developing and exploiting strategic partnerships with other institutions to the benefit of the Gemini partnership

National Optical Astronomy Observatory: Becoming an Effective National Organization for O/IR astronomy by:

- Implementing the O/IR initiatives of the decadal survey. Importantly, establish firm partnerships for the GSMT, and LSST, leading to construction starts before 2010.
- Making the NOAO Gemini Science Center the exemplar of Gemini partner offices.
- Playing a lead role in the NVO by operating an O/IR ground-based node that meets or exceeds international virtual observatory standards.

National Solar Observatory: Exercising leadership in solar and space science research and education by providing access to unique and complementary research facilities, especially the Advanced Technology Solar Telescope by:

- Developing a community-wide roadmap for ground-based solar facilities and work closely with NASA to link space-based and ground-based assets to maximize their synergy for advancing understanding of the Sun.
- Bringing SOLIS to full operational capability and enhance the scientific productivity of GONG.
- Developing and operating the ATST as the premier ground-based facility for high-resolution studies of solar magnetism and dynamics in the solar atmosphere.
- Leading the development of a virtual solar observatory that provides community access to all aspects of solar data.
- Establishing a strong university/student basis for solar physics.

Space Telescope Science Institute: Enable excellence in astronomical research by optimizing the science from state-of-the-art observational instruments in space.

Enhance AURA's role by:

- Maintaining HST as the world's leading observatory until JWST operations begin
- Ensuring that JWST meets its science goals
- Competing to be the S&OC for the next major UV O/IR mission(s)
- Making OPO a national center for astronomy education and outreach in astronomy

Increase STScI Competitiveness by:

- Decreasing costs at STScI while preserving the scientific and technical excellence that provides a competitive advantage for mission support.
- Supporting community-led astronomy programs that enhance our core competencies and contributions.

METRICS

In fulfilling the AURA Mission, success and progress will be assessed in the context of:

- The success in winning competitions and re-competitions for AURA core operating contracts
- Community satisfaction in AURA's performance and advocacy of priorities

Each AURA Observatory shall establish metrics to accomplish the actions stated above. These metrics will be reviewed on an annual basis at the time of the AURA Annual meeting. Metrics will include:

- Progress on actions stated above supplemented by Center actions
- Indicators of institutional health including operating budgets
- Specific outputs or results related to productivity, including users served and publications and scientific progress enabled by AURA-managed Centers.

THE GEMINI OBSERVATORY

Vision Statement – from the Gemini Board, September, 2004

We are poised to advance into an exciting and challenging scientific era, having created a first-rate institution, the Gemini Observatory. We see the Observatory establishing a leadership role in a global effort to define, address, and solve compelling scientific questions. The answers to these questions will have a fundamental impact on our view of the Universe and our place in it. Gemini, by exploiting its unique strengths and capabilities, will be a keystone in that global effort. Among our strengths are the breadth of the partnership, the diversity and depth of our communities and staffs, our connections with other institutions sharing common scientific aspirations, and the energy and vision of our Observatory.

MISSION AND ROLES

The mission of the Gemini Observatory is *“To address compelling astrophysical questions by providing state-of-the-art, productive observing capabilities that will enable the Gemini community to be a leader in OIR ground-based astronomy.”*

CUSTOMER

The Gemini Observatory serves *“The funding Agencies as influenced by the astronomical communities and the public through the Actions and Resolutions of the Gemini Board.”*

ACTIONS

- **Become the most scientifically productive O/IR ground based observatory by 2009**
 - a. Achieve a fully-optimized operational model by 2007, increasing the efficiency of both telescopes by being able to support multi-instrument queue observing every night
 - b. Provide quality-assured data, with the telescope and instrument signatures removed, for all Gemini observing modes
 - c. Enable high quality “end-to-end” science support of the community by both maintaining a quality science staff able to execute the queue and optimize instrument performance at world-class levels and effectively managing the distributed model in partnership with the National Gemini Offices (NGOs).
 - d. Provide tools to enable the community to more effectively access and exploit the Gemini Science Archive
 - e. Serve as a primary data source for the International Virtual Observatory
 - f. Maintain the effectiveness of the Public Information Office in the arenas of news and informal and formal education
- **Maintain and enhance Gemini’s performance and competitiveness as a world-class Observatory:**

- a. Maintain and further optimize instrument and telescope performance, particularly image quality and emissivity
 - b. Increase operational reliability, sky coverage and science hours available, including provision of new, infrared-capable acquisition and guide units
 - c. Achieve a fully operating laser guide star MultiConjugate Adaptive Optics (MCAO) capability by 2007
 - d. Enhance the scientific productivity of the Gemini North telescope by enabling the existing instrument suite to exploit the Mauna Kea site conditions through the provision of an enhanced seeing capability and effective use of near- and mid-infrared instruments.
 - e. Identify future compelling scientific questions and areas of scientific productivity and pursue the GSC's top-priority "Aspen" instruments that take full advantage of Gemini's capabilities
 - f. Explore new modes of astronomical observation and lead in the evolution of necessary cultural, managerial, and institutional changes. For example by enabling and undertaking large-scale, partnership-wide astrophysics projects on Gemini or leading processes designed to stimulate collaboration among 8-10 m class Observatories.
 - g. Further improve the transparency and cost effectiveness of Gemini's information and administrative services
- **Develop and exploit strategic partnerships with other institutions to the benefit of the Gemini partnership**
 - a. Initiate and continually strengthen scientific and technical partnerships with other 8-10m observatories to share developments and operating costs and avoid instrumentation and capability duplication.
 - b. Increase the Gemini communities' access to competitive capabilities through time trades with other 8-10m telescopes
 - c. Enable long-term scientific collaborations between partners centered on Gemini's scientific strengths.
 - d. Commit to the long-term strategic goal that by 2015 the partnership and its international "system partners" should have a far simpler but broadly accessible "system of telescopes" able to cost effectively support the 30m – 100m telescopes now under consideration. . On Mauna Kea, this could be comprised of two 8m and two 10m telescopes (Gemini North, Subaru, Keck). In the South, VLT, Gemini (and perhaps Carnegie), could evolve into equally complementary, system of telescopes.

METRICS

Evaluation of Strategy

- Science productivity for each telescope measured through publication rates
- Science impact measured by citation indices and "science productivity measures"
- Number of programs executed and users served
- Quality of services provided through the distributed model (users support, data delivery, science program support) relative to competitors
- Delivery and cost performance of instrumentation and development contracts

Track and maintain

- Performance evaluations by partnership
- Average cost of an available science hour/semester/telescope
- Effectiveness and impact of PIO program
- Quality of staff

NATIONAL OPTICAL ASTRONOMY OBSERVATORY

MISSION AND ROLES

As the national observatory for O/IR astronomy, the mission of NOAO is “*to promote excellence in astronomical research by providing the interface to state of the art facilities and data for U.S. ground-based astronomy and, thus, becoming the national observatory*”.

CUSTOMER

NOAO serves the U.S. astronomical community, which, through AURA, influences national and international agencies to fund it and to host it in Chile.

CONTEXT

NOAO Role in the System: NOAO operates telescopes at Kitt Peak and Cerro Tololo and provides the interface for US astronomers to the international Gemini Observatory. Independent observatories operate a larger set of facilities, and NOAO provides very limited access to these facilities in return for NSF funding for instrumentation administered through sub awards. We conceive of the whole entity of U.S. astronomical facilities as a system. Leading strategic planning for the system is a responsibility of NOAO, which must involve the independent observatories, so that their plans can be integrated into a system plan. NOAO’s system responsibility is called out by the AASC decadal survey, but community acceptance will only follow when NOAO’s efforts in this direction actually bear fruit.

AURA and NOAO have a strong record of bringing advanced concepts to decadal surveys. As foreseen by the AASC, NOAO’s largest new facilities will be public/private partnerships or international partnerships. Challenges posed by this context include

- Building partnerships between natural competitors
- The balance between the national centers’ budgets and the individual grants program
- The diversity of facilities’ needs between small colleges and prestige research universities

National Astronomy Landscape: The context in which NOAO operates

- Intellectually, involves the emergence of the new disciplines of particle astrophysics and astrobiology;
- Internationally, involves an informal network of national observatories, e.g. AAO (binational), ESO (intergovernmental), Gemini (international funding agencies), NAOJ and HIA (Japanese and Canadian ground-based astronomy);
- Nationally, is characterized by a tight federal budget with steady, but not increasing, availability of NSF funds; increasing, but indirect, access to DOE funds (supporting particle astrophysics); and little access to NASA funds.

As our anchor agency, NSF strongly encourages NOAO to promote public education, understanding, and support of astronomy. NSF also values diversity in the workforce of its

centers, and NOAO thus needs to match its scientific and technical staff to the profile of the nation's graduate schools and colleges.

ACTIONS

As top priorities, NOAO will:

- Implement the O/IR initiatives of the decadal survey; importantly, establish firm partnerships for the GSMT, and LSST, leading to construction starts before 2010.
- Make the NOAO Gemini Science Center the exemplar of Gemini partner offices.
- Play a lead role in the NVO by operating an O/IR ground-based node that meets or exceeds international virtual observatory standards.

NOAO will also:

- Working with AURA members, independent observatories, and appropriate partners, develop a long range plan and evolve the O/IR system into an integrated national observing system, and set the User Support standards for observatories in the System, so as to become the gateway for a US and international system for merit-based proposals.
- Restructure NOAO to create a shared infrastructure support organization to serve Gemini, TMT, LSST, etc within the national observatory.
- Focus with highest priority on facilities of scale. Retire or devolve from NOAO productive facilities that are not fully the state of the art as fast as new facilities are created.
- Include a user grants program in proposals for new facilities.
- Develop the concepts for new facilities that will seed the next decadal survey, e.g. a 10 km baseline interferometer array, a global network of telescopes for full time domain coverage, South Pole telescopes.
- Work with the community to achieve a robust national instrumentation capability.
- Become the national leader in astronomy education.
- Exploit scientific synergies with NASA missions invigorated by the exploration vision, especially facilities complementary to TPF and dark energy probes.
- Explore U.S interest in an international meta-observatory.

METRICS

Evaluate our strategy:

- The schedule for new facilities in the decadal survey
- Usage and scope of the O/IR node of the NVO

Things we will track:

- The number and scope of facilities making up the US observing system.
- Large telescope productivity exceeding the citation rates of NOAO's 4-meter telescopes by the end of the decade.
- Impact on the next AASC decadal survey in 2010 in the form of
 - recognition of NOAO's system approach
 - a high priority for NOAO's concepts for new O/IR facilities
- Production of new state of the art instruments for telescopes in the US system.

- Numbers of students and teachers involved in NOAO's education programs, numbers of visitors to our observatories, and media impact of discoveries made using the US observing system.

NATIONAL SOLAR OBSERVATORY

MISSION AND ROLES

The mission of the National Solar Observatory to exercise *“leadership in solar physics and related space, geophysical, and astrophysical science research and education by providing access to unique and complementary research facilities as well as innovative programs in research and education.”*

CUSTOMER

As the National Observatory for Solar Astronomy, the NSO serves *“The science community and the public on behalf of the National Science Foundation as the primary funding agency, with contributions from NASA, DOD, and other US agencies.”*

CONTEXT

Funding environment – The funding and budget contexts are characterized by strong competition for project and operational resources at the NSF; the conduct of multiyear operations and projects in the context of annual budget allocations; and, the enhanced support needed for increasingly complex and sophisticated operations. These challenges, which are not unique to the NSO, also offer opportunities for the NSO to lead proposals to provide new scientific capabilities for the conduct of forefront research with the support and collaboration of its community.

Scientific community environment – The establishment of new foreign and domestic facilities dedicated to advancing our knowledge of the Sun is a positive development for the field of solar physics, space and geosciences and other closely related fields. The NSO encourages and supports these additions to the public and private capabilities in solar physics. The NSO further responds by adding complementary capabilities in solar astrophysics that are not within the plans or scope of other programs but are highly desired by the scientific community.

Strategic strengths of the current NSO – A key strength of the NSO is its scientific staff that engages in frontier research, actively and visibly participates in the community, develops advanced instrumentation, participates in educational outreach, and establishes new initiatives. Of equal importance is community confidence in the NSO as expressed in the Decadal Survey’s endorsement of the NSO organization and its proposed initiatives. A further strength is that, as a federally funded research and educational institution, the NSO is able to provide leadership, continuity and stability for the conduct of long-term programs and projects that are a scientifically necessary component of solar and solar-terrestrial research. Finally, the interdisciplinary nature of, and multi-agency participation in, solar astrophysics enables the formation of productive partnerships with the NSO that result in a stronger and broader-based program.

The needs of stakeholders other than the primary customer – The NSO must be responsive to the solar/space weather community in addition to the solar/astronomy community. NSO receives funds from other agencies that include funding for co-located

scientists. This synergism enables a broader range of science in the NSO than would otherwise be possible. The NSO must be sensitive to the requirements of its partners and ensure that their objectives are compatible with the NSO mission. The NSO must also be sensitive to the quality of the scientific environment of its staff that, in turn, contributes to the quality of its interactions with the community.

NSO has developed a strong and vital student program for undergraduate students and a limited number of graduate students. The student program enables participants to gain experience in hands-on solar research. The NSO has recently added high school teachers to its educational program. It also conducts K-12 outreach programs as well as outreach to the general public.

ACTIONS AND TOP LEVEL GOALS

As top priorities, NSO will:

- Develop and operate the Advanced Technology Solar Telescope (ATST) as the premier ground-based facility for high-resolution studies of solar magnetism and dynamics in the solar atmosphere.
- Engage the national and international community in developing a three-station SOLIS network.
- Develop an NSO structure that effectively operates new capabilities, consolidates the scientific staff, and supports the research community.
- Use the opportunities provided by ATST, SOLIS, the enhanced GONG network, the new AO and IR capabilities to promote strong university/student basis for solar physics.

NSO will also:

- Take a leadership role in developing a community wide road map for ground-based solar facilities and work closely with NASA to link space-based and ground-based assets to maximize their synergy for advancing understanding of the Sun. Conduct a series of community workshops to discuss operation of current facilities and the development and operation of new facilities.
- Increase the diversity of the NSO by recruiting minority and female candidates for openings as they occur.
- Create positions for one or two theorists on the NSO staff.
- Through the development and operation of enhanced and new observing capabilities, provide the space weather community with the data needed to monitor, model, and understand solar activity and variability.
- Partner with NASA and universities in the development of a Virtual Solar Observatory (VSO) that provides community access to all aspects of solar data.
- Continue NSO scientific and instrumentation leadership by balancing staff responsibilities, increasing staff opportunities for research and postdoctoral support, developing strong university collaborations, and strengthening partnerships with other solar organizations. Develop and strengthen connections with the university community of researchers and educators in solar physics; assist them in strengthening their programs through participation in the NSO program of research, education, and the implementation of new scientific capabilities.

- Maintain and upgrade existing facilities as needed to ensure continued scientific productivity until future equivalent assets (i.e., ATST) are in place.
- Through discussions with the funding agencies, proposals for new opportunities, and shared efforts with other solar groups, increase the NSO budget to sustain and enhance its operations and programs supporting the solar and space science community.

METRICS

- Bring the ATST on line with full operational support by 2014.
- The establishment of a solar road map for public accessible facilities by 2007.
- The establishment of a better balance of scientists' service, project, and research responsibilities, leading to a measurable (through publications, talks, citations) increase in the scientific productivity of the NSO.
- Upgrade the DST and McMP by 2006 to provide state-of-the-art high-resolution and IR observing capabilities until supplanted by the ATST.
- The establishment of a synoptic network giving 24-hour coverage of solar activity and variability by combining SOLIS and ISOON capabilities by 2010. The formation of a national and international partnership to extend SOLIS to three sites by 2007. Combine SOLIS, GONG and other network operations into a unified NSO network operations management structure by 2008.
- The establishment of the VSO and inclusion of NSO data and archives by 2008, including near-real-time GONG and SOLIS science products.
- Obtain and encourage the commitment of universities and funding agencies to substantially increase the number of new solar astronomer positions with a provisional goal of 20-40 new positions by 2015.
- Obtain an increase in the NSO operational budget by 25% over the next four years and by 50% in the ATST era.

SPACE TELESCOPE SCIENCE INSTITUTE

MISSION AND ROLES

The mission of the Space Telescope Science Institute is “*to enable excellence in astronomical research by optimizing the science from state-of-the-art observational instruments in space.*”

CUSTOMER

The primary customer for STScI is “*NASA as influenced by the astronomical community and the public.*”

CONTEXT

Funding changes or limitations - HST’s lifetime is limited. JWST as planned will require about half the staff to support it as HST. There are no other missions on NASA’s planning horizon with the same scope of HST, although there are several under consideration that are similar in scope to JWST (e.g. TPF-C). NASA’s current paradigm for science operations centers is to keep them small so that resources can be focused on other aspects of NASA’s program.

External factors or trends affecting future levels of spending by funding agencies

- NASA is shifting its strategic focus to “exploration,” mostly of the solar system. This shift is widely perceived as a shift away from the astronomical science that STScI supports.
- The NASA astronomy program has no present plan for a future major UV/optical observatory.
- The United States is running a large budget deficit that will put downward pressure on the discretionary part of the budget, which includes NASA funding.

Government requirements and the organization’s desire to meet the needs of stakeholders other than the primary customer.

- Public education and stimulation of student interest in science, engineering and mathematics are high priorities of government programs.
- Government places a high priority on developing and fairly employing a diverse national workforce.

ACTIONS

- Institutional base (retention, enhancement, or acquisition of missions that support substantial fractions of the Institute’s workforce.)

Goal 1: Maintain HST as the world's leading observatory at least until JWST operations begin.

With its unique spatial resolution, wavelength coverage, and low background, the Hubble Space Telescope has been a revolutionary instrument for astronomical research. Astronomers have applied its broad range of capabilities to explore the entire gamut of astrophysical problems, from study of nearby planets to the origin and nature of the Universe. In doing so, they have driven our knowledge of our Universe forward in countless ways. Central factors in the enormous scientific productivity of Hubble have been the regular upgrades to instrument technology and the longevity of the telescope afforded by servicing. Guided by the recommendations of the scientific community, the STScI will be an advocate for servicing of Hubble, especially for the installation of already developed instruments. The scientific products of Hubble and its user community will increase with the length of the mission. Notwithstanding the goal of additional servicing, the STScI will continue to work with the Hubble Project at GSFC to develop techniques to extend the lifetime of the telescope. The STScI will also work closely with NASA and the astronomy community to optimize the scientific program over the remainder of the mission. In order to accomplish these goals effectively, the STScI will develop and implement plans that cover the transition from the Hubble operational era to the archival era. In doing this, we will coordinate our plans with the Hubble Project at GSFC, and respond formally with proposals necessary to extend the STScI contract.

Objectives for Goal 1:

- Advocate for Hubble servicing as supported by NASA and the NRC (Lanzerotti report)
- Enhance the scientific impact of HST by extending its operational lifetime
- Plan post-servicing and post-operational HST work to guide new development decisions
- Create AURA proposal for next HST contract

Goal 2: Ensure that JWST meets its science goals.

The James Webb Space Telescope will be a powerful observatory. It will exceed the grasp and resolution of the Hubble and Spitzer telescopes by orders of magnitude in the near and mid infra-red, the spectral regions where the birth of stars and galaxies will be found. Selected by NASA to be the JWST Science and Operations Center (S&OC), the STScI is responsible for managing the JWST science program and developing and operating the science and mission operations systems. Because of its extensive experience with Hubble servicing missions and the development of state-of-the-art instrumentation, the STScI also provides support to NASA, the instrument development teams, and the other mission partners in the areas of science systems engineering, operations and optimizing science productivity. To meet JWST's technical and scientific requirements under a cost-constrained budget and tight schedule, the STScI will utilize Hubble experience and adopt the best and most relevant Hubble systems and development processes.

As an AURA center, the STScI champions the broad interests of astronomical fields and communities. The STScI works with NASA, the instrument teams, the Science Working Group and the astronomy community to identify and protect the highest priority science capabilities for the S&OC and the Observatory. In the next three years, the STScI will begin development of the S&OC systems and will prepare for the JWST mission and S&OC Preliminary Design Reviews (PDR), the Non Advocate Review (NAR), and the Critical Design Reviews (CDR). Along the way, we will communicate the excitement and reality of the mission to the astronomy community and the public. Community and public support will be crucial elements to ensuring the successful completion of the JWST mission.

Objectives for Goal 2:

- Develop JWST operations systems that ensure productive use of the observatory for its science goals
- Build public support for JWST through coordinated approaches to the community, NASA, & the public

Goal 3: Compete to be the S&OC for the next major UVOIR mission(s).

The STScI has demonstrated the value of a science-led Institute by maximizing and broadly disseminating the knowledge gleaned from the Hubble Space Telescope. This performance was the rationale for selecting STScI as the S&OC for the James Webb Space Telescope. Our science mission operations experience and expertise are clearly recognized as major assets to UVOIR space missions. We have established a strong connection to and understanding of the needs of the UVOIR astronomy community and are thus in a good position to be representative of these interests to NASA as it develops its astrophysics roadmap for the next decade. The Institute will work actively with the community and NASA to define the next generation of large UVOIR space astronomy facilities. Two relevant strategic opportunities now present themselves. First, NASA's Navigator Program includes the Terrestrial Planet Finder Coronagraph (TPF-C) mission – an 8m-class optical telescope, designed to detect and characterize terrestrial planets that will also support an excellent general astrophysics program in addition to its core mission. The S&OC for TPF-C will be competed within the next 2 years and the STScI will enter that competition with full conviction to win it, beginning with the rapid establishment of an internal proposal team. Second, the Joint Dark Energy Mission (JDEM) includes a number of OIR telescope concepts that promise to provide key breakthroughs in cosmology and early universe studies. We will work with NASA (and other government funding agencies) and the astronomical community to position ourselves for a JDEM science operations role.

Objectives for Goal 3:

- Work with NASA on TPF-C mission definition
- Create proposal team and support to bid for the TPF-C S&OC
- Work with NASA and the community on definition of other large UVOIR missions

Goal 4: Make OPO a national center for education and outreach in astronomy.

In part because of the efforts of the Office of Public Outreach, Hubble is a household name. The media discuss not simply results from, but also the future of, HST very frequently, and a large percentage of all schools display HST images. However, past successes are no guarantee of future performance. In particular, outreach efforts for HST now face a variety of new challenges. An obvious one is, of course, the uncertain future of the mission itself. Equally profound challenges are present in the form of an entirely new level of competition for resources and public attention not present a decade ago. For example, there are now two other Great Observatories on orbit, and NASA is making major (multi-million dollar) investments in space science EPO at other forums, such as the Navigator program at JPL. The schedule of JWST development, although perhaps rapid by space science standards, still implies a lengthy interval until media-worthy science results begin to arrive, and thus presents an outreach challenge in the interim. Finally, other entities with ambitions to national prominence in space science EPO, such as the Rose Center, are rapidly strengthening their external programs.

Other external changes and challenges are also driving the evolution of OPO activities. It is becoming increasingly clear that there are significant underserved populations in science outreach, for example, and we must make targeted efforts to reach this population. The increasing prevalence of the internet in the lives of all Americans has multiple consequences for almost all OPO activities, and we must continue and accelerate our evolution from last century's distribution media to electronic methods. Finally, a recent and very significant reorganization of science at NASA HQ, to be echoed shortly at GSFC, combines space and Earth science activities, and opens new opportunities for OPO to broaden its work, using the infrastructure and international recognition that we have nurtured for years.

Objectives for Goal 4:

- Maintain rate of engaging science results from Hubble in the media
 - Expand the cross-section of the American public that we reach
 - Provide resources and tools across multiple NASA missions to support teaching of science, technology, engineering, and mathematics
- **Competitiveness (ways we carry out our work or acquisition of special work that improves the likelihood of enhancing our institutional base):**

Goal 5: Decrease costs at STScI while preserving the scientific and technical excellence that gives us a competitive advantage for mission support.

While we operate a unique facility in HST, we are no longer unique in the support we provide to NASA and the science community. Other institutions and organizations have come on the scene performing similar functions, and have established operations that cost less while providing varying levels of service. They have been driven to do this by the reduced size of the operations budgets NASA has given them. Even though we were awarded a sole-source contract, we experienced

this same cost pressure ourselves in our negotiations with NASA to develop the Science and Operations Center for JWST. Such budget pressure is a reality we must anticipate in future competitions for other contracts or in seeking a new contract to continue to operate HST. We must therefore examine our management, development and science operations processes and decision making to maintain a high quality scientific program while operating for less cost. We must have visibility into the true costs of providing our services, the ability to determine the sensitivity of both cost and benefit to modifications of those services, and capitalize on the synergy from operating HST, JWST and other smaller missions.

Objectives for Goal 5:

- Improve STScI processes to comply with all major mission performance, cost, & schedule requirements
- Use full cost evaluations of our work to guide strategic choices of the systems and services we will support and the evolution of those systems and services
- Coordinate HST and JWST best practices and investments to optimize work across both missions

Goal 6: Support community-led astronomy programs that enhance our core competencies & contributions.

Small to moderate-sized community missions derive many benefits from STScI participation. The science mission operations knowledge base that resides within the staff at STScI spans the full range of space-based astronomy mission life-cycle activities. Our staff have an in-depth understanding of the scientific and technical challenges that face a mission from pre-phase A through post-phase E. Furthermore, the incremental cost to support a new astronomy mission by augmenting our existing software and hardware infrastructure is typically far lower than the cost of developing it anew. By using our experience and our infrastructure, new mission teams can meet their science and technical requirements more efficiently and less expensively than beginning from scratch. STScI should thus strive to provide our expertise and experience to those astronomy missions that can make ready use of them. To remain at the cutting edge, STScI is most interested in new missions that explore new fields of study and push existing technological and scientific limits. One particular area in which STScI has excelled is the processing and archiving of large volumes of data and the development and design of user-friendly interfaces to these information reservoirs. We aim to be a key node for the operational facility of the National Virtual Observatory by virtue of our leadership and innovation in the generation, storage, organization, and analysis of large data volumes from multiple UV/optical/NIR missions.

Objectives for Goal 6:

- Make STScI a leader of the NVO operational facility
- Reduce costs for small mission support by leveraging our expertise and infrastructure
- Seek partnerships on community projects that focus on key scientific and technological areas relevant to large astronomy programs

METRICS

Evaluate our strategy:

- Scientific impact of missions: #papers, citations, Davidson metric, etc.
- Success at winning proposals for NASA's UVOIR space observatories
- Contributions to JWST, as measured by size & scope of contract
- Quality of services (users supported, data delivery, small mission support) relative to competitors
- Cost of services relative to competitors.

Track and maintain:

- Performance evaluations by NASA
- Performance of E/PO programs relative to competitors
- Quality & skill mix of staff