by Henry Roe

STAC Report

The recently formed Science and Technology Advisory Committee (STAC) held its second meeting in Hilo, Hawai'i, and set a course for instrument development, planning, and other important issues impacting Gemini's scientific potential. This report by the committee's chair, Henry Roe, shares the meeting's highlights including a vision for future instrumentation development.

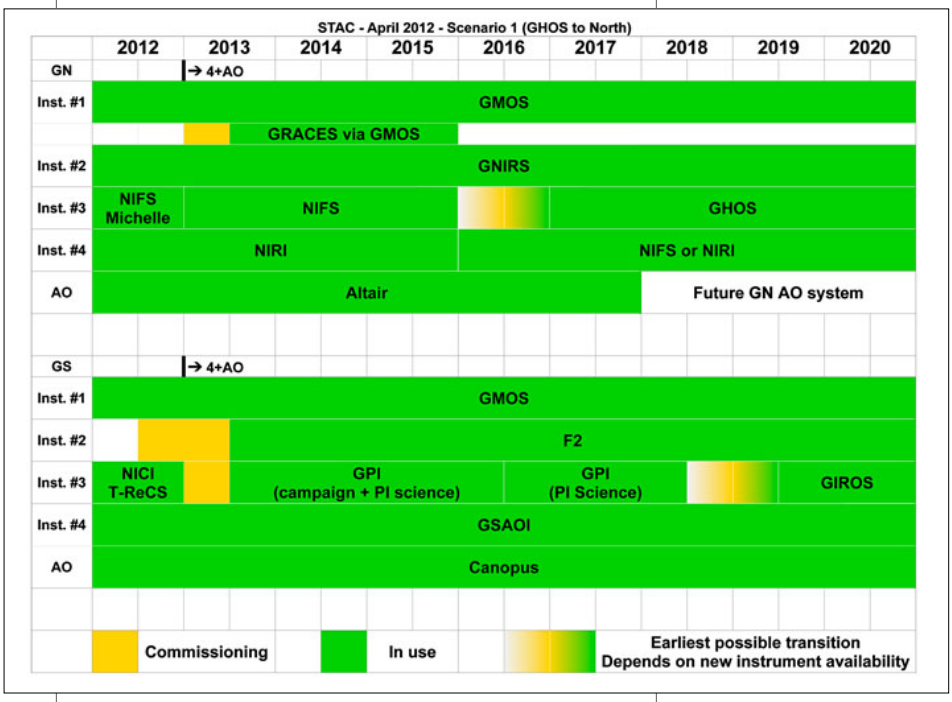
Gemini's Science & Technology Advisory Committee (STAC) (www.gemini.edu/science/#stac) held its second in-person meeting on April 24-25, 2012, at the Hilo Base Facility. By the time this newsletter is published, the meeting report should be publicly released. As you may recall from the previous *Gemini*Focus, the STAC is a recently formed committee that is appointed by the Gemini Board to advise the Board on scientific priorities across the observatory, including instrumentation, operations, facility development, and long-range planning. In making its recommendations, the STAC is focused on scientific productivity, user demand from partner communities, and using its best judgement as to what capabilities will be most productive and demanded in the future. All of the STAC's decision making and planning must take into account the current fiscal era, with the U.K. withdrawal and uncertainties in future availability of instrumentation funding from partners.

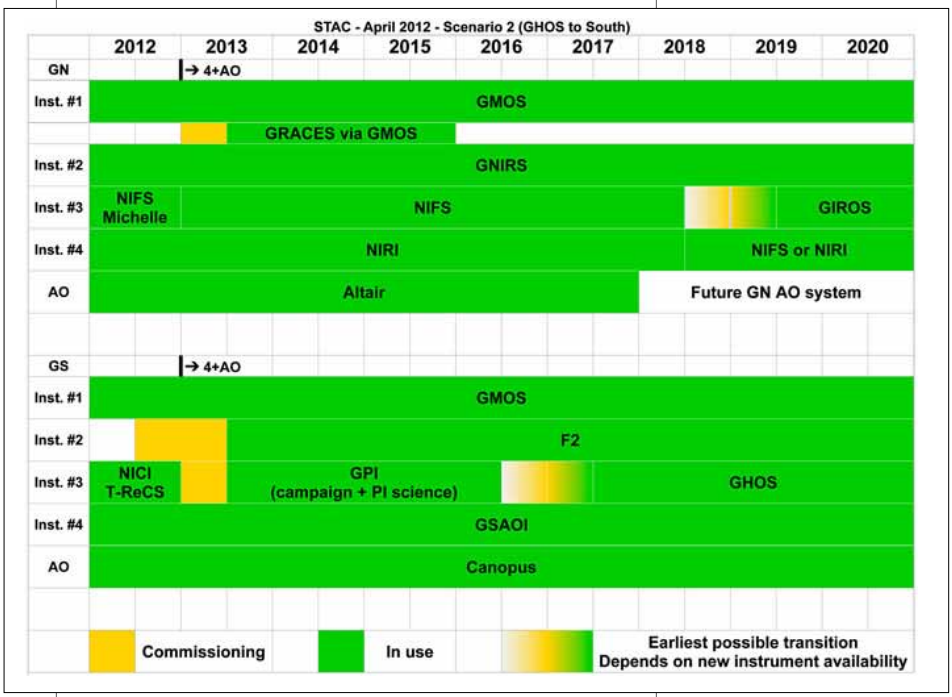
With the U.K. withdrawal, and subsequent decreased budget, Gemini Observatory is undergoing significant change. This includes moving, by the end of 2012B, to the "4+AO" operations model in which only four instruments and one adaptive optics system are supported at each telescope. This restriction comes from estimates of the staffing required to support and maintain each instrument. Instruments will still need to be swapped on-and-off the telescope, as the current configuration allows only three instruments to be simultaneously co-mounted on each telescope. In order to attain 4+AO by the start of 2013 the STAC recommended that the MICHELLE mid-infrared imager and spectrometer, and, as already planned, the Thermal-Region Camera Spectrograph (T-ReCS) be retired at the end of 2012B. Further, the STAC recommended that that the Near-Infrared Coronagraphic Imager (NICI) be retired once the Gemini Planet Imager (GPI) is ready for commissioning. These were difficult recommendations as they eliminate,

at least for now, the ability to do mid-infrared observations from either Gemini site. However, within the constraints of the 4+AO operations model, the STAC judged the Gemini Multi-Object Spectrograph (GMOS, plus the GRACES fiber feed), Gemini Near-Infrared Spectrometer (GNIRS), Near-infrared Integral-Field Spectrograph (NIFS), and Near-infrared Imager and Spectrometer (NIRI) in the North and GMOS, FLAMINGOS-2, GPI, and Gemini South Adaptive Optics Imager (GSAOI) in the South as the instruments that will have the highest science impact and most demand from the partner communities.

One consequence of the current tight budget predictions is that the observatory, STAC, and community all should be looking for creative new ways of using existing resources. An excellent example of this is the newly-commissioned Laser Guide Star (LGS) mode (LGS+P1) on Gemini North (see: www.gemini.edu/sciops/instruments/altair/lgs-p1-quotsuper-seeingquot-mode).

The STAC has begun working on draft instrumentation scenarios based on coming decisions. Shown here are two example scenarios that highlight some of the potential follow-on impacts of the hemisphere decision for GHOS. More details of these scenarios are available in the STAC's most recent meeting report.





The earlier Altair-LGS system was limited in its sky coverage by the need for a bright enough star to fall within the tip-tilt sensor's modest patrol field and therefore many targets could not be observed because of the lack of a near enough tip-tilt star. In LGS+P1 the peripheral wavefront sensor (PWFS1 or P1) with its much wider patrol field is used to observe a tip-tilt star, thus enabling nearly 100 percent sky coverage with LGS. This capability significantly expands the targets possible with Altair and is expected to be particularly useful for programs using NIFS. Another example is the possibility of commissioning a mode using GMOS-S behind the Canopus Multi-Conjugate Adaptive Op-

tics (MCAO) bench. While observations would be limited to wavelengths > ~ 850 nanometers (nm), the correction achieved across the field of GMOS is very impressive (see: *http://www.gemini.edu/sciops/instruments/gems/gems-news*).

The STAC has also been considering mid- and longer-term instrumentation plans. The next new instrument to be built for Gemini is planned to be the Gemini High-resolution Optical Spectrograph (GHOS). Currently three teams are working on Conceptual Design Studies and a down-select was held in late May to decide which team(s) will be funded to proceed with work on a preliminary design. Depending on the design, GHOS may be available for commissioning as soon as 2016.

The STAC has begun discussing the scientific justifications for deciding whether GHOS is best mounted in the North or the South and has generated two strawman instrument scenarios based on whether GHOS goes North or South (see Figure 1). An additional factor in this decision is the impact on other instrumentation under the 4 + AO model — to install GHOS requires removing an instrument from that site. The decision of which hemisphere to place GHOS will need to be made by late 2013 or early 2014.

The funding for GHOS and other future instruments and upgrades comes from the Instrument Development Fund (IDF), which is funded on a best-effort basis by the partners. Thus, there is uncertainty regarding how much instrumentation funding will be available over the remainder of the decade. This uncertainty factors into the STAC's discussions and requires a careful balance to ensure that the observatory achieves as much as possible of the ambitions of its user community, but also does not embark on projects it does not have a high probability of completing. In the 2012-2020 timeframe, the IDF can likely fund 1-2 instruments beyond GHOS and several upgrades to existing instruments.

Given the uncertainty in how much of the IDF will be required for GHOS and the limited number of new instruments that can be built in the near future, the STAC is carefully considering what the next instrument capability after GHOS should be and gathering input from a variety of sources, including the recent white papers submissions.

Looking further out to 2020-2025, the STAC is developing its input to Gemini's long-range planning process. Toward this long-range planning, the STAC is developing a list of the key questions that need to be answered and a timeline of when decisions will need to be made concerning new instrumentation, upgrades to existing instrumentation, and future instrument retirements.

The goal of the STAC is to give as much lead-time notification to the community of when and how a decision will be made as possible. The STAC wants to ensure that the community has as much time as possible to give input on pending decisions and avoid (as much as possible) situations where users are surprised by decisions, such as the retirement of an instrument with little or no advance notice.

The STAC itself takes input from a variety of sources, including community surveys, solicited and unsolicited white papers, meetings such as the upcoming Gemini Science & User Meeting (*www.gemini.edu/gsm12*), and individual discussions with community members like you. I encourage you to contact your STAC representative or myself with comments and questions. Your input is important for the STAC to hear. The STAC's next biannual meeting will be October 29-30, 2012, with members participating from both the Hilo and La Serena Base Facilities.

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