

**REPORT OF GEMINI'S SCIENCE & TECHNOLOGY ADVISORY COMMITTEE (STAC)
MAY 2012**

The STAC held its second meeting on 24-25 April 2012 in Hilo.

STAC Membership

Lydia Cidale (by polycom)
Tim Davidge (in person)
Alastair Edge (by polycom)
Karl Glazebrook - Deputy Chair (in person)
Paulina Lira (by polycom)
Thomas Matheson (in person)
Jennifer Patience (not attending)
Henry Roe - Chair (in person)
Alice Shapley (by polycom)
Nathan Smith (in person)
Alan Stockton (in person)
Thaisa Storchi-Bergmann (in person)
Kim Venn (in person)

Preface

The priority of the STAC is the scientific productivity of Gemini Observatory in the near-, mid-, and long-term time-frames. This concern for scientific productivity dominates the STAC's discussions and guides the STAC's decision-making process. The full potential productivity of Gemini Observatory is best realized when its partner communities are deeply and fully engaged and the broad needs of these communities are met as thoroughly as possible. Instrumentation is the top priority of all communities in the Gemini partnership. The Instrument Development Fund, separate from Operations & Maintenance, and with regular funding, is welcome. The commitment of \$4.8M (USD) per year on a best effort basis from the partners to the IDF will enable upgrades to several existing instruments and 2-3 major new facility instruments by 2020. Should the best-effort contributions fall short of that goal, then instrument plans will have to be scaled back. The STAC recognizes that it must make its plans within these budget constraints and have contingency options for if the available funding is less than projected. An additional constraint is the move to the 4+AO operations model that allows support for only four instruments per site. In spite of these budget and resource restrictions the STAC sees great opportunities for increasing the scientific productivity of the Observatory through greater engagement of users and clever uses of existing resources.

Gemini Director

2.1 The STAC thanks Fred Chaffee for his leadership of the observatory over the past year, especially in pushing forward projects that provide new capabilities to observers such as the interim E2V GMOS CCDs.

2.2 The STAC welcomes Markus Kissler-Patig to the Directorship and looks forward to working with him.

Impact of 4+AO transition plan on science

The transition plan for the Observatory in preparation for the UK departure includes moving to an operational model of four instruments and one facility adaptive optics (AO) system per telescope by the end of the 2012B semester. This restriction on number of instruments is driven by the financial and personnel costs of supporting instrumentation. (While each Cassegrain cube has 5 ports, only 3 are available for instrumentation as the GCAL units and AO systems (ALTAIR & GeMS) each require their own ports. Thus even with 4 instruments per site, instrument swaps remain part of the operational model.) In preparation for 2013 the 4+AO model has forced the STAC to make difficult choices, discussed elsewhere in this report, and may in the future force instruments to be retired before their scientific potential has been adequately exploited. Further, in a strict 4+AO model the STAC believes that in order to maximize scientific productivity all instruments must be more general purpose work-horse instruments and that the observatory will likely be forced to forgo scientific opportunities presented by more niche instruments.

2.3 While the STAC accepts that current fiscal realities restrict the observatory to only supporting 4 facility instruments per site, the STAC notes with concern that this will limit the Observatory's opportunities to exploit scientific opportunities presented by more niche-type instrumentation.

2.4 As the transition plan is accomplished and the resource requirements needed to support the decreased instrumentation of 4+AO are better understood, the STAC recommends the Observatory and Board remain open and flexible to additional instrumentation opportunities that do not require long-term commitment of resources and/or can exploit scientific niches that cannot be achieved with existing facility-class instruments.

Implementation of 4+AO transition plan

Cutting back instrumentation to achieve the 4+AO model at the end of 2012B has been one of the challenging issues facing the STAC during its first seven months in existence. The intent 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 timeline of the formation of the STAC in late 2011 and the need for a decision on instrument retirements by early 2012 is forcing the STAC to recommend retirement of instruments without as much lead-time notification to the community as would be preferred. In the future 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

The STAC recommends two potential scenarios for the instrument suite for the near- and mid-term future. Both scenarios are identical in the near-term and differ primarily on which hemisphere is chosen for GHOS. Additional comments on the future choice of hemisphere for GHOS and other aspects of the decisions that went into these scenarios are contained in other sections throughout this report.

2.5 In order to comply with the 4+AO model of the transition plan, the STAC recommends that Michelle and T-ReCS be retired at the end of 2012B.

2.6 The STAC further recommends that NICI be kept in use until GPI is ready for commissioning and then be retired at that time.

NIRI

The STAC highly values near-infrared imaging capability on Gemini North and considers it a fundamental capability that should be available to the Gemini communities. The STAC discussed several possible avenues for maintaining this capability and decided that maintaining NIRI as an imager is the most economical option and covers the most science cases. In response to STAC Recommendation 1.21 the Observatory presented the STAC with a report (“The future of NIRI”) on a range of options for maintaining a near-infrared imaging capability with NIRI. The STAC is recommending a course of action to maintain the current imaging capability of NIRI, which includes: abandoning NIRI’s spectroscopic capability, refurbishing cryo-mechanisms necessary for imaging, and improving noise performance and downtime to faults by replacing the detector controller. If a more modern better detector can be secured at a reasonable price, the STAC will recommend upgrading the detector, but that is a lower priority. The intention of the STAC is that NIRI be revitalized to be a reliable facility instrument for at least 3-5 more years and potentially another decade. The STAC is not recommending a more significant upgrade of NIRI’s optics or other components that might enable a wider field of view or other capabilities, as those options would cost significantly more time, money, and effort.

2.7 The STAC requests a more detailed analysis of the costs (both money and effort) and time needed to refurbish NIRI’s mechanisms, upgrade its detector controller, and possibly replace its detector. (This package falls between Options 3 and 4 of “The Future of NIRI” report to the STAC.)

Michelle & T-ReCS

The STAC discussed at length the future of Gemini’s current two mid-infrared instruments (Michelle in the North & T-ReCS in the South). The STAC discussed numerous possible scenarios for keeping one of the two instruments available. The STAC considered both the past landscape of Gemini mid-infrared science with these two instruments and their scientific productivity in recent years as well as how their capability on Gemini fits into a future including ALMA, JWST, University of Tokyo Atacama Observatory (TAO), and other projects.

2.8 The STAC regretfully recommends that Michelle be retired at the end of 2012B. In the stark reality of the 4+AO operations model the STAC judged GMOS, GNIRS, NIFS, and NIRI as the four instruments that will have the highest science impact and most demand from the partner communities.

2.9 The STAC regretfully concurs with the already-planned retirement of T-ReCS from Gemini South at the end of 2012. The STAC applauds the observatory’s efforts to complete in 2012B rolled over Band-1 programs on T-ReCS from earlier semesters. While the STAC foresees significant science opportunities for T-ReCS over the next few years if it were to be maintained in the South, especially to complement ALMA observations, in the stark reality of the 4+AO operations model the STAC judged GMOS, F2, GPI, and GSAOI as the four instruments that will have the highest science impact and most demand from the partner communities.

Future of AO on Gemini-North

2.10 The STAC reiterates its statement from November 2011 that it strongly values having AO capability at Gemini North as part of its vision for 2020 and beyond. The

STAC recognizes that a replacement for the current Altair system (even with the planned near-term upgrades) will be needed on that timescale. The STAC looks forward to receiving input from the June AO workshop in Victoria, BC. The STAC is particularly keen to be presented with a range of options, both in price and capability. Options to be considered might include better single object AO for existing and future instruments, replicating MCAO from the South, or a plan by which a GLAO system could be accomplished within the current budget forecasts. What capabilities can be achieved at \$5M, \$10M, \$15M (USD)? Gemini's instrumentation budget through 2015 is \$4.8mil (USD) per year on a best-effort basis and the STAC has been instructed not to plan for increases to that in the second half of the decade. Given the restrictions of the 4+AO operations model of the transition plan and the total amount of funding available for new and upgraded instruments, any new AO system will necessarily be a general-purpose system able to satisfy a wide variety of science cases and community needs. The STAC is open to creative options, such as further significant upgrades of ALTAIR or identifying other funding sources than Gemini's Instrument Development Fund. STAC Chair Henry Roe will attend the GNAO workshop.

Observer Eavesdropping

The STAC received an observatory report ("Remote Eavesdropping Model") on how user eavesdropping on their queue observations could be implemented to engage users more closely with observing and provide real-time input, such as assisting with difficult acquisitions or deciding on whether sufficient signal-to-noise has been achieved.

2.11 The STAC is strongly supportive of moving forward with eavesdropping. The STAC recommends that a subset of 2012B programs be identified as potential test-cases for an initial eavesdropping system. The criteria for programs in this initial test should include that PI's are experienced Gemini users in Bands 1 or 2.

Remote Observing

There is a strong consensus amongst the STAC that users want and will benefit from the ability to perform classical observations from remote non-Gemini sites.

2.12 The STAC requests the Observatory prepare a report for its next meeting laying out a path to providing remote observing for classical observers, including identifying the challenges to offering this capability and suggesting what the minimum requirements should be of remote users.

Classical Observing

The STAC discussed the costs and benefits of classical vs. queue observing. Currently approximately 10% of observing time is performed in the classical mode. The STAC would support the percentage of classical time increasing to 20-30% of total time if warranted by user demand. At percentages $>\sim 30\%$ the STAC would need to revisit the issue and consider the impact on queue operations and science output. The sense of the STAC is that classical observing is an important activity for the observatory as it leads to greater user engagement and understanding of how the observatory operates. Not only will this also increase face-to-face interactions between Gemini staff and users, but classical users also have more flexibility in tuning observations and target lists to match observing conditions in real time. The STAC is

supportive of efforts to encourage increased user demand for classical observing. Meanwhile, queue operations remain important for ToO (although rapid ToOs are allowed on classical nights) and time domain science and is an important attraction to existing and potential partners.

2.13 The STAC recommends that to maximize scientific productivity the Observatory be as flexible as possible when working with classical observers, particularly with regard to backup programs and target selection.

Flamingos-2

The STAC reviewed the status of F2 after the optics failure. The estimate is that the recovery from this failure adds roughly 1 year to the schedule, with SV expected in 2013Q1.

2.14 The STAC endorses the Observatory's plan for recovery and re-design. While the STAC is keen to see F2 available for science as soon as possible, it is also concerned that the repairs and redesign address the issues fully and mitigate the risk of a similar lens failure in the future. As the redesign plans develop the STAC encourages the Observatory to continue to bring in outside expertise to review the plans.

GHOS

The STAC was updated on progress of the three teams and the plans for the down select committee to meet in May. The STAC began discussing science reasons for deciding between the northern and southern hemisphere for GHOS and found compelling reasons in both directions. The STAC understands that a hemisphere decision is needed at least a year before an instrument is ready to ship, particularly as some designs would require significant site preparation. The STAC will further discuss the tradeoffs between hemispheres at its October 2012 meeting. Under the constraints of 4+AO this tradeoff must consider both the science justification for GHOS in each hemisphere and also consider the implications on other instruments.

2.15 The STAC reaffirms its recommendation to have an external independent cost analysis.

2.16 Once the GHOS down-select has occurred the STAC is keen to understand the projected cost and timeline of the down-selected team(s) as these have significant impact on when the next instrument post-GHOS could be started.

2.17 At its October 2012 meeting the STAC will review the science rationale for placing GHOS in the North vs. South, as well as the follow-on implications to science with other instruments under such a decision.

GPI

The STAC was updated on the status of GPI with delivery planned to Gemini South in 2013Q1. While the GPI campaign team should receive some form of target protection, the STAC sees significant science potential on other targets and topics and wants to ensure that GPI science impact is maximized through PI programs as well as the campaign.

2.18 The STAC encourages the Observatory to advertise as widely as possible that GPI will be available for PI science. Based on the good community response with targets for the GeMS pre-SV observing runs, the STAC recommends a similar community call for targets for GPI pre-SV and proceed with a fully public SV as soon as possible during commissioning. The intent is to provide data to users as

soon as possible to help them understand the capability and begin to plan their PI science proposals.

2.19 In working through instrumentation scenarios the STAC has maintained a minimum of 6 semesters of GPI operations to fulfill the requirements of the campaign. The STAC is concerned that the 4+AO operations model may force the removal of GPI before it has fulfilled a significant fraction of its scientific potential and will be closely monitoring user demand and scientific output.

GeMS pre-Science Verification Targets

Earlier in 2012 the Observatory and STAC recognized that GeMS+GSAOI would not be ready for Science Verification observations before southern winter. Progress on commissioning GeMS was promising enough that the STAC recommended that the Observatory solicit pre-SV targets from the community for use during commissioning runs. The strong response from the community (27 proposals with 38 targets) is indicative of the high community interest in this new capability. Data from these observations will have no proprietary period and will be made available to all users for evaluating performance and planning future observations.

2.20 The STAC applauds the Observatory for being flexible in attempting to engage the community as early as possible in the commissioning project. The STAC sees great value in having users involved during early commissioning and distributing data publicly as soon as possible for the community to evaluate and understand the new capability. This pre-SV model should be considered for all future commissioning.

GMOS CCD

The STAC received a report on the current status of the Hamamatsu CCD project for GMOS. The STAC's concern remains maximizing the time-integrated QE of the instruments, i.e. upgrading as soon as possible, but understands that resource limitations and conflicts are slowing the project. Current Observatory plans are to install Hamamatsu CCDs in GMOS-N in February 2013 after the GNIRS shutdown and repair. GMOS-S would then be upgraded as soon as possible following GMOS-N, although depending on F2 repair and commissioning progress it may be necessary to delay the GMOS-S upgrade until F2 and/or GPI can use significant amounts of telescope time.

2.21 The STAC endorses the current GMOS CCD plan, however encourages the Observatory to continue to pursue avenues that might bring this highly desired upgraded capability to users sooner, especially in the South.

GeMS + GMOS

Due to a cooling failure on GSAOI during the March GeMS commissioning run the Observatory used GMOS-S as an optical wavelength imager behind the GeMS AO system. This is not a mode of operations originally considered, but the results were impressive, converting 0.7" natural seeing to 0.23" seeing across the entire field of view. Due to the dichroic in GeMS observations on GMOS are limited to $>0.8 \mu\text{m}$ allowing observations in only three filters (i, z, CaIII). Even with the dichroic limitation the STAC sees the potential for a unique capability and interesting science (e.g. imaging of redshifted galaxies) using GMOS-S behind GeMS in both imaging and IFU modes. The STAC recognizes that some of the necessary software development is most efficiently done at the same time as F2+GeMS software is developed and that the

sensitivity of such a mode will be greatly increased once the new Hamamatsu CCDs are installed in GMOS-S.

2.22 The STAC applauds the Observatory for its flexibility in deciding to use GMOS in order to keep moving the GeMS commissioning forward and exploring ways in which existing resources could be used in new ways to provide unique and exciting capabilities to users.

2.23 The STAC provisionally recommends the Observatory pursue commissioning of GeMS+GMOS once GeMS is commissioned and functioning reliably. To assist with further decision-making the STAC requests a more thorough study of the expected sensitivity of GMOS-S behind GeMS.

GRACES

The STAC continues to be enthusiastic about this project and applauds the Observatory for flexibility in offering this highly desired capability to the community as soon as possible. In 2013A GRACES should be offered in a limited 'stage 1' mode leading to full inclusion in the 2013B call for proposals. Once on-sky performance is characterized the STAC will lead a mid-2013 assessment of GRACES. The STAC's current understanding is that GRACES should be available to Gemini users for at least two years and that the primary limitation to the lifetime of GRACES is when ESPaDOnS is retired and replaced by SPIRou at CFHT. The STAC views the soon-to-be-available public pipeline (OPERA) for ESPaDOnS/GRACES data as very important to scientific productivity, however any delays in the availability of this pipeline to users should not be allowed to hold back commissioning the capability and providing data to users.

2.24 The STAC endorses the Observatory's plan to bring this capability to Users as soon as possible, even though it means offering the instrument in the 2013B Call-for-proposals before the performance is fully characterized. The STAC recommends the Observatory solicit community input on to targets to be observed during commissioning with the goal of engaging users and providing example data to users as soon as possible. Because of the timing of the commissioning and the desire to involve the community as soon as possible, the STAC views the inclusion of time during commissioning for observing community suggested targets, in a similar manner as the pre-SV GeMS observations, as very important. With the inclusion of these community suggested targets in the commissioning, the STAC endorses the request for 5 nights of GRACES commissioning.

2.25 The STAC requests more details of the GRACES vs. HIRES trade study that was completed before the project was initiated as part of the input to its mid-2013 assessment of GRACES.

SPIRou

The STAC reviewed a report on the CFHT instrument SpectroPolarimètre Infra-Rouge (SPIRou) currently under development. SPIRou is a fiber-fed near-infrared high-resolution spectro-polarimeter designed for precision radial velocity measurements. SPIRou is potentially of interest to the Gemini community because it is fiber-fed and could potentially be fed by a long fiber in the same form as GRACES. While the design of SPIRou is not yet finalized, given the requirement for high stability, fiber swaps would likely be much more troublesome than with GRACES. Further, based on SPIRou's current design as presented to the STAC any fiber-feed

on the Gemini side would be significantly more complicated than the modifications to GMOS-N to feed GRACES.

2.26 While near-infrared high-resolution spectroscopy is a desirable capability, given the reality of limited current development resources and the operational model of 4+AO in the future, the STAC recommends not pursuing the possibility of a Gemini fiber feed to SPIRou at this time. However, this issue might be re-visited after the observatory and user community gains experience with GRACES, and assuming that there are no technical impediments.

ALTAIR LGS+P1 Mode

The STAC received a report on the new LGS+P1 mode on ALTAIR and anticipates this should lead to increasing user demand for NIFS as all-sky LGS coverage will now be available. The mode was included in the 2012B call for proposals.

2.27 The STAC commends the observatory for commissioning the new PWFS tip/tilt star mode for use with LGS on ALTAIR, which significantly increase the available sky coverage. This is a mode not originally envisioned in the design of the system, but that significantly expands the capabilities available to users.

2.28 The STAC recommends advertising the capabilities of this mode as widely as possible, including publishing more detailed performance numbers, such as encircled energy, to assist users in planning observations.

GCAL-2 as part of A&G-2

A possibility with the A&G-2 project is that the calibration unit could be incorporated into the new instrument cube, rather than occupying one of the 5 ports.

2.29 The STAC is strongly supportive of exploring whether a GCAL-2 could be incorporated within the A&G-2 units, thus freeing an additional instrument port. This would allow all four instruments at a site to be mounted and available on the telescope simultaneously, enabling an “every instrument available every night” mode of operations.

Detector Controllers

The Observatory has an ongoing project to simplify the number of different types of detector controllers at the observatory that the STAC endorsed at its November 2011 meeting. Because the personnel needed for this project are currently working on the Hamamatsu CCD upgrade and F2 detector the current project plan proposes to deliver the first controller in 2014A.

Especially given the unreliability and unavailability of spare parts for NIRI's controller the STAC is concerned about the risk of losing NIRI (or GNIRS) to a controller failure during the next two years.

2.30 The STAC requests a more detailed analysis on the risk of failure in the NIRI and GNIRS controller and recommends the development of a contingency plan if a failure occurs in the detector controller of one of these workhorse instruments.

2.31 The STAC recommends the Observatory seek additional outside expertise to help move either the Detector Controller project or GMOS Hamamatsu CCD project forward in order to enable acquiring new detector controllers for NIRI and GNIRS sooner than 2014. If outside help cannot be borrowed or purchased to accelerate the timeline to new detector controllers, then the Observatory should

consult with the STAC to determine which project (GMOS CCD upgrades vs. Detector Controller) has a higher priority.

Visitor Instruments

The Observatory currently has no formal policy on visitor instruments. An important concern is that visitor instruments not be allowed to significantly derail resources from other Observatory priorities. The issue arose at the STAC meeting because of a current proposal to bring a speckle camera to Gemini for an observing run to follow-up Kepler targets. The Observatory judged this to be an unusual case because of the very modest resources required to support the instrument (1-2 days of summit crew) and potential high science impact. The STAC discussed this particular case and was supportive of this one-time decision, although had concerns that if the instrument is on the telescope more than once access should be made available to the community.

2.32 The STAC requests the Observatory keep the Chair informed of the status of the current Speckle Camera project. The STAC will meet by telecon if it is necessary to review the project or make specific recommendations ahead of its October 2012 meeting. If the Speckle Camera is assigned time then the STAC requests a summary of the Gemini resources that were required to get the instrument operational.

2.33 More generally the STAC will draft a basic policy document for Visitor Instruments to guide future decision-making, with the goal of finalizing and approving the policy at its October 2012 meeting.

Data Cookbooks & Pipelines

The STAC views data cookbooks and reduction pipelines as separate, though related, issues. The STAC is concerned that the lack of these tools, particularly cookbooks, is a significant hindrance to new and less-experienced users and is impeding scientific productivity. The STAC believes that making cookbooks and reduction pipelines available to users will be transformational and enable a significant increase in scientific output.

2.34 The STAC encourages the Observatory to take a pragmatic approach to the development of cookbooks and pipelines. Releasing 'quick-and-dirty' cookbooks that are refined and updated over time is a better approach than delaying release until much more thorough versions are perfected. Based on experiences at other observatories the STAC encourages the Observatory to utilize the expertise and enthusiasm of its users, e.g. some of the best data cookbooks have been written or significantly improved by non-staff graduate students and postdocs.

2.35 The STAC views data reduction pipelines as a separate issue that should be considered on a case-by-case basis with instrument. In some cases a 'quicklook' reduction is all that is necessary as most users will use other tools for their final data reduction, while in other more complicated data cases a full pipeline is necessary to enable science for most users. However, again, the STAC recommends a 'quick-and-dirty' approach whenever possible; Better to release a tool sooner and find that users need additional refinements or extensions than to take much longer to build in every possible function and discover that only a fraction of the functionality is useful to most users.

Time Exchanges & Partnerships

The STAC invited Naruhisa Takato (Manager of the Development Group at Subaru) to speak with the STAC about Subaru's future instrumentation plans. The STAC discussed the current Subaru time exchange program, which is limited only by demand from both sides and typically results in ~5 nights/semester.

2.36 As a first step towards strengthening the Subaru-Gemini relationship, the STAC intends to invite a Subaru representative -- recommended by the Subaru Directorate -- to attend future STAC meetings as an observer. The Gemini Director could explore ways to see if this could be reciprocated (ie. a STAC or Gemini representative attending Subaru meetings as an observer).

2.37 The STAC sees Subaru and Gemini Observatories as having complementary strengths and capabilities. The STAC desires to continue to build the Subaru-Gemini relationship and intends to invite a Subaru representative to attend future STAC meetings.

2.38 The STAC encourages the Observatory and Board to consider other time-exchange and partnership programs as opportunities arise.

Gemini Science & User Meeting

The STAC received an update on plans for the GSM meeting and discussed its plans for using the meeting to communicate with the community and gather input. Most STAC members intend to be at the meeting. In addition to a session on the coming capabilities of GRACES & GHOS, the STAC intends to hold three roughly 1-1.5 hour panel discussion sessions that notionally will focus on the following topics:

1. What is Gemini's role as it enters middle-age and the at the dawn of the era of 30-m telescopes? Is the analogy between 4-m and 8-10m telescopes the right model to look to for how Gemini can adapt? Or, does some different model apply better?
2. What capabilities are needed to take scientific advantage of the existing and coming flood of survey data? How can Gemini best position itself to maximize its scientific productivity in the era of massive surveys?
3. What should be the future of AO on Gemini North? This will include a report from the GNAO June Workshop.

The preference of the STAC is to spread these sessions across multiple days.

2.39 The STAC will refine these three topics and generate further questions and discussion points to be distributed to attendees well in advance. The STAC will communicate with the SOC to figure out how best to schedule these sessions.

Large Programs

The STAC again discussed how to encourage and enable more Large Programs, with the sense that a healthy, scientifically productive system for Large Programs could use ~20-30% of the available telescope time. Large projects are possible currently either through multiple allocations from different partners or via the NOAO Survey TAC, which has an open-skies policy. However, the sense of the STAC is that the Observatory is not currently achieving its full scientific potential in the area of Large Programs and that additional options should be explored by the STAC, Board, and new Director over the next 6-12 months.

Input to the STAC

The STAC discussed methods for gathering input on promising technologies, possible instrument upgrades, desired new capabilities, etc.. The STAC would like to establish a regular system of input, perhaps via short proposals solicited from the community every 1-2 years that could lead to the funding of a few modest ($\leq \$100K$) design studies.

2.40 The STAC will discuss with the Board and new Director how such a system might be implemented and hopes the first round of these could be started in 2013.

GNOSIS

The STAC received a report on the Australian project to develop an OH-suppressing fiber feed unit using Fiber Bragg gratings to selectively suppress OH emission lines across J- and H-bands, achieving higher signal-to-noise and/or spectra of fainter targets. While there are no current definitive plans for installing such a unit on Gemini, the STAC views this as a promising technology and is interested in continuing to monitor its development and scientific potential.

GIROS

The modest number of white papers received on the GIROS concept did not generate a consensus as to the desired capability requirements and raised a variety of excellent questions that need to be addressed both in defining the next (post-GHOS) instrument and in the STAC's long range planning process. The STAC greatly appreciates the input from the authors who did submit papers.

2.41 The STAC thanks all of the authors who submitted White Papers.

Given a variety of factors, the STAC is not prepared to recommend moving forward with the GIROS concept at this time. Aside from the low number of white papers and lack of consensus, these include concerns that the costs of GHOS is not yet well enough understood, which may delay when funding is available for the next post-GHOS instrument. Additionally, with the funding limitations that only 1-2 post-GHOS instruments are likely to be constructed by the end of the decade and the arrival of a new Director, it seems appropriate to the STAC to delay committing to the next instrument until further discussions with the new Director.

2.42 The STAC will discuss with the Board an anticipated timeline for defining the next post-GHOS instrument, taking into account the uncertainty in the timeline and costs of GHOS and other ongoing instrumentation projects (e.g. F2 repairs).

One of the concepts that emerged from the STAC's GIROS discussions was of retrofitting in a dichroic beamsplitter into the current A&G to acquire simultaneous broadband capability envisioned for GIROS. The STAC recognizes that there are astronomical targets where obtaining simultaneous visible and near-IR spectra would be highly desirable. The STAC discussed an earlier report from the Observatory concerning the possibility of replacing the fold mirror in one A&G unit with a dichroic, which could enable simultaneous multi-band capability (e.g. optical spectroscopy on GMOS simultaneously with near-infrared spectroscopy on GNIRS). Even if a dichroic could be fitted to the A&G the STAC recognizes that this is not an entirely satisfactory solution to achieving the capability envisioned for GIROS as two different grating settings are required in GMOS to cover the full wavelength range effectively and the resolution of GNIRS when covering the J-K is only 1000 with typical slit widths. We note that a potential problem is that instruments may not be well enough aligned when mounted on the A&G to permit a single source to fall on the slit of two instruments at the same time. However, this is not an issue because GMOS can take light any where over its 5.5 arcmin field of view. A single mask (or suite of

masks) can be cut for the GMOSs with the slit positioned at the point on the focal plane that allows the entrance of either GNIRS or F2 to be fed.

2.43 The STAC recommends the Observatory investigate further the possibility of retrofitting a dichroic into one of the existing A&G units. The STAC requests a report for its October 2012 meeting on the feasibility, predicted performance, and estimated costs of this possible upgrade. Questions that arise during this work may directed to Alan Stockton and Henry Roe.

Long Range Planning Process

Developing input to an Observatory Long Range Plan is one of top priorities of the STAC. The expected funding available for instrumentation will at best enable 2-3 new facility instruments (including GHOS) and modest refurbishments to a few existing instruments by 2020. Thus, by necessity many of the current existing instruments will still be in use in 2020 and beyond. In terms of a Long Range Plan the STAC must focus on what capabilities will be most widely desired by the partner communities and will be most scientifically productive. With such limited instrumentation resources every new instrument must be a facility workhorse able to serve a broad swath of community needs and provide the basic tools the community needs to address new scientific topics as they arise. The STAC firmly believes that community satisfaction correlates well, though not perfectly, with scientific productivity. However, current user demand for specific observing capabilities does not always correlate well with what users will want and need 5-10 years in the future. The community and the STAC must be forward looking and use their best judgement as to what the most important capabilities will be in the future. Some of the questions the STAC is working to answer are:

- * What is Gemini's role as it enters middle-age and the at the dawn of the era of 30-m telescopes? Is the analogy between 4-m and 8-10m telescopes the right model to look to for how Gemini can adapt? Or, does some different model apply better?
- * In which ways can Gemini best contribute and compete scientifically with respect to other major new capabilities expected to come online in the next decade? (e.g. JWST, ALMA, LSST)
- * What will be the most important capabilities to follow up on and take advantage of the existing and ever-increasing flood of survey data?
- * Which of the existing (or soon-to-be-commissioned) capabilities are most important to maintain to 2020 and beyond? Can modest upgrades significantly extend these capabilities in useful ways?
- * Given the limited resources for new instrumentation and recognizing the long lead times involved with constructing new facility instruments, what are the most important and promising capabilities to bring to the community via the 2-3 new potential new facility instruments?
- * How can Gemini best be flexible and creative, leveraging the intellectual capital of its communities, to realize additional value from existing resources (e.g. commissioning GeMS +GMOS) or with modest investments (e.g. the possible dichroic option)?
- * On the timescale of a decade, technological advances are often easier to predict than scientific advances. What technical advances are likely to come to fruition in the next decade that could enable new and desirable parameter space?
- * How can the Observatory be most responsive and flexible to the changing landscape of user needs and technical innovations? How is community input best continuously gathered and synthesized on topics from large future facility instrument construction projects to more modest near-term upgrades?

The STAC has begun to discuss these questions internally and intends to gather community input via a variety of channels, including:

- * Reviewing the numerous surveys and studies the partner communities have conducted over recent years.
- * The June Gemini North AO workshop is expected to help define the broadly desired AO capabilities at Gemini North, as well as examine in depth options at price points that may be achievable given the limited instrumentation budget.
- * As discussed elsewhere, the STAC will lead several focused discussion sessions during the July Gemini Science & User Meeting.
- * The STAC welcomes unsolicited White Papers addressing any of the above questions.

The STAC is also developing a timeline of events, decisions, and contingencies to guide its decision making process in the future and help ensure that the community is informed of pending decisions and has ample opportunity to comment. It is the intention of the STAC to focus on long-range planning at its October 2012 meeting, discuss its preliminary recommendations with the Board at the November 2012 meeting, and finalize its recommendations by early 2013.

Science Time 2013A

2.44 The STAC endorses the observatory proposed science time goals and minimums for 2013A. While the observatory does not anticipate that on-sky engineering time will be a limiting factor in commissioning F2 and GPI, if on-sky engineering time does become the limiting resource for commissioning these new instruments the STAC would support using more on-sky time to commission these instruments as soon as possible and make them available to the community for science.

Project Priorities

The STAC was asked to consider priorities amongst projects given expected or potential resource conflicts.

2.45 F2 vs. GPI commissioning: While the STAC places a high priority on the commissioning of both of these instruments, if a resource conflict occurs the STAC recommends that F2 should take priority because of its workhorse nature, and broader community appeal. Also, because it has been delayed, there is a sense of urgency that has built up in the user community. However, if on-sky time is the limiting resource, the committee encourages increasing the amount of engineering time available in order to bring both projects to fruition as soon as possible.

2.46 GNIRS repairs vs. GMOS CCD upgrades: While the STAC places a high priority on both of these projects, concern about the uncertain level of risk to GNIRS leads the STAC to place a higher priority on repairing GNIRS.

2.47 GRACES commissioning vs. GMOS-N CCD upgrades: The observatory suggested that there may be some minor interferences of the order of a few weeks between these two projects. If the delay is to be only of a few weeks, the STAC recommends that GMOS-N CCD upgrades take priority in order not to delay the highly-desired and new-capability-enabling GMOS-S CCD upgrade to occur as soon as possible.

Future STAC Meetings

The STAC will convene by telecon as necessary and intends to hold a brief in-person meeting during the July Gemini Science & User Meeting. The next full in-person STAC meeting will be 29-30 October 2012 in Hilo at Gemini North HQ to precede the Board's meeting (14-16 November 2012 in La Serena). To ease travel burdens a subset of the committee may join the meeting by polycom from La Serena. If NGOs are agreeable, at some point in the future the STAC might consider holding some of its meetings at NGO sites.