Gemini Science Committee (GSC) Report October 2008

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2 Membership and Conflicts of Interest

(Institutional conflicts of interest listed in brackets after the names)

Simon Morris, Chair (WFMOS, GLAO, GMOS, GNIRS)
Timothy C. Beers (None)
Nancy A. Levenson (None)
Christopher C. Packham (Flamingos 2, HRNIRS, T-ReCS)
Henry G. Roe (None)
Suzie Ramsey-Howatt (None, attending by Phone)
Ross J. Mclure (WFMOS, attending by Phone)
Rene Doyon (GPI, F2T2)
Chris Willott (GSA, GLAO, GMOS, Flamingos 2, Altair, GPI)
Scott Croom (None)
Basilio Santiago (None)
Alan Stockton (GLAO, NICI, NIRI)
Simon Casassus (None)

2.1 Attending from OpsWG

Verne Smith (WFMOS, Flamingos 2, NICI, GNIRS)

2.2 Attending from GAOSWG

Richard Myers (WFMOS, GLAO, GMOS, GNIRS)

2.3 Attending from Gemini

Dennis Crabtree
Jean-Rene Roy
Doug Simons
Joe Jensen
Inger Jorgensen

3 Matters Arising from the Oct 2007 Reports

The three main areas requiring careful tracking from these previous reports are:

1. Current priorities for Instrument and Telescope commissioning and improvements
2. Progress on the Aspen Program
3. User Issues

All of these topic areas have explicit sections dedicated to them in the report below. In those sections, the relevant text from the above report has been inserted, along with information on the progress since the time of the report.

As part of the GSC routine business, it receives copies of the Gemini Board Resolutions since the previous GSC meeting. It was noted that the set of resolutions the GSC received did not include any mention of the PRVS cancellation.

4 Scientific Productivity

As usual, an analysis of the publication statistics for Gemini compared with other 8m class telescopes was discussed. The GSC was pleased to see the continued rise in the numbers of papers being written per year using Gemini data. The highly cited papers using Gemini data were also considered. During the discussion of this issue, ways of encouraging more ‘large’ programs

on Gemini which feature heavily in that list were debated. Changes in the TAC process to move it closer to the HST or ESO model might achieve this goal.

There was a discussion of the oversubscription rate. Scaling the factor reported to better account for the time available (roughly speaking amounting to dividing the previous number by 0.6) obviously made the numbers look better, but the GSC suggested that perhaps both the scaled and unscaled numbers should be given.

5 Current priorities for Instrument and Telescope Commissioning and Improvements

The GSC received a complete report on the status of the Gemini instruments. For tracking purposes, the GSC recommendations for all years from 2006 onwards are kept below.

5.1 Scientific priorities at Gemini from Oct 2006 GSC Discussions

The recommendation from the Oct 2006 GSC report is given below. It was well known at the time these priorities were set that many of them could take more than one year to complete. *(Notes from the Oct 2007 meeting are given after each point in italics)*

5.1.1 Oct 2006 Gemini North Priorities

- Red CCDs for GMOS N. The GSC still holds to a specification of 'competitive with FORS2' *(A plan for purchase of LBNL CCDs was presented, that would meet this specification. See below for Oct 2007 recommendation)*
- ALTAIR LGS
    - With NIFS (and NIRI with PSF variable) – option for no field lens larger TT sky coverage *(NIFS is now available with the LGS. Operating without the field lens is not possible.)*
    - Larger FOV for TT with field lens (goal to get comparable sky coverage to Keck LGS) (*A plan for achieving many of the goals below was presented. See below for Oct 2007 recommendation)*
    - Improve the operational elevation from ≥ 59 deg to ≥ 30 deg *(This has been improved to ≥ 40 deg, and is considered acceptable given the considerable effort needed to improve the limit beyond 40 deg.)*
    - Goal of comparable IQ to Keck LGS *(It was noted that identical performance to the KECK LGS system was not possible, due to differences in system architecture and primary mirror size. However, IQ improvements with the LGS were being implemented.)*
- Blind offset ability for GN (and GS) – GMOS high priority *(This was said to be close to deliverable.)*
- MICHELLE *(A report was received on this, but none of the requested improvements have been completed.)*
    - Eliminate image elongation which is impacting science output
    - Dual beam chopping/guiding
    - Increase chop throw to 30"

- Spectropolarimetry

GN Footnotes:

The initial TEXES results look encouraging. If we have lost the current opportunity due to earthquake, the GSC would like Gemini to investigate bringing it back after IRTF. *(This was done – TEXES started a 13 night observing run on 19 Nov 2007.)*

5.1.2 Oct 2006 Gemini South Priorities

- NICI *(A report was received on this; the new DM has substantially improved the NICI performance. Commissioning was in progress)*
  - Commissioning
  - System Verification
  - Start of science campaign
- FLAMINGOS 2 *(A report was received on this; acceptance Testing at U. Florida is expected in April 2008)*
  - Commissioning
  - System Verification
  - Demo science
- MCAO *(A report was received on this; including a tour of the Canopus bench in the labs in La Serena; Laser delivery is expected April 2008)*
  - System Verification
  - GSAOI
  - Flamingos-2
  - MCAO science operation readiness
- Red CCDs for GMOS S . The GSC still holds to a specification of 'competitive with FORS2'. NB First priority for red CCDs is GMOS N. *(A plan for purchase of LBNL CCDs was presented, that would meet this specification. See below for Oct 2007 recommendation)*
- Blind offset ability for GS – GMOS, GNIRS high priority *(This was said to be close to deliverable.)*

GS Footnotes

A NICI DM upgrade path may be important to free up good seeing nights for MCAO, but may need on sky data and some analysis of possible queue building before making a decision. *(See above)*

5.1.3 Oct 2006 General Footnotes

- The Subaru MOIRCS trade is also very important
- The GSC supports the Gemini directorate in its continued investigation of further exchanges of time.
- The GSC noted the Keck trade barrier around Keck 2 (Deimos), but agreed that an option for access to LRIS blue was worth further investigation.

(The issue of time trades was discussed, with the GSC continuing to endorse the Director's efforts to expand this program.)

5.2 Scientific priorities at Gemini from Oct 2007 GSC Discussions

The numbers (=X) are an attempt to generate a merged ranking for all the listed upgrades across telescopes. There are some tied ranks. The ranking process was based primarily on scientific priority with minimal consideration of expected timing and/or resources required, as obviously the GSC does not have all the detailed information (or skills, or time) needed to produce a fully resourced plan. The GSC recognizes that without careful balancing of resource loading, this list expresses a science based ordering, and that it should not be strictly executed in the order of priority presented.

It is recognized that many of the items on this list will take more than 1 year to deliver. *(Notes from the Oct 2008 meeting are given after each point in italics)*

5.2.1 Either Telescope

- Red CCDs for GMOS. The GSC still holds to a specification of 'competitive with FORS2'. The LBNL CCDs described would seem to meet this specification, although the GSC requested some more details on pixel size, readout noise and fringing, which it would be happy to comment on by email as soon as this information is available) (=2) (not N specific any more) .

The loss of blue sensitivity was discussed, with a consensus being reached that, although some science cases could indeed be seriously impacted, the gains would likely be worth the losses overall. The GSC requested more information about the number of GMOS proposal that exploit the existing blue sensitivity so that we can evaluate the number of proposals that would be affected.

There was also a discussion of which GMOS to prioritize for red CCDs. While there was support from many of the GSC to get red CCDs in the South (in particular given the concerns about the current oversubscription rates), it was recognized that it would be foolish to take GMOS S off before replacement workhorse instruments, benefiting from dark time, are available in the South.

Mixed solutions with some blue and some red sensitive CCDs were also considered, but an all LBNL red combination was recommended. *(A paper with detailed information on red CCD options was presented. The GSC recommendation is presented in the Oct 2008 discussion below)*

- Blind offset ability for GN (and GS) – GMOS high priority (nearly done, hence not ranked, but below correction of the MICHELLE image elongation problem) *(This has not yet been implemented, and is re-discussed in the Oct 2008 discussion below)*

5.2.2 Gemini North

- GNIRS fix (=1) *(While there has been some slippage in schedule, it was reported that GNIRS would be on the telescope in March/April 2009)*
- ALTAIR LGS (=3)

    - Larger FOV for TT with field lens (goal to get comparable sky coverage to Keck LGS)
    - Comparable setup time/efficiency/reliability
    - (Goal of comparable IQ to Keck LGS – this is deliberately somewhat vague.)
    - *(The FOV issue is related to implementation of OIWFS within the various AO fed instruments, and is discussed further in the Oct 2008 section. LGS reliability was flagged as a possible concern.)*
- MICHELLE
    - Eliminate image elongation which is impacting science output (The GSC was informed that there was ongoing work on this, but that it will take time to get a solution as the work needs on sky time) (=5) (This would be a very high priority if it does not delay MCAO significantly.) *(This problem has been fixed)*
    - Dual beam chopping/guiding (also a desire to replicate to TRECS on GS) (=6) *(This has not yet been done)*
    - Increase chop throw to 30" (also a desire to replicate to TRECS on GS) (=6) *(This has not yet been done)*
    - Spectropolarimetry (=7) *(This has not yet been done)*

5.2.3 Gemini South

- NICI (=1) *(The GSC received a report on NICI status, and a report from the PFSW. This is discussed in a separate section below)*
    - Commissioning
    - System Verification
    - Start of science campaign
- FLAMINGOS-2 (=2) *(While there has been some slippage in schedule, it was reported that Flamingos 2 would be on the telescope by the end of Feb 2009)*
    - Commissioning
    - System Verification
- MCAO (=4) *(Now renamed GeMS. There has been some slippage in LGS delivery, which probably moves it on to the critical path. The GSC also received a report from the GAOSWG, which is discussed further below)*
    - System Verification
    - GSAOI
    - Flamingos-2

5.3 Scientific priorities at Gemini from Oct 2008 GSC Discussions

The numbers (=X) are an attempt to generate a merged ranking for all the listed upgrades across telescopes. There are some tied ranks. The ranking process was based primarily on scientific priority with minimal consideration of expected timing and/or resources required, as obviously the GSC does not have all the detailed information (or skills, or time) needed to produce a fully resourced plan. The GSC recognizes that without careful balancing of resource loading, this list expresses a science based ordering, and that it should not be strictly executed in the order of priority presented.

It is recognized that many of the items on this list will take more than 1 year to deliver.

5.3.1 Either Telescope

- Red CCDs for GMOS. (=2 for North, =3 for South) Based on the information given the GSC supported the recommendations at the end of the document provided. The Hamamatsu devices with good blue sensitivity seemed the most attractive option. It was noted that for applications with high spatial and spectral sampling (e.g. IFU data), it would be good to confirm the readout noise did not seriously compromise the gains from improved quantum efficiency.

- Blind offset ability for GN (and GS) – GMOS (=5), GNIRS (=4)
- During the discussions, the issue of GPOL was raised. It was concluded that there without a strong scientific champion and updated science case it was not possible to support any work in this area.

5.3.2 Gemini North

- GNIRS fix (=1)
- ALTAIR LGS (=3)
    - Larger FOV for TT with field lens (goal to get comparable sky coverage to Keck LGS) (=9 – this has become a long term project, requiring an upgrade to the instrument OIWFS. The GAOSWG offered a further analysis of the gains expected, and the ranking should be revisited when this is available)
    - Error budget analysis for Altair/LGS performance leading to action plan (=3)
    - Investigate operation with no TT (=3)
- MICHELLE
    - Dual beam chopping/guiding (also a desire to replicate to TRECS on GS) (=6)
    - Increase chop throw to 30" (also a desire to replicate to TRECS on GS) (=7)
    - Spectropolarimetry (=8)

5.3.3 Gemini South

- NICI (=1)
    - Campaign start – need to start by Jan 09.
    - See below for discussion
- FLAMINGOS-2 (=2)
    - Commissioning
    - System Verification
- MCAO (=3)
    - System Verification
    - GSAOI
    - Flamingos-2

5.3.4 NICI Campaign

A very clear and helpful report was received from the PFSWG. Their recommendation could be paraphrased as asking the NICI campaign team to revisit their observing strategy given the relatively poor performance of NICI at separations greater than 1 arcsec, with no go-ahead until this has been reviewed (by the PFSWG). The GSC agreed with the recommendation.

Also given the GAOSWG concerns about resources for MCAO (see below), the GSC recommends that the NICI campaign should start as soon as possible (January 2009), and the Observatory should try not to let this pull significant further resource away from the higher (medium term) priority MCAO project.

5.3.5 GAOSWG Short Term Recommendations

An equally helpful and informative report was received from the GAOSWG. This contained advice on both the short and long term priorities for Gemini AO. The short term recommendations for Gemini North focused on the need for a proper error budget analysis for Altair/LGS in order to better understand how improvements could be achieved. The GSC agrees with this advice.

The GAOSWG expressed concerns about the resource levels for MCAO, and noted a possible resource conflict with NICI. For that reason they recommended a start for the NICI campaign as soon as possible, with an implied freeing of resource to focus on MCAO. The GSC agrees with this recommendation.

6 Progress on the Aspen Program

The GSC received a report on the status of the Aspen instrument program. The GSC was sad to hear of the cancellation of PRVS. There have been no changes to the GSC recommendations from April 2007.

The GSC strongly urges the rapid pursuit of the remaining Aspen instruments and their associated contracts.

6.1 GAOSWG Longer Term Recommendations

The GAOSWG presented two alternative models for the long term development of AO at Gemini. The more ambitious plan includes most of the original Aspen GLAO idea, with an updated timescale and indeed a possibility of going beyond GLAO to MOAO. The GSC welcomed this plan, and recommends its consideration by the Gemini Director and Board. Due to the timescales involved, this also overlaps with the Gemini Long Range Plan (see below).

7 User Issues

The GSC received a report on science operations and a summary of User Issues from the OpsWG. For tracking purposes, the User Issues for all years from 2006 onwards are kept below.

7.1 User Issues from 2006 (received from the OpsWG)

The October 2006 list of User issues collected by the OpsWG is given below, *(with updates on progress with these issues from Dennis Crabtree appended in italics)*.

- Oversubscription is not high and falling in several partners *(The subscription rate at Gemini South is of concern, especially with the loss of GNIRS. The loan of Phoenix from NOAO helps attract proposals from some partners, but the offered instruments (GMOS, T-ReCS and Phoenix) do not appear to be of sufficient interest in some partners. In fact, Gemini South time is undersubscribed by two partners for 2008A. The concerns about low subscription rates at Gemini South will likely remain until Flamingos-2 and/or MCAO are available to the community. We have encouraged the NGOs to advertise the lower subscription rates at GS to draw out proposals from the community. This is also an opportunity for larger programs. This far, these efforts seem to have had little, if any, impact.)*
    - End of semester web pages with completion statistics
    - Less confusing Phase-II skeletons
    - Better advertising of Phase-II libraries within the skeleton
- Phase-II skeletons are not useful *(It has been said that the current Phase II skeletons which are distributed to successful PIs are not particularly useful. Their only advantage is that the target information is included from the Phase I proposal. (Especially true for programs with a large number of targets). The current skeletons actually lead to Phase II errors as new users think they are an indication of how to structure a program. New templates are in production. The steps we are taking to improve the Phase II 'experience' for users include:*
    - *update the Phase II checks, such that the PI has an option to not continue to show warnings if they have been shown once, and to allow the NGO contact scientist to turn-off errors.*
    - *allow easier access to the OT libraries.*
    - *add a step called "In Review" to indicate a phase in which the NGO contact is reviewing observations and the PI cannot access and change these observations during the "In Review" process.*
    - *institute "Smart GCAL" observations into the OT.*
    - *continue to improve the Skeletons/Templates, with emphasis on the actual sequences of the observations as organizational folders.)*
    - Investigate short and long term possibilities for including the OT libraries as part of the Phase-II skeleton
    - Improve the guide star selection algorithm in Phase-I, which feeds into the Phase-II skeleton
- Users are finding data reduction difficult *(Many users are experiencing difficulties in reducing Gemini data. This is due to the finicky nature of some of the reduction software, lack of good documentation and graduate students not receiving support from their supervisors. The Gemini Data Flow Project is meant to solve many of these problems.)*
    - Not discussed in detail. Some issues within remit of DRWG.
    - Discussion between Gemini staff (DRWG) and NGOs required.
- Web pages are out of date. Information is hard to find *(There is common agreement that the Gemini web pages are not well organized, are to interlinked and contain incomplete, out of date or incorrect information. We are finishing the first phase of a total makeover of Gemini Science Operations web pages. Phase I focused on the instrument pages as these are the pages deemed to be most useful. The instrument pages are better organized, easier to navigate and the information has been edited and corrected as necessary. The*

new web pages are in a content management system which will make maintenance much easier.)

- A two stage plan to improve the web pages is in progress
- Led by Gemini (Rachel Mason) with effort from Gemini and NGOs
- Stage 1: remove conflicting and confusing information
- Stage 2: migrate to new content management system for improved navigation

7.2 User Issues from 2007 (received from the OpsWG)

(with updates on progress with these issues appended in italics)

- Blind Offsets on both Gemini-N and –S. At the October 2007 Gemini Science Committee meeting this item was discussed and was noted by Gemini staff to be "close to deliverable". *(This is not yet available – see the GSC short term recommendations list for further discussion)*

- GMOS mask making without pre-imaging. This was implied to be ready in the 2008A Call for Proposals. This is now possible, though not recommended for all programs, but details can be found at:
  http://www.gemini.edu/sciops/instruments/gmos/gmosHotNews.html
  with the details of MOS mask design using object catalogs at:
  http://www.gemini.edu/sciops/instruments/gmos/gmosMOScat.html
  This should be noted to the community.

- Create an informal webpage/forum for data reduction scripts plus tips/tricks. *(No update reported)*

- Improve the AO tools and webpages. No clear progress so far on this one, but was one of the highest-ranked requests from the U.S. SAC in October 2007. This is all part of the general feeling that the users want a fully operational/capable LGS system on Gemini-N. *(See discussion listed under GSC short term priorities above)*

- Improvements in the Phase II skeletons or OT libraries. This was discussed at the OpsWG as a high priority item. *(This was reported as mostly done)*

- Maintain a webpage of Gemini papers sorted by instrument as a tool for users of specific instruments and capabilities. Note that NGSC maintains a website with the U.S. Gemini papers sorted by instrument:
  http://www.noao.edu/usgp/usgp_publications.html *(No update reported)*

7.3 User Issues from 2008 (received from the OpsWG)

- Improvements in OT/Phase II: Reported as mostly done.
- Improvements to PIT: a list of changes was delivered. Despite this it was still a perception in the community that has access to both Gemini and ESO time that

completing ESO proposals was more straightforward.

- Ways to improve band 3 completion rate: One suggestion was to shrink the number of proposals accepted into the band. This will require a more accurate model predicting the telescope conditions in advance. The GSC supported this general effort.

A plan to initiate feedback questionnaires was outlined. These will go out after Phase II and after completion of data collection. There will be 5-10 questions maximum. The observatory will keep 'end of run' web form as well. The GSC supported this initiative.

8 Recommended Science Time Fractions for 2009B

The GSC received a report from Dennis Crabtree on the Science Time Fractions for 2009B. The GSC endorsed his recommended percentages, and was pleased to see the aggressive approach taken by the Observatory in keeping the science time fraction high.

Gemini North 85% with 90% goal. (assumes GNIRS is done in 09A)

Gemini South 80% with 85% goal. (assumes F2 is done in 09A)

9 Long Range Plan

The GSC has been working with the Gemini Directorate over the past year to deliver a draft Scientific Long Range Plan. This has been completed, and was used to generate presentation material for the Gemini Visiting Committee over the summer.

At the beginnings of the meeting, the Gemini Director updated the GSC on the expected timeline:

- Gemini Visiting Committee 2008
- GSC October 2008
- Kyoto Users Meeting 2009
- Gemini Future Science Workshop 2010
- Gemini Visiting Committee 2011 Delivery of Draft LRP
- Negotiated of new international agreement complete by end of 2011.
- 5 year budget submission 2012 Delivery of Final LRP
- New international agreement and 5 year budget cycle begins – Jan 2014

The draft Scientific Long Range plan is expected to be provided as input to the Kyoto Users Meeting.

There was a discussion of the preferred format for the Gemini Future Science Workshop. One clear recommendation was the meeting needed again to be community based and hence to start with substantial national pre-meetings. There was also a question as to whether it might help to request ideas for instruments with a range of ‘price tags’ to avoid overconcentration on a small number of very powerful, but costly instrument. The outcome of the meeting was expected to be

both an instrument list and a science case, which might make it something a hybrid between the Abingdon and Aspen meetings.