

Note: this report is one month overdue so it covers 4 months: 2012Q4 and January 2013.

## 1 PROGRAM MANAGEMENT OVERVIEW

Project	Work complete	Status	Comments
<b>FLAMINGOS-2</b>	87%	2 weeks behind schedule	Milestone tracked is to be on telescope the last week of March. One complete (MOS+camera dewars) cool-down performed in January.
<b>GeMS</b>	N/A	On-schedule	Currently in phase 8 of final technical commissioning and Systems Verification. Six SV programs were completed in the December and January runs and 2 are on-going.
<b>A&amp;G-2</b>	NA	On-schedule	Requirements and feasibility study done internally to descope project due to budget constraints.
<b>GMOS CCD</b>	43%	2 weeks behind schedule	Milestone tracked is complete lab work at end of May. ESD board was built and tested.
<b>GPI</b>	NA	1 month behind schedule	Milestone tracked is Acceptance Testing review at end of May. IFS shutdown performed during Christmas holiday break. AT phase starting Feb 18.
<b>GHOS</b>	NA	2 months behind schedule	Preliminary Design Phase kickoff slipped to early March at best due to delays in contract approval process.
<b>GRACES</b>	~30%	Several months behind schedule	Difficulty with throughput of long fibers not resolved yet, pushing on-telescope testing to June 2013.

The order reflects the priority of internal resources assigned to the various projects during that quarter.

## 2 PAST/CURRENT PROJECT ACTIVITIES

- **FLAMINGOS-2**
  - Mounting scheme of lenses L2 to L9 was improved to avoid point contacts and allow pre-compensation of centering of lenses (warm to cold). Hardware was modified and re-alignment of all camera lenses attempted.
  - OIWFS was realigned with HIA engineers supporting on-site. Probe cold strap was binding in some areas of the field so upgrade design is underway.
  - Instrument was re-assembled in December and cold-testing done in early January. All mechanisms were functional (camera and MOS dewars) and tested at 2 gravity vectors. The detector (on its new fanout board) behaved well. Image Quality specifications was not met so an iteration is needed on optical alignment during February. Complete tolerancing analysis has been done to guide the alignment process. Gate valve baffle was also found slightly misaligned, causing minor background radiation.

- In December, the R3K grism coating was found damaged in 2 areas near the edges. It was removed from the wheel for inspection. Discussions with UF and the vendor revealed there might be residual stress from fabrication, but the ultimate cause of the failure is unknown. We will attempt to stabilize the coating to prevent further peel-off, mask the bad parts, and reinstall in the instrument while procuring a spare. We are investigating alternative substrates (the vendor does not like working with this CaF2 substrate.).
- **GeMS and GSAOI**
  - LGSF run performed early October then two technical commissioning runs in late October and November. Two runs dedicated to SV in December and January were quite successful and SV should be completed by March to start the 2013A queue.
  - GSAOI filter wheel misbehaved in October and tuning of motor current was done to stabilize behavior. Might require a shutdown mid 2013 to exchange motor.
  - Laser misbehaved in October so complete realignment with LMCT engineer was performed and produced spectacular results in December, getting up to 54W out of the laser allowing to close High-Order loop at 800Hz in the lowest Sodium season (in good seeing).
  - Several instances of GSAOI DC crashes in December required intensive debugging in January leading to more stable performance.
  - Real Time Computer (RTC) hot spare under final testing.
- **GMOS CCDs**
  - Leaks in new lab test dewar have delayed final integration of Focal Plane Array (FPA).
  - Metrology of FPA geometry was done in the lab with a new laser sensor that was able to provide accurate measurements with all three CCDs..
  - Electro-Static Discharge protection board was designed and sent for procurement.
- **GPI**
  - End-to-end characterization continued during most of 2012Q4 after all remediations were implemented.
  - Power shutdown on UCSC campus during Christmas holiday break triggered an IFS shutdown to avoid risks during the power system work. Instrument was cold again the 3<sup>rd</sup> week of January.
  - On-going performance optimization before Acceptance Testing phase starts mid-February.
  - New measurements of end-to-end contrast ratio measured through simulated atmosphere (phase plates) with the CAL LOWFS closed have produced spectacular results indicating the extreme sensitivity of the instrument compared to existing ground-based facilities.
- **GHOS**
  - Contract approval on the AURA side (AOC-G then AURA Board).
  - Contract approval delayed on the contractor side due to management of one sub-contractor and legal process escalation due to Federal constraints.
- **GRACES**
  - Small fiber bundle produced by vendor and delivered in January didn't meet the specification so an iteration is being done before producing the final lengths of 280m.
  - Image slicer fabrication underway by 2 vendors. Delivery of first unit delayed to early February due to coating schedule.
  - Iterations on ESPaDOnS coupling module mockup to eliminate all interferences and minimize impact to ESPaDOnS.
  - Final design produced for the injection module in GMOS cassette.
  - Reviewed fiber routing inside Gemini building and ordered parts.
  - Iteration on the acquisition procedure and science commissioning plan
- **A&G-2**
  - Intensive work in September-October to review requirements, business case and cost/benefit led to an internal study of various project alternatives presented to the Board. The down time caused by A&Gs has decreased significantly since the project was proposed due to revised maintenance procedures implemented at Gemini.

- Instead of building two new units, we will focus on upgrading the subsystems identified in the failure mode analysis, and improve the performance of the wavefront sensors with more modern detectors and controllers.
- 2013 will be dedicated to further detail these alternatives, create work packages and their specific requirements, bringing contractors to work at Gemini if needed during shutdowns.

### 3 COMING PROJECT ACTIVITIES (next quarter)

- **FLAMINGOS-2**
  - Iterate on warm optical alignment until Image quality is acceptable, then repeat cool-down and analyze images by end of February
  - Install the improved OIWFS cold strap
  - Improve alignment of gate valve baffle.
  - Depending on results of simple flexure testing (along 1 axis) and schedule, we might skip the flexure testing on the lab flex rig and go to the telescope by end of March.
- **GeMS and GSAOI**
  - The punch list established to inventory all remaining activities is being split into 3 categories: critical for operations in short-term, useful for increased reliability in medium term, and improvements for long-term.
  - Continue GSAOI DC stability work
  - Compile all results for remaining contractual acceptance of GSAOI with ANU.
  - A formal acceptance review and hand-over into Operations is scheduled for May 13.
- **GMOS CCDs**
  - Test the ESD board with engineering array.
  - Final characterization of science detectors with ESD board in place.
  - End-end-testing with software acceptance and 'burn-in' by end of May. Installation in GMOS-S is scheduled to start in September.
- **GPI**
  - Finish optimization and end-to-end testing of contrast ratio measurements in dynamic mode.
  - Put instrument under change control (hardware and software) and begin acceptance phase around Feb 18. Acceptance will conduct many functionality and performance tests in normal lab conditions, then in the cold and on a flexure rig. Acceptance review is scheduled for end of May (and shipping in June at the earliest).
- **GHOS**
  - Continue monitoring and supporting contract approval process.
  - Preliminary Design phase kickoff meeting to be held no earlier than late March.
- **GRACES**
  - Iterate with vendor on fiber assembly.
  - Delivery and testing of slicer
  - Build the injection module and slicer coupling module
- **A&G-2**
  - Resource allocation was lowered again to prioritize F2 and GeMS transition into science in 2013Q1-Q2. Work with outside contractor(s) will be organized where needed.
  - A new temporary position was opened for a dedicated electronics/detector engineer to support this project without affecting other activities.

### 4 OTHER DEVELOPMENT TEAM ACTIVITIES

- **Next Instrument**
  - The STAC and Board approved the top-level financial scenarios presented for of our instrumentation Long Range Plan, where the current priority by 2015 is to fund GHOS and a future instrument we are currently calling Gen4#3. The Statement of Work for a Request for Proposal (RfP) of the later will be discussed with STAC in April for later launch once our

instrument commissioning load decreases (F2, GeMS, GPI, GMOS-CCD, GRACES). This RfP will be more open in terms of instrument capabilities than in the past.

- **Gemini-North AO roadmap**

The report following the workshop in Victoria in May was discussed with Gemini's Governing bodies in November, reaching a consensus that AO must remain a priority for the Observatory and a replacement of Altair is needed in the 2015-2020 timeframe and will be funded after the instrument Generation 4 #3 to be defined in 2014.

- **IR Detector Controller project**

- Slow progress made and we are still in planning mode.. The current plan is to concentrate on upgrading the GNIRS controller with outsourced help. We expect a more fully developed project charter this quarter.

- **Small Project Development Fund**

- The Board approved the initiative of creating a yearly fund offering small projects with our collaboration to enhance Gemini's instrumentation capabilities. We are developing guidelines for the process now and expect to have them completed by mid year.

- **Recruitment**

- On-going effort to staff properly all development activities have resulted in the hire of Olivier Lai as new AO scientist for GN (starting in March) to lead the short-term Altair upgrades, Marcos van Dam for 9 months (March-December) and Vincent Garrel as AO fellow to support GeMS (and other AO work if needed).
- An experienced project manager position was also opened to help supplement our project management and oversight capabilities.