Development Division
Quarterly Report: 2013Q1
16 April 2013, V1.1

Note: this report covers February and March 2013 (January was covered in previous report).

1 PROGRAM MANAGEMENT OVERVIEW

Project	Work complete	Status	Comments
FLAMINGOS-2	93%	1 month behind schedule	Two incidents in March causing malfunctioning of detector and MOS wheels have forced us to do another thermal cycle and postpone the telescope installation until end of April.
GeMS/GSAOI	N/A	On-schedule	SV was finished and 2013A queue started in the February run. Formal hand-over to Operations division is scheduled for September.
GMOS CCD	65%	On-schedule	Lab work in Hilo will be completed by end of June. GMOS-S shutdown was scheduled mid-October and we are on target.
GPI	NA	1 month behind schedule	Acceptance testing started formally in February and is on-going. Most gravity testing was completed by end of March. Cold chamber delivery and testing documentation is late so the AT review might be postponed by 1 month until end of June.
GHOS	NA	3 months behind schedule	Project is still in contract approval loop and making slow progress.
GRACES	NA	~9 months behind schedule	Slicer delivered and progress made on fiber fabrication and focal ratio degradation control. New schedule calls for acceptance testing in July and on-telescope testing in Sept 2013.
A&G-2	NA	On-schedule	Projects alternatives were presented to staff and STAC and final deliverables are being defined.

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

2 PAST/CURRENT PROJECT ACTIVITIES

- **FLAMINGOS-2**
  - Issues found during the first cool down in January have been fixed:
    - Image Quality: warm imaging was performed with a SBIG CCD camera to verify image quality and compare to Zemax optical modeling. Torque to M1 and M2 fold mirrors was lowered to eliminate the astigmatism. With careful alignment telescope metrology, some elements were re-centered and adjusted in tilt. L5, the most sensitive element to position, was used as the correcting element to compensate residual coma, and pre-compensate the coma induced by cooldown.
    - Gate valve was adjusted to operate reliably

- The March cool-down showed the image quality criteria is met on axis (FWHM ~2pix and round intensity contours) but is worse off-axis (~3.5pix) than the model prediction or past performance (~2.4pix).
- An unexpected uncontrolled sequence during the cool-down due to a site power failure has caused the detector to exhibit a lot of hot pixels. After consultation with detector experts, it was recommended to warm and restart a slow cool-down to eliminate this effect.
- Once installed on the flexure rig, hundreds of repeatability tests were done for mechanisms and the MOS wheel ended up binding.
- The instrument was warmed up completely by the end of March. A bearing adjustment was done on the MOS wheel and the motor was replaced as preventive action. Both camera and MOS dewars were cooled down again early April to meet the target date of installing on telescope the last week of April.

- **GeMS and GSAOI**
  - February run was quite successful allowing 89% completion of the SV programs (goal was >75%).
  - March run was stopped mid-way due to a failure of a stepper motor in the LGSWFS but 2013A queue is well underway: 3 programs completed, 6 in execution, 2 not started yet.
  - Systems are in general stable and performing as needed. AO performance is being monitored and analyzed to drive the remaining performance optimization and tools to automate operations.
  - New version of GSAOI DC produced by ANU was installed and is under testing.
  - Real Time Computer (RTC) hot spare is in stand-by waiting for some cables.
  - Intense work was performed to review all remaining work for the formal acceptance now scheduled for September.
  - GSAOI acceptance tests were completed and contract with ANU is being closed with last milestone payment. Congrats to the ANU and Gemini GSAOI team!
  - ANU has contacted us with a proposal to upgrade the sky coverage of Natural Guide Star for GSAOI with a focal plane detector concept. They are competing for an Australian Government grant and we are collaborating to supporting their request.
- **GMOS CCDs**
  - Science focal plane array assembled and aligned.
  - Extensive ESD risk mitigation implemented and tested with engineering CCDs.
  - Read noise optimization completes and is ~4e- in typical readout modes.
- **GPI**
  - Final end-to-end characterization done early February.
  - Acceptance testing period started February 18th.
  - Flexure testing conducted for most of March. Two mechanisms are currently not behaving well: IFS prism holder and pupil viewer. Performance seems in specifications when all Look-Up Tables are activated.
  - About 48 of 78 tests were done early April.
- **GHOS**
  - Some progress made on contract approval on the contractor side with management of one sub-contractor and legal process escalation due to Federal constraints.
- **GRACES**
  - Image slicer delivered.
  - Mechanical design review of the injection and bench-coupling module. Now moving into final drawings and start some constructions. The bench to insert the fibers into ESPaDOnS was significantly redesigned to avoid affecting the spectrograph's performance and operations.
  - Progress done by the fiber vendor with the connectors on small test fibers and focal ratio degradation < 5%. Preparing to build the long science fibers
  - Prepared fiber routing inside the CFHT building.
  - Continued iteration on the acquisition procedure and science commissioning plan

- **A&G-2**
  - Final iterations on feasibility studies of various alternative designs of an improved peripheral WFS.
  - Presentations to Gemini staff and STAC to collect feedback. Increasing WFS sensitivity (and sky coverage) is prioritized versus reducing flexures (and increasing integration times).
  - Project broken into phases looking first at reliability and then performance (WFS re-design for sensitivity).
  - PMAC motor controller manufacturer (DeltaTau) contacted to explore upgrades needed to improve reliability.

3 COMING PROJECT ACTIVITIES (next quarter)

- **FLAMINGOS-2**
  - Complete cool-down and basic functionalities tests on April 19, installation on telescope April 22 and first commissioning night April 25.
  - Continue monthly commissioning runs until July to get instrument ready for imaging and long-slit spectroscopy science in 2013B.
- **GeMS and GSAOI**
  - Execute the tasks identified on punch list in particular SW stability, BTO Beam Dump Mirror mechanism, GSAOI DC stability until end of June.
  - The formal acceptance review and hand-over into Operations was postponed to September.
  - Monthly runs in April-May-June.
  - Prepare the detailed plan for the July-August winter shutdown in particular LGSWFS upgrade.
  - Some AO optimization will be tested with new wavefront reconstructors.
- **GMOS CCDs**
  - Install the science CCDs in lab dewar (end of April).
  - Final characterization of science detectors with ESD board in place.
  - End-end-testing with software acceptance by end of June. 'Burn-in' period will be conducted in Chile in September. Installation in GMOS-S is scheduled to start in October.
- **GPI**
  - Cold testing in April.
  - Acceptance readiness review meeting on April 29.
  - Acceptance review and remediation of failed tests likely in June and shipping delayed to July.
- **GHOS**
  - Finalize signature of contract.
  - Preliminary Design phase kickoff meeting.
- **GRACES**
  - Build the 300m-long science fiber bundle and test at HIA (April-May)
  - Build the injection and slicer coupling modules and do an end-to-end test (June-July).
- **A&G-2**
  - Create the Work Breakdown Structure for all the reliability upgrades.
  - Write the top-level requirements for the new peripheral wavefront sensor.
  - Finish the hiring of a dedicated electronics/detector engineer.

4 OTHER DEVELOPMENT TEAM ACTIVITIES

- **Next Instrument**
  - Stephen Goodsell and Rachel Mason, respectively as project manager and project scientist, have started work on the Generation 4 #3 instrument Request for Proposal process. This will be released to the public in 2013Q4.
- **Altair upgrades**

- Olivier Lai joined us in March as the new AO scientist for GN. He started assessing the performance of Altair and modeling the weight of effects contributing to Strehl degradation. We expect to perform new internal calibrations (Non-Common Path Aberrations) and launch contracted work by the end of 2013 to improve and ensure Altair performance for the next 5+ years.

- **IR Detector Controller project**
  - The charter was written and contemplates starting procurement of HW in 2013Q4 when detector work on the GMOS-CCD slows down. The SW effort cannot be done in house and will need to be contracted.
- **Small Sciencet and Technology Project Development Fund**
  - We developed a guideline and will discuss it with STAC and Board in April-May, hopefully releasing it to the community by the end of the year. This will be a mechanism to upgrade instruments (or any subsystems enabling new or more science) with simple but effective deliverables that can be accomplished in less than 2 years.
- **Recruitment**
  - Marcos van Dam, AO scientist, joined us in March for 9 months to help smoothing out the Transition to operations for GeMS. Vincent Garrel, AO fellow, just joined us in April to also be part of that team.
  - The project manager position and detector/electronics engineer (for A&G2) positions are starting interview process.