1 PROGRAM MANAGEMENT OVERVIEW

See acronyms list at the end of report

Project	Stage progress	Status	Comments
GPI	50%	On-schedule	The second run (of 4) of the Verification and Commissioning campaign happened successfully March 20-25, and the early science run just finished April 21-26 with 14 out 16 programs observed.
GMOS CCD	75%	On-schedule	Reliability testing, packing and shipping happened between January and March. The system went through a successful delivery campaign in the CP lab early April, and is now awaiting integration into GMOS-S starting on May 19.
GHOS*	NA	active	Contracts were signed at the end of March by the NSF. Preliminary Design stage started in April and a kickoff is organized for early May.
GEN4#3*	NA	active	Project was on-hold in 14Q1. We resumed work in 14Q2 and have a procurement model to discuss with Governance.
Canopus NGS2*	NA	active	ANU finalized funding for this project through ARC and ANU grants. They provided us with a MOU to start a feasibility stage.
GRACES	~90%	On-schedule	Acceptance of all the hardware (injector, fiber, slicer) happened successfully at NRC-H early March. All hardware was shipped to Hawaii and most of it has been installed in and between the Gemini and CFHT telescopes by the end of April. Measured fiber performance has exceeded requirements.
A&G upgrades*	NA	active	Project was on hold until a new Project manager took over in January. The team prepared a comprehensive project plan and requirements for an electro-mechanical test bench to test the new Turbo-PMAC motion controllers. Some measurements of the WFS performance were performed at GN.

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

*Stage progress will be reported in future reports.

2 PAST/CURRENT/FUTURE PROJECT ACTIVITIES

- **GPI**
  - Remediation of known problems was performed in January and February: fixed IFS pupil and prism mechanisms, installed new baffle to eliminate some ghosting, synchronize the controller of the cryo-cooler to reduce vibrations, reduce IFS frame readout from 7 to 3sec, upgraded several other subsystems (like MEMS DM control, communication network and software bugs)
  - The second run of the Verification and Commissioning (V&C) campaign (March 20-25) confirmed the remediation and allowed continuing with performance optimization.
  - An early science run was conducted April 21-26 with high level of completion (14 out of 16 programs observed, 13 completed)

  Upcoming:
  - Third V&C run scheduled May 9-14; fourth run in September.
  - Documentation review at the end of May and post-delivery acceptance review in June
  - Project closure and handover to science operation in October
  - Vibrations are still a risk (both to GPI's performance and possibly to other instruments attached to the ISS like Canopus/GSAOI). We will conclude our risk ISS mitigation project in July and decide on the next step if needed.

- **GMOS CCDs**
  - The test dewar was opportunistically connected to the real instrument controller at Gemini North in January during a one-month telescope shutdown to repair the dome. Some software issues were discovered and fixed.
  - A two-week reliability testing was conducted and uncovered memory leaks in the controller that were causing the system to crash due to lack of available memory after about a day of intensive data taking. In-house efforts to diagnose the problem did not converge upon a solution on schedule, so an expert consultant from the OS vendor, WindRiver Systems, was engaged to work on this, ultimately helping Gemini staff correct the problem.
  - Subsequent reliability testing, final hardware testing, packing and shipping then proceeded as planned and with no major problems arising. The shipment arrived in Chile on 4 April 2014 and was unpacked and set up in the summit lab by a team of GN and GS personnel.
  - The CCDs have been tested to confirm all 12 channels are operating correctly, the array is cold in the lab dewar shipped from Hilo, and final preparations are underway to embark on the second phase of reliability testing which will run the system through to the integration in GMOS-S during the shutdowon starting May 19.

  Upcoming:
  - Integration shutdown from May 19 to mid-June.
  - The remaining risks are the usual ones seen in the final integration and test on a constrained schedule. They include errors in how well the new FPA physical location with respect to the interface points replicates that of the original FPA (we've never had the opportunity to disassemble one and find if the drawings we have of the original system are truly as-built). In addition to careful planning, we are mitigating these risks by carefully preserving a fallback that will allow a decision to return to the E2V detectors at any point in the integration sequence if something goes awry with the new detector integration.
  - Contracting for additional CCDs for GMOS-N is not yet complete. One key issue has been Hamamatsu's unwillingness to warrant the CCD specifications to the same level as they did the previous orders. Another has been the change of contracting personnel at CAS due to Andy Flach's departure. Given the quoted 9 month delivery time, our timeline for the integration of the GMOS-N CCDs is 2015Q3 at the earliest.

GHOS

- Contracts were reviewed by AOC-G and AURA Board at the end of December and submitted to NSF early January.
- One iteration was required and we got the approval from NSF at the end of March.
- Preliminary Design stage started April 8th.

Upcoming:

- A Preliminary Design stage kickoff meeting will occur May 1-6 in Hilo and include spectroscope site selection and management related activities. May 21-23 design meetings in Australia will include a larger part of the AAO, NRC-H, and ANU technical teams.
- The nominal timeline calls for a preliminary design stage review in January 2015.

Gen4#3

- Project on-hold in 14Q1 as most of the core resources were focused on GPI.
- Activity resumed in April with Stephen Goodsell, the project manager, preparing an outline of the procurement strategy discussed and agreed with the directorate. The proposal builds on lessons learned from past procurements so that we hope to improve significantly on the process. Our approach employs two Request for Proposals (RfP) processes: first, one to obtain feasibility study proposals from which the order of 3-4 will be down-selected by a panel, and the second for the remaining instrument design and build based on results of the feasibility studies. The staged approach follows the competitive procurement rules from the executive agency and enables us to plan the details of the next phase sequentially instead of requiring everything at the beginning. It also avoids multiple teams competing for the same design and allows us to invite teams to form collaborations early in the process.

Upcoming:

- Present the procurement strategy to Governance for validation in May.
- Release the first RfP for feasibility study later in 2014.

Canopus NGS2

- ANU had received confirmation from the ARC of their grant in 2014Q3 although not the full amount requested. Subsequently, they applied for an internal ANU grant and confirmed in March 2014 they had secured all the budget they needed.
- ANU provided us with a Multi-Institutions agreement (a sort of memorandum of understanding between ANU, AAO, Swinburne University and Gemini) that we are in the process of revising in order to sign it by the end of May.

Upcoming:

- Gemini staff will provide high-level requirements and ICDs by the end of May
- A performance feasibility study and conceptual design review is planned in 2014Q3 before we engage into a formal contractual agreement with ANU around October.

GRACES

- The science fibers (the project most critical element) were delivered to NRC-H at the end of February. They demonstrated a low Focal Ratio Degradation (FRD) of about 11% (requirement was 20%). These are some of the longest optical fibers ever built for an astronomical applications (270m). They are usable between 500 and 1000nm and their transmission at 800nm is 85%.
- The complete acceptance testing of all subsystems was performed in Canada early March. All important criteria were met to allow continuation of end-to-end testing in-situ between the telescopes. The injection module is aligned to within 1 min of arc. Its flexure is within the specs (it stays aligned within 0.05") and it is stable thermally. The slicer (receiver unit) is sending sliced image that meet specifications. Its flexure and fiber positioning repeatability are within

the specs (within 0.001mm). The end-to-end transmission including the injector, fiber and slicer (without the pickoff mirrors) peaks at 70% at 800nm, which agrees closely with the predicted performance.
- All subsystems (injector, slicer and fibers) shipped to Gemini North and CFHT early April.
- With minor support from Gemini staff, the fibers were laid out between the telescopes and connected to the injector module in the GMOS cassette on April 29 for a preliminary test on the sky with stars in a twilight engineering test. FRD measurement done at the CFHT end of the fiber were still around 10%, as good as in the lab.

Upcoming:
- Connect to the spectrograph and have the first light data to measure overall performance (and therefore how competitive this prototype can be compared to other similar instruments like HIRES at Keck) in May.
- If performance is validated, propose GRACES as a visiting instrument for a few semesters to gauge community's interest.

- **A&G-2**
  - Project was on hold until February after the departure of the project manager in December. Manuel Lazo has taken this role and updated the project plan for the two work packages identified: upgrading the motion controllers from PMAC to Turbo PMAC (tackling both obsolescence and reliability), and upgrading the performance of the peripheral WFS.
  - Smooth integration is key for this project since the A&G is used every night for operations. Requirements to build an electro-mechanical bench for the Turbo PMAC testing outside the telescope are being prepared.
  - Noise and performance measurements of the PWFS2 at GN were taken to have a current baseline and compare to models.

  Upcoming:
  - Contract Turbo PMAC integrator to adapt the motion control code, and a SW contractor for to update the EPICS drivers. Contract out the fabrication of the test bench.
  - Make WFS measurements at GS during the A&G annual shutdown in August.

3 OTHER DEVELOPMENT TEAM ACTIVITIES

- **Altair upgrades**
  - We have received a proposal from NRC-H on March 13 and have iterated on the definitions of work packages and stages. We are now gathering technical information about the RTC (identified as first priority) to update the original building team. We will prepare a contract for the conceptual design. The main risk is the availability of our resources with expertise in operating Altair.

    Ongoing internal work for procurement of the two new science dichroic beamsplitters and for understanding the Non-Common Path Aberrations and corrections for the secondary mirror print-through.

- **IR Detector Controller**
  - Project was mostly on hold in 2014Q1 due to priority put on the GMOS-CCDs. We will resume testing the prototype in 2014Q3.

- **Small development project Fund**
  - Activity on-hold but expected to resume in 2014.

- **Laser Guide Star Facility upgrades**
  - We have initiated our medium and long-term strategy to improve the GS laser performance and reliability. The plan is to contract small parallel feasibility studies to: i/ validate through modelling the performance of a new fiber amplification laser (like the one commercialized by Toptica) compared to our existing solid-state laser; ii/ implement D2b sodium line repumping to boost the return from the mesosphere.

- **Recruitment**
  - Manuel Lazo (project manager/engineer) and Luc Boucher (electronics/detector engineer) have joined us in February to support development projects.
  - Madeline Close has joined us in March as the systems engineering group manager.
  - Gaetano Sivo has joined us in April as an AO science fellow to work on GeMS operations and improvements.

4 ACRONYMS

- AAO: Australian Astronomical Observatory
- ANU: Australian National University
- ARC: Australian Research Council
- A&G: telescope Acquisition and Guiding unit
- BTO: Beam Transfer optics
- CFHT: Canada-France-Hawaii telescope
- CP: Cerro Pachon
- DM: Deformable Mirror (DM0 is at 0km)
- ESPaDOnS: high-resolution spectrograph at CFHT
- F2: FLAMINGOS-2
- FPA: Focal Plane Array
- FRD: Focal ratio Degradation
- GeMS: Gemini Multi-conjugate System
- Gen4#3: Generation 4 #3 (next instrument after GHOS and GRACES)
- GPI: Gemini Planet Imager
- IFS: Infrared Field Spectrograph (within GPI)
- ISS: Instrument Support Structure
- LGSWFS: Laser Guide Star WaveFront Sensor
- MEMS: MicroElectroMechanical Systems
- NGSWFS: Natural Guide Star WaveFront Sensor
- NRC-H: National Research Council, Herzberg institute (Canada)
- OIWFS: On-Instrument WaveFront Sensor
- PMAC: Programmable Multi-Axis Controller
- PWFS: Peripheral WaveFront Sensor (inside A&G)