

*We report the general progress of Gemini Development Division projects during the stated quarter, including recent information between the quarter end and the document date.*

## 1 Key Projects Overview

*Sections 3 and 4 provide project descriptions and acronym definitions for reference.*

Project	Past and Upcoming Milestones	Comments
<b>GPI</b>	Jun '15: Last Quarterly Report	The remaining Development work on GPI is to review and accept some remaining documentation. This will be the last time we report on GPI here.
<b>GMOS CCDs</b>	Dec '15: GMOS-N CCDs ready for installation	Work on resolving problems in the GMOS-S CCDs has delayed the GMOS-N CCD installation. We are planning major work on GMOS-S in August, delaying GMOS-N readiness until the end of 2015.
<b>GHOST</b>	Oct '15: Optical Design Review Dec '15: Critical Design Review	The GHOST team continues to make progress in the Critical Design Stage. CCDs are on order with deliveries beginning at end of 2015. The prototype assembly fiber arrived out of specification, so the team is adding a second vendor. Schedule impact should be minimal.
<b>LGSF</b>	May '15: Board approved Laser procurement	The Board approved new the laser procurement. We are preparing the request for proposals now.
<b>GIFS</b>	Jun '15: Mid-point visits Sep '15: Team presentations	We completed our mid-point visits and each team presented at the Toronto Users Meeting. Presentations are available at <a href="http://www.gemini.edu/fsg15/program">www.gemini.edu/fsg15/program</a>
<b>NGS2</b>	2016Q1: Target installation	Work continues on a heat extraction system for the NGS2 camera. This unplanned effort and a prolonged contract review process put the schedule at risk.
<b>GRACES</b>	May '15: Start on-sky testing 2015B: GRACES offered to users	Initial GRACES science data are available at <a href="http://goo.gl/wNuk31">http://goo.gl/wNuk31</a>
<b>A&amp;G Upgrade</b>	On hold	Although the project is on hold for 2015, we plan to complete trade studies for detector and mechanism controller options during the year.
<b>DM0</b>	Jul '15: Resume project	We will start procurement in July, with no activity expected beyond that.

## 2 Additional Activities

### IR Detector Controller

This project is still on hold this quarter. Once resumed, the objective would be to build an engineering system that controls the GNIRS/NIRI detectors with a modern controller. We would not work on high end software until 2016, at the earliest. This project is still on hold for the next quarter, pending GMOS-S and GMOS-N CCD optimization and installation work.

### **Small development project Fund**

We are preparing the Request for Proposal (RfP) material for a 2015Q3 release as an open call where proposers can select one of our projects or propose their own. The focus is to add new capabilities to existing Gemini instruments.

### **Systems Engineering**

- In support of GIFS and in preparation for the Gen4#3 and Small Projects RfPs, the team made several key requirements, specification and interface control documents publicly available online.
- We completed an update to the GHOST requirements and transitioned the document to AAO's new Systems Engineer.
- Updated internal and external Development web pages to bring them up to date.
- We may be close to completing the recruitment for our vacant *Systems Engineer* position.

### **Miscellaneous**

- We have started contract work for the Altair realtime computer upgrade.
- We have identified some cooling fans as the key contributor to the observed 37 Hz vibrations on the Gemini South telescope. We replaced these fans and find the 37 Hz vibration is now effectively gone (reduced 30 dB), although it appears again, fairly quickly damped, when other disturbances are present.

## **3 Project Description Summaries**

*These are brief project summaries for reference. Current updates are in section 1.*

**A&G Upgrade:** Upgrade the two telescope A&G units to avoid obsolescence and offer more reliability, less downtime, and higher performance. The key work areas are 1) upgrade the A&G mechanism control systems, and 2) upgrade the PWFS units to enable guiding on fainter stars. This project is on hold in 2015 and expected to resume in 2016 to complete in 2017. *Project Manager: Manuel Lazo.*

**DM0:** Provide a new deformable mirror for GeMS to replace the failed third deformable mirror. The new mirror will serve as a spare for the two currently used DMs and will eventually be installed as the planned third DM for GeMS. Work in 2015 is limited to contracting for the new mirror and electronics with acceptance testing expected in 2016. *Project Manager: Chad Trujillo.*

**Gen4#3:** The next new facility instrument for Gemini. We will develop requirement for Gen4#3 after completing the GIFS studies at the end of 2015. We are planning to release the design and build RfP for Gen4#3 in 2016 with the eventual instrument coming to Gemini sometime in the early 2020s. *Project Manager: Stephen Goodsell.*

**GHOST:** A two-object plus sky, R=50,000 – 75,000 spectrograph with simultaneous wavelength coverage from ~360 – 1000 nm being built for Gemini by the AAO, NRC-H, and ANU. We are expecting to hold the Critical Design Review by early 2016 with delivery to Gemini by 2018. *Project Manager: David Henderson.*

**GIFS:** Community-lead feasibility studies intended to generate science requirements and ideas for potential feasible instruments. We started four GIFS studies to in 2015Q1 that will complete by the end of the year. *Project Manager: Stephen Goodsell.*

**GMOS CCDs:** Upgrade the existing detectors and controllers in both GMOS-S and GMOS-N to Hamamatsu fully depleted CCDs with a current generation ARC controller. The goal is to provide good performance with state of the art red quantum efficiency. We installed the GMOS-S CCDs in 2014 and plan to install the GMOS-N CCDs in the second half of 2015. *Project Manager: Manuel Lazo.*

**GRACES:** Provide high-resolution optical spectroscopy capabilities at Gemini North by running a fiber from Gemini to the ESPaDOnS spectrograph at the CFHT. We completed GRACES stage 1, a proof of concept, in 2014. During 2015, we will make a few improvements to the system to aid operations and increase performance prior to handing over GRACES to Operations as a visitor instrument starting in 2015B. *Project Scientist / Manager: André-Nicolas Chené.*

**LGSF:** We are replacing the GeMS Laser Guide Star Facility to increase reliability and decrease support costs. We will competitively procure the new laser and will need to make modifications to the current beam transfer optics and other systems in order to utilize it. The new will likely arrive in 2016 with integration and testing happening thereafter. *Project Manager: Manuel Lazo.*

**NGS2:** Working with ANU, we intend to replace the NGSWFS of GeMS with a more modern sensor to reduce maintenance requirements and increase sensitivity and, hence, sky coverage. ANU expects to deliver NGS2 in late 2015 and we are planning to commission it in GeMS in 2016. *Project Manager: Vanessa Montes.*

**Small Projects:** Later in 2015, we will be launching an external call for small projects to provide additional capability to our current instrument suite. We expect to have a total budget of order \$200,000 and a small amount of telescope time and would like to fund at least two projects

## 4 Acronyms

*Common acronyms used in this and other reports.*

AAO: Australian Astronomical Observatory

ANU: Australian National University

AOTel: The Adaptive Optics / Telescope group at Gemini, led by Chad Trujillo

ARC: Astronomical Research Cameras Inc. (makers of the “Leach” detector controllers)

A&G: telescope Acquisition and Guiding unit

BTO: Beam Transfer Optics (laser optical path to the launch telescope)

CCD: Charge-Coupled Device (optical image sensor)

CFHT: Canada-France-Hawaii Telescope

DM: Deformable Mirror (GeMS DM0, DM4.5, and DM9 are conjugated at 0, 4.5, and 9 km)

ESPaDOnS: Echelle SpectroPolarimetric Device for the Observation of Stars (a high-resolution spectrograph at CFHT)

GeMS: Gemini Multi-conjugate adaptive optics System

Gen4#3: Generation 4 #3 (next instrument after GHOST and GRACES)

GHOST (formerly, GHOS): Gemini High-resolution Optical SpecTrograph

GIFS: Gemini Instrument Feasibility Study

GMOS: Gemini Multi-Object Spectrograph, an optical imager and spectrograph at Gemini North (-N) and South (-S)

GNIRS: Gemini Near-InfraRed Spectrometer

GPI: Gemini Planet Imager

GRACES: Gemini Remote Access to ESPaDOnS

IR: InfraRed

LGSF: Laser Guide Star Facility

MEMS: MicroElectroMechanical Systems

NGS2: Natural Guide Star New Generation Sensor

NGSWFS: Natural Guide Star WaveFront Sensor

NIRI: Near InfraRed Imager and spectrometer

NRC-H: National Research Council, Herzberg Institute (Canada)

PWFS: Peripheral WaveFront Sensor (inside A&G)

RfP: Request for Proposals

## **5 Completed Past Milestones**

### **5.1 GMOS CCDs**

Apr '15: First GMOS-N CCD tested and accepted

### **5.2 GHOST**

Mar '15 Critical Design Stage start

### **5.3 LGSF**

May '15: Feasibility study complete; Board endorses the next stage (procurement)

### **5.4 GIFS**

Apr '15: All kickoff meetings complete

Jun '15: Mid-point visits completed; Team presentations at Gemini Users Meeting

### **5.5 NGS2**

Mar '15: Design review at ANU

### **5.6 GRACES**

May '15: Start on-sky testing

### **5.7 A&G Upgrade**

### **5.8 DM0**