

*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>GMOS CCDs</b>	Oct '15: Resolve GMOS-S issues Jun '16: Ready to install GMOS-N	GMOS-S CCD remediation work delayed the GMOS-N CCD installation. We completed the GMOS-S work in October, moving the GMOS-N installation to 2016Q3.
<b>GHOST</b>	Dec '15: First half of critical design review completed Mar '16: Spectrograph and enclosure critical design review	The team fell behind its planned schedule for the spectrograph optomechanical elements, so we moved the planned September optics review to the Critical Design Review held in December. We are planning for a second, delta review to cover the spectrograph and its enclosure in March, 2016.
<b>LGSF</b>	Dec '15: Proposals received Feb '16: Downselect made	We released the laser RfP in October and quickly received three letters of intent. We received the proposals in early December and aim to complete the downselect process in early 2016.
<b>GIFS Gen4#3</b>	Oct '15: Final reports received Dec '15: Gen4#3 begins 2015Q2: Release Gen4#3 RfP	The four GIFS teams completed their presentations and final reports on schedule during 2015Q3. We closed out the GIFS project in December and started developing the design and build RfP for Gen4#3, to be released in 2016Q2.
<b>NGS2</b>	Aug '15: Mechanical review completed 2016B: Target installation	We completed the complex contracting process in October '15 and can now concentrate solely on developing NGS2. The schedule is still vulnerable to technical risk, so we are planning for installation in the 2016B semester.
<b>GRACES</b>	2015B: GRACES offered to users	GRACES is now regularly offered to users. The team made several upgrades that improve throughput prior to its offering. This will be the last quarterly report in this series on GRACES.
<b>A&amp;G Upgrade</b>	On hold	Although the project is on hold for 2015, we completed some testing, selection, and training for mechanism controllers.
<b>DM0</b>	Sep '15: Completed Electronics Contract Jan '16: Complete DM contract 2016Q3: Integrated testing	We resumed procurement activities, completing the electronics contract in September and aiming to complete the mirror contract by January, 2016.

## 2 Additional Activities

### Small development project Fund

We released the Instrument Upgrade Small Project Request for Proposal (RfP) in October, 2015, will receive proposals in December, and aim to make selections in February, 2016. The focus of these projects is to add new capabilities to existing Gemini instruments.

### Systems Engineering

- We have started the cleanup and reorganization of our document management system including properly filing a large number of older unfiled archival documents. This work will continue into 2016 to provide Gemini an easily navigable document management system that is consistent across Gemini divisions and departments.
- We are preparing final updates and additions for the requirements and interface control documents needed for the Gen4#3 RfP.
- We are still recruiting a new Systems Engineer and have opened a position for a Project and Configuration Management Associate to replace a departing employee.

### Miscellaneous

- Contracting resource conflicts delayed the start of the Altair realtime computer upgrade work, but we plan to have this project started in 2016Q1.

## 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 and 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. Unless needed as a spare, we will not install DM0 until after we complete the NGS2 and new laser work. *Project Manager: Chad Trujillo.*

**Gen4#3:** The next new facility instrument for Gemini. We will develop requirements 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 expect to start the build phase in early 2016 and offer GHOST to users in 2018. *Project Manager: David Henderson.*

**GIFS:** Community-lead feasibility studies intended to generate science requirements and ideas for potential feasible instruments. These studies completed in 2015Q4. *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 fixed some remaining problems in 2015. We plan to install the GMOS-N CCDs in the second half of 2016. *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 made a few improvements to the system to aid operations and increase performance prior to handing over GRACES to Operations as a visitor instrument in 2015B.

*Project Scientist / Manager: André-Nicolas Chené.*

### **IR Detector Controller**

This project is still on hold. Once resumed, the objective will be to build an engineering system that controls the GNIRS/NIRI detectors with a modern controller. We will likely not work on high end software until 2017, at the earliest. We are evaluating reinitiating this project in 2016.

**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 laser will likely arrive in 2017 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 time for commissioning in 2016B. *Project Manager: Vanessa Montes.*

**Small Projects:** In October 2015, we launched an external call for small projects to provide additional capability to our current instrument suite. With a total budget of \$200,000 and a small amount of telescope time, we expect to fund two small projects. *Project Manager: Ruben Diaz.*

## **4 Acronyms**

*Common acronyms used in this and other reports.*

AAO: Australian Astronomical Observatory

ANU: Australian National University

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

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

TAO: The Telescope Adaptive Optics Department at Gemini, led by Chad Trujillo

## **5 Completed Past Milestones**

### **5.1 GMOS CCDs**

Apr '15: First GMOS-N CCD tested and accepted  
Oct '15: Resolved GMOS-S installed CCD issues

### **5.2 GHOST**

Mar '15: Critical Design Stage start  
Nov '15: Gemini Board confirms Gemini South as destination for GHOST  
Dec '15: Initial Critical Design Review held at Gemini North

### **5.3 LGSF**

May '15: Feasibility study complete; Board endorses the next stage (procurement)  
Oct '15: RfP released  
Dec '15: Proposals received

### **5.4 GIFS**

Apr '15: All kickoff meetings complete  
Jun '15: Mid-point visits completed; Team presentations at Gemini Users Meeting  
Sep '15: GIFS team presentations at Gemini North  
Oct '15: GIFS team final reports submitted

### **5.5 NGS2**

Mar '15: Design review at ANU  
Aug '15: Mechanical review completed  
Oct '15: Contract finalized

### **5.6 GRACES**

May '15: Start on-sky testing

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

### **5.8 DM0**

Sep '15: Completed DM0 electronics contract with Cambridge Innovations