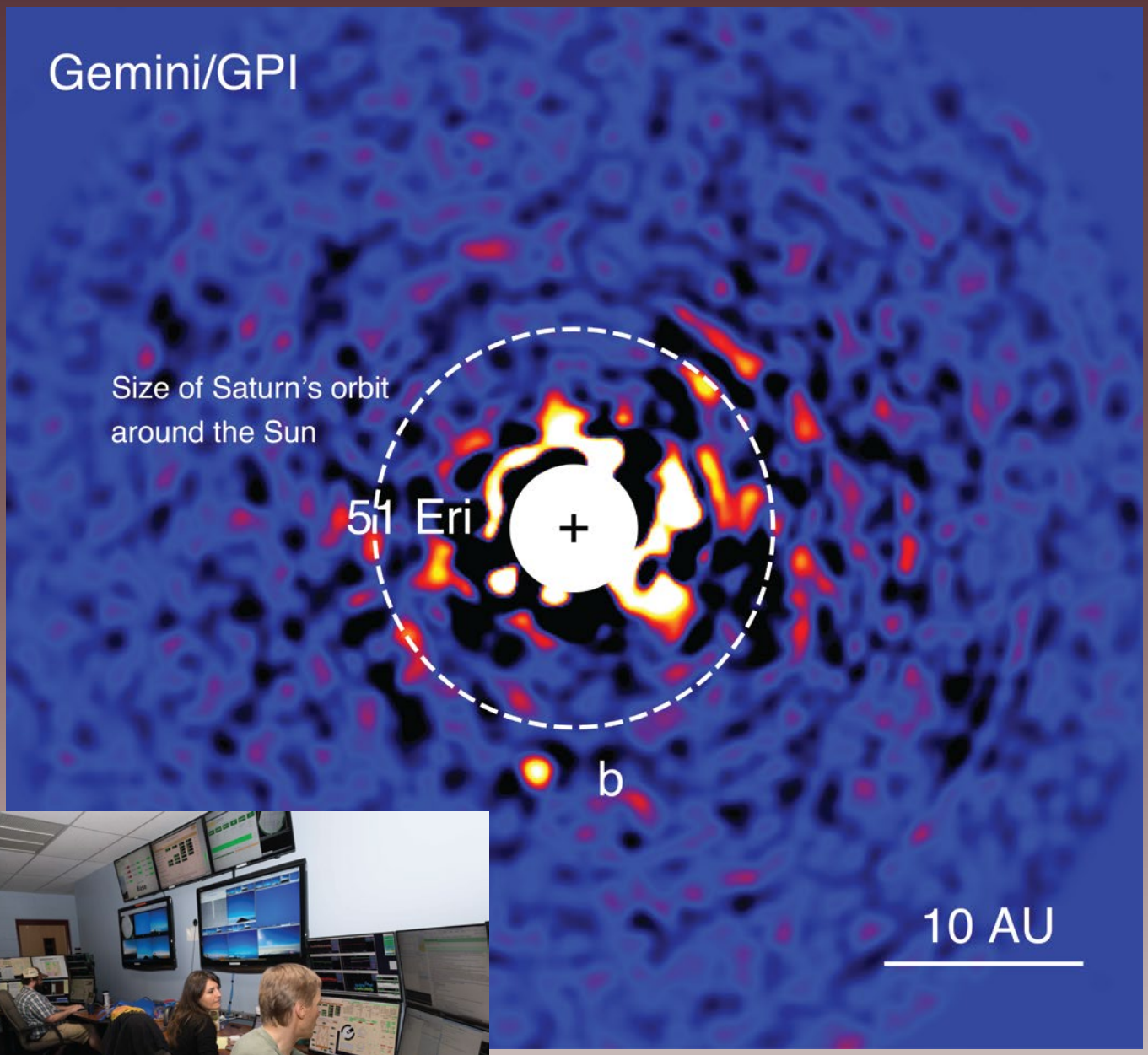
2015 Annual Progress Report and 2016 Program Plan of the Gemini Observatory



AURA

GEMINI OBSERVATORY
Exploring the Universe, Sharing its Wonders

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Ministerio de Ciencia, Tecnología e Innovación Productiva
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1 Executive Summary

The Gemini Observatory consists of twin 8-meter diameter optical/infrared telescopes located on two of the best observing sites on the planet. Locations in the northern and southern hemispheres (Hawai‘i and Chile) provide access to the entire sky. A range of instrumentation provides imaging and spectroscopic capabilities, with enhancements from adaptive optics and specialized instrumentation.

The primary pillar of activity within the Observatory is dedicated to maintaining and supporting operations on behalf of the international scientific community of the Gemini Partnership. The Observatory's goal is to enable our users' scientific progress; as they explore the Universe on all scales, from the nearby objects in the Solar System to the largest cosmological structures. Gemini continues to fulfill this goal as an efficient, nimble, and responsive observatory. Gemini's flexibility offers a variety of observing and proposing modes to suit the varying needs of our individual investigators. For example, astronomers may choose to visit and conduct their own observations, or they may have staff execute their observations in a "queue" mode. The queue maintains access to the time domain and to the rarest observing conditions as needed. We also introduced the novel Fast Turnaround proposal mode: with its monthly proposal deadline and rapid peer review, successful proposers can obtain data as soon as a month after their first idea.

The second pillar of the Observatory is the development of instrumentation and the facilities. These development projects provide novel capabilities for users through new facility instruments and upgrades to existing ones, on both small and large scales. The facility instruments and adaptive optics systems remain stable on both telescopes, with improvements to the popular GMOS instrument, including a detector upgrade to increase sensitivity. Visiting instruments expand the range of capabilities for all users, and 2015 saw the repeat visits from several instrument teams. We introduced the Science User Support Department, concentrating the efforts to deliver post-observing support across the Partnership.

The third pillar in 2015 is the Transition Program which implements fundamental changes to the Observatory that are required for sustainable and worthwhile operation at a significantly reduced budget. The work of the Transition is largely complete now, and Gemini is poised to continue in a streamlined mode in the future.

The effects of these three areas of activity are evident in our users' science achievements; we describe some of these outstanding results to give a flavor of the range of astronomical interest and use of Gemini. Overall, the rate of peer-reviewed publications based on Gemini observations remains high, and adaptive optics results continue to appear frequently. Korean astronomers began using Gemini as limited-term Partners in 2015 and are already producing results, including the discovery of a distant quasar that has implications for the early evolution of the Universe. The Gemini Planet Imager (GPI) offers world-leading capabilities to all users and is enabling discoveries as part of the multi-year, multi-Partner GPI Campaign.

The Development Division, looking forward, executed projects to deliver new and improved instrument capabilities. One highlight was GRACES (Gemini Remote Access to Canada-France-Hawaii ESPaDOnS Spectrograph), which provides high-resolution optical spectroscopy at Gemini North via an innovative fiber connection to an existing

spectrograph located at the neighboring Canada-France-Hawaii Telescope. The next facility-class instrument continues to advance: its critical design review was held this year. Four different teams produced feasibility studies to inform the requirements of the subsequent instrument. Finally, we launched a call for small upgrade projects, to engage Partner members to deliver scientifically-motivated improvements to existing instrumentation.

Gemini supports broadening participation in science and technical fields, and we communicate our activities with the general public and users. Our flagship public outreach programs, Journey Through the Universe in Hawai'i and Viaje al Universo in Chile, remained successful, attracting new supporting partners to reach our local communities. These weeklong programs attracted over 14,000 participants through classroom visits and public events. We expanded *Live from Gemini,* providing virtual fieldtrips to the telescopes in partnership with the Hawai'i State Department of Education. Students used Gemini observations to produce attractive and scientifically useful images. We continued to support strong communications with our users through a quarterly newsletter, a monthly electronic newscast, social media, web features, and directed communications. Gemini maintained a vigorous intern program, hosting 26 interns in all areas across both sites.

Gemini continues to improve the rigor of our budget planning and reporting. Table 1-1 summarizes the budget, distinguishing funds for Operations and Maintenance (O&M), the Instrument Development Fund (IDF), and the Facility Development Fund (FDF). O&M spending exceeded Partner contributions in 2015 as planned, relying on past unspent funds to smooth the transition to a reduced budget.

Fund	2015 Actual
Operations and Maintenance (O&M)	28,494
Instrument Development Funds (IDF)	2,117
Facilities Development Funds (FDF)	36
Total	**30,647**

Table 1-1: 2015 spending by fund, values in US $1000.

The two most significant sources of variance compared with the original planned budget in O&M are the extremely favorable foreign exchange rate of the United States dollar compared with the Chilean peso and hiring lag. IDF variance is due to contractors' delays in meeting milestones, which deferred payments. The staffing level remained stable over the year, with an average of 175 full-time equivalents (FTEs; summarized in Table 1-2).

Division	FTE
Administration	17.4
Development	17.3
Operations	122.0
Deputy Director	12.3
Directorate	6.0
Total	**175**

Table 1-2: 2015 staffing.

In 2016, Base Facility Operations will extend to Gemini South, and energy savings projects now in process will be completed. Regular operations will occupy the vast majority of effort and budget, delivering high-quality nighttime use of the telescopes and instruments for the benefit of our observers' scientific programs. We will move from studies to execution of the next facility instrument, and long-term instrument and facility improvements will continue.

2 Introduction and Overview

Gemini Observatory's mission is
To advance our knowledge of the Universe by providing the international Gemini Community with forefront access to the entire sky.

Our foundation is the twin 8.1-meter telescopes on Maunakea, Hawai'i, and Cerro Pachón, Chile, with their complement of instrumentation that provides a range of broad and specialized capability across the optical–infrared bandpass, including adaptive optics. Building on that foundation is our multi-national astronomer user community, including Gemini's own scientific staff. Our users are directly responsible for Gemini's scientific achievements, pursuing their interests that range from scales of the Solar System to the most distant galaxies and structure of the Universe. Gemini Observatory provides the flexible, responsive platform that enables these advancements.

2015 has been an exciting and productive year, in which the Observatory and the facilities it offers users have transformed. We introduced a novel mode to access the telescopes, the Fast Turnaround program, which offers peer review to obtain data in as little as a month after first proposal. This new mode follows last year's introduction of Large and Long Programs, which we continue today. We completed the first phase of Base Facility Operations, fully operating the Gemini North telescope from the control center in Hilo, Hawai'i, with no staff at the summit. This regular mode of operation is part of Gemini's Transition Program, in which we restructured the Observatory to function robustly despite a budget reduction of roughly 25%. 2015 marked the last full year of activity in the execution of the Transition Program, which has set us on a sustainable course for 2016 and beyond. We continued to advance the major instrument in progress, and we completed the feasibility studies for the next facility-class instrument.

Section 3 describes scientific highlights from the Gemini Observatory, which include discoveries of new planets based on observations with the world-leading Gemini Planet Imager (GPI). Section 4 reports on our Operations, including the daily preparation and nightly use of the telescopes. We also present summaries of user interactions, new proposing and observing modes, Observatory metrics, and we describe specific activities that are part of the Transition Program. Section 5 discusses accomplishments in instrumentation and facility development, including adaptive optics capabilities, progress on new facility-class instrumentation, and upgrades of existing instruments. In Section 6, we review our educational programs, our efforts toward broadening participation, and our communications for users and the general public. Section 7 summarizes administration and finance. Section 8 contains the program plan for 2016.

3 Science Highlights

3.1 The Deepest Ground-Based Photometry in a Crowded Field

Paolo Turri (University of Victoria, Canada) and colleagues used the Gemini Multi-conjugate adaptive optics System (GeMS) with the Gemini South Adaptive Optics Imager (GSAOI) to produce the most accurate and deepest near-infrared photometry of a crowded field from the ground. Their *Ks* measurements of the galactic globular cluster NGC 1851 reached the precision and depth of optical observations obtained using the Hubble Space Telescope, and the resulting combined color-magnitude diagram revealed physical characteristics of the cluster. Notably, they detected the double subgiant branch in the cluster center, which is evidence against a single, uniform population of stars. They also measured the main sequence well below its turnoff, for 3.5 magnitudes (Figure 3-1). (Turri *et al.* 2015 *ApJ* 811 L15)

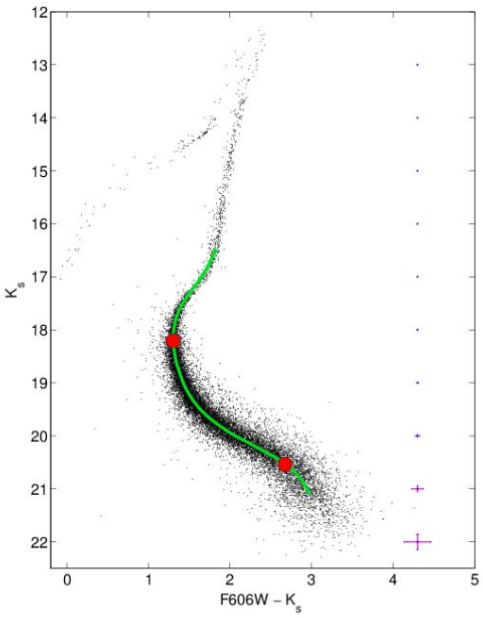


Figure 3-1: Red dots on this color-magnitude diagram of globular cluster NGC 1851's crowded center mark the main sequence turnoff and the main sequence knee, around Ks = 18 and 20.5, magnitudes, respectively.

3.2 Discovery of the Most Jupiter-like Exoplanet

Observations using the Gemini Planet Imager (GPI) revealed a planet about two times the mass of Jupiter orbiting the young (20 Myr) host star 51 Eridani (Figure 3-2). The data also provided the strongest-ever spectroscopic detection of methane absorption in a planet outside the Solar System. The result differs from most other exoplanets imaged, which have atmospheres more similar to cool stars. The discovery also validated the combined imaging and spectroscopic approach to identify exoplanets. (Macintosh *et al.* 2015 *Science* 350 64)

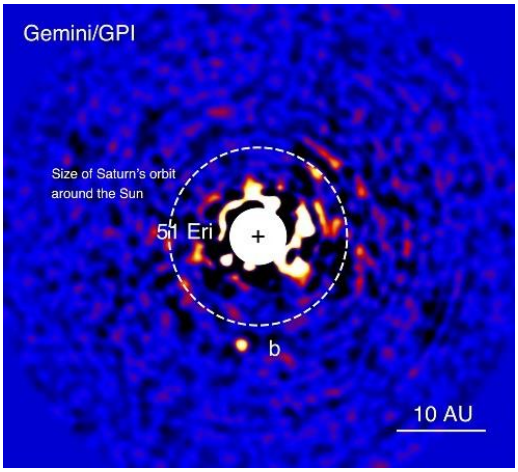


Figure 3-2: This *H*-band image shows the newly-discovered planet 51 Eri b, which is 10^6 times fainter than its host star.

3.3 Best View of an Exoplanet Orbit

Observations using GPI provided images and polarization measurements of the β Pictoris (β Pic) system that probed angular scales smaller than ever before, from ground or space. The dynamical interactions of exoplanet β Pic b and a debris disk offer tests of planet formation models. A further advantage of the new data is that they covered observations of the disk and planet together for more than a year, reducing errors in measurements of their relative positions. The planet is visibly offset from the alignment of the outer disk. The Gemini website[1] provides an animation of the planet's observed orbit. (Millar-Blanchaer *et al*. 2015 *ApJ* 811 815)

3.4 A Young Solar System Analog

Gemini, with GPI, imaged the bright disk around HD 115600, finding it to be a younger version of the Kuiper Belt, around a host star in an environment similar to the Sun's. The eccentric structure of the emitting disk is consistent with its being shaped by planets like those in the Solar System, at similar distances from the host star. Many systems that have been observed previously required unusual super-sized planets (larger than Jupiter). (Currie *et al.* 2015 *ApJ* 807 L7)

3.5 An Asymmetric Polarized Disk

GPI found an intriguing result for the circumstellar debris disk around the star HR4796A: despite the overall symmetry of the disk's total flux (Figure 3-3, left), the polarized intensity is strongly asymmetric (Figure 3-3, right). The asymmetry seems likely due to forward scattering by relatively large dust particles, which contradicts previous interpretations of the system. The disk seems to be optically thick in the near infrared, suggesting it is geometrically narrow (perhaps due to "shepherding" planetary bodies) and dynamically cold. Saturn's rings are an analog, where shepherding by larger bodies is dynamically important. (Perrin *et al.* 2015 *ApJ* 799 182)

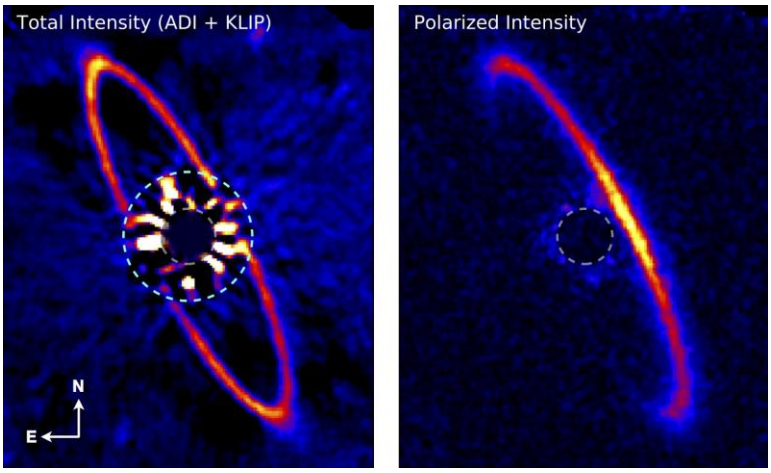


Figure 3-3:
The debris disk around HR4796A is evident in total flux (left) and polarized images (right), obtained using GPI in the K1 band (~2 μm). Detailed analysis suggests the presence of large dust particles and the possibility of "shepherding" planets. Each image is approximately 2 arcseconds by 2.5 arcseconds in size.

[1] http://www.gemini.edu/node/12422

3.6 Water Vapor in a Terrestrial Planet Region

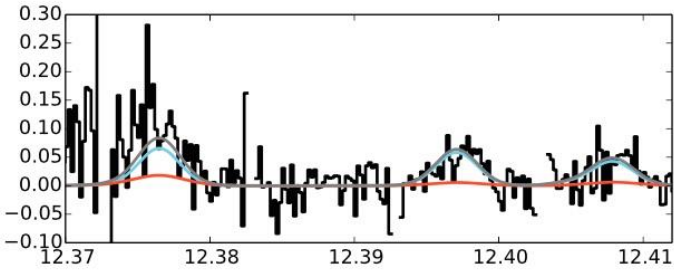


Figure 3-4: This spectrum of the planet-forming region around the young star DoAr 44 (black) shows water vapor in emission; the colored lines indicate different models, with the red line being the expect emission for an object at this stage of its evolution.

Figure 3-4 shows the spectrum of a planet-forming region around the young star DoAr 44 taken with visitor instrument TEXES on Gemini North. This "transition disk" object is unusual in showing water in emission; such emission normally does not appear until later stages of evolution. The unexpectedly high water content in the inner ring of DoAr 44 may be replenished by material from the outer disk. Alternatively, planets may affect the chemistry in this region where terrestrial planets develop. (Salyk *et al.* 2015 *ApJ* 518 512).

3.7 Single-Degenerate Origin of a SNIa

Gemini followed up a SWIFT satellite gamma ray burst trigger as part of a Large and Long Program. Gemini's observations using GMOS were critical for classifying the source rapidly as a type Ia supernova (SNIa) and for measuring the host galaxy's redshift. The origin of these supernovae is disputed, and this detection points to the "single-degenerate" origin, with accretion from the companion of a white dwarf and survival of the donor. The ultraviolet emission was initially bright and decayed rapidly, where collision with ejected material produced the emission. These characteristics would not have been observed in a "double-degenerate" SNIa. (Cao *et al.* 2015 *Nature* 521 328)

3.8 Discovery of a z~6 Quasar

The first publication from Korea's limited-term partnership with Gemini reported the discovery of a faint quasar at redshift *z*~6, which helped to constrain the role of such objects as the sources of reionization in the early Universe. Spectroscopic data from GMOS-South confirm the object's identity and determined its redshift. This source and six additional candidates from the same survey are consistent with limited contributions to reionization from the faint end of the quasar luminosity function. (Kim *et al.* 2015 *ApJ,* 813, L35)

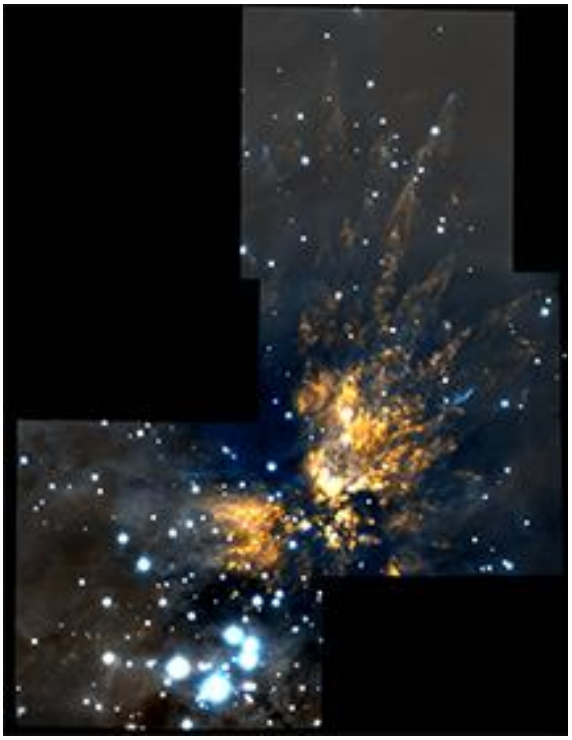


Figure 3-5: The Orion "bullet" outflow, observed with GeMS and GSAOI.

3.9 Evolution of an Explosive Stellar Outflow

The large scale of the outflow of the Orion Molecular Cloud 1 and the common dynamical

age of the many moving knots point to an explosive origin. Using GeMS and GSAOI, John Bally (University of Colorado) and collaborators directly measured the motion of specific fingers in the outflow and their morphological changes. They suggest that stellar merger events could produce such outflows, which would also trigger the runaway of massive stars from their birthplaces. In Figure 3-5 (previous page), the leading fingertips appear in [Fe II] (cyan), and the trailing fingers are evident in molecular hydrogen emission (orange) in this near-diffraction limited image. (Bally *et al.* 2015 *A&A*, 579 130)

3.10 An Extremely Massive Black Hole at z > 6

Infrared observations using GNIRS confirmed a 12 billion solar mass black hole in an exceptionally bright quasar in the very early Universe. The observations in the *z*=6.3 host galaxy imply extremely rapid black hole growth; *i.e.* mass accretion at the Eddington limit over most of cosmic time. The quasar is one of the most luminous overall and the most luminous one known at *z* > 6. Figure 3-6 shows the GNIRS spectrum combined with observations from the Magellan Telescope in red. The optical spectrum (from the Large Binocular Telescope; black) and noise are also plotted. The MgII emission (blue in the inset) was used to determine the black hole mass. (Wu *et al.* 2015 *Nature* 518 512)

As described above, Partner community astronomers use the Gemini facilities effectively to make scientific discoveries. Overall, the publication rate based on Gemini observations continues to be strong, although we may be reaching a plateau. A total of 203 refereed publications were published in 2015 (Figure 3-7). Publications remain relatively balanced between Gemini North (110) and Gemini South (122), with slightly more results based on Gemini South observations for the first time. More than 40% of publications are based on more than one program, and some use data from both telescopes.

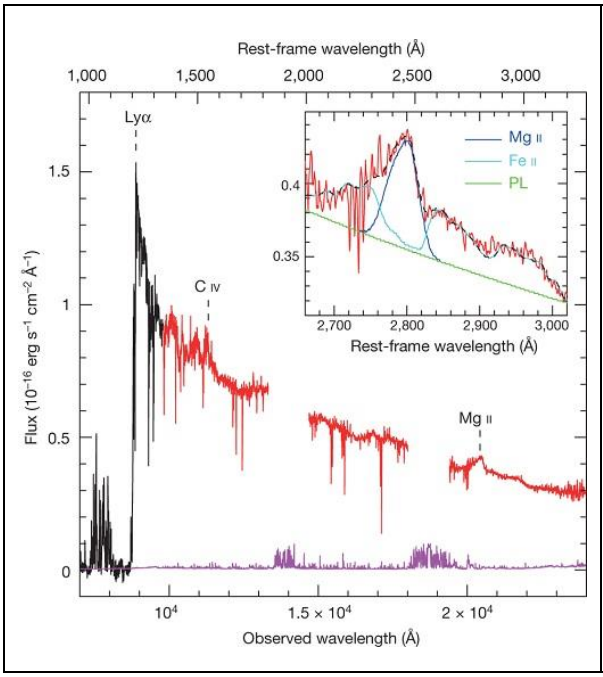


Figure 3-6: Data from GNIRS confirm a 12 million solar mass black hole in a distant quasar.

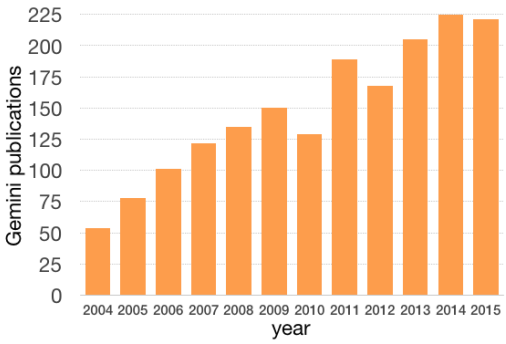


Figure 3-7: Number of refereed publications based on Gemini data, from 2004 through 2015.

The use of adaptive optics remains strong, with 41 (20%) of these publications utilizing Gemini adaptive optics capabilities. More than 20% of these 2015 publications have a Gemini Observatory staff member as lead or co-author. All Gemini staff publications are listed in Appendix B, and all publications based on Gemini data are listed in Appendix C.

The Observatory serves hundreds of Principal Investigators (PIs) each year, who have access to a variety of different program types and observing modes. We list the total numbers of approved programs by proposal type for the semesters 2014B and 2015A in Table 3-1. National Time Allocation Committees evaluate "Semester" programs, which may be executed in queue or classical mode. Semester 2014B was the first semester of observations for Large and Long Programs (LLPs), and Gemini introduced the innovative Fast Turnaround mode during 2015A. These are described more below (§4.4). Project titles and PIs in these completed semesters are listed in Appendix D.

Proposal Mode	number
2014B	
Semester	189
Large and Long	7
Fast Turnaround	0
Director's Discretionary	16
2015A	
Semester	199
Large and Long	7
Fast Turnaround	9
Director's Discretionary	19

Table 3-1: Number of programs per proposal mode, for completed semesters.

4 Operations

4.1 Operations Summary

The Operations Division of Gemini is responsible for maintaining the instruments and telescopes to conduct science observations on sky. Its staff monitor performance and take remedial action, as necessary, and conduct planned maintenance and improvements. They support science users, from the time allocation process, including in preparation of observations and with data reduction using tools provided by Gemini. The outcomes of these activities in 2015 are described in the following sections, and Section 4.7 provides a summary of operations metrics.

The 2015 program plan provided a list of "regular operations" activities and tabulated specific additional major tasks scheduled for 2015. These major items are listed in Table 4-1 and Table 4-2. The main major tasks are already complete. Most of the operational model review was complete by year end. GeMS operational stabilization has progressed, but not as far as originally planned due to significant effort being required on other instruments and projects (GPI, GeMS, and the new natural guide star sensor for GeMS). We expect to review this work in 2016Q1 and prioritize the remaining activities for 2016. Throughout this section we describe progress with all of these activities, list changes and decisions taken within the year, and give highlights of the regular operations activities.

Title	Completion	Section
Mirror Recoating	100%	4.7.2
Review of Operational Model	80%	4.10
Fast Turnaround Programs	100%	4.6
Stabilize GeMS Operations	50%	4.3.2
Conclude Dome Shutter Failure Work	100%	4.7.3

Table 4-1: Major Operations activities in 2015.

Title	Completion	Section
Incorporation of KASI as limited-term partner	100%	4.1

Table 4-2: Other Operations activities in 2015.

4.2 Instrumentation

4.2.1 Gemini North

GMOS-N

GMOS-N is performing very well; fine probe mapping implemented in November 2014 speeds up science acquisitions and increases the accuracy of blind offsetting. The R150 grating is degrading in throughput and will be replaced once staff time is freed up from the Base Facility Operations project.

GNIRS, NIRI and NIFS

All three of the infrared instruments have been performing well, with occasional cold-head issues in GNIRS and NIRI. The most significant problem for those two instruments remains the array controllers, which are unreliable and intermittently produce excess noise.

GRACES

GRACES offers high-resolution optical spectroscopy using a long fiber to combine the collecting area of the Gemini North telescope with the existing Canada-France-Hawaii spectrograph, ESPaDOnS. After a successful initial experimental phase in 2014B, GRACES saw no further action until recommissioning with improved optics in July (§5.4). We used it for a first science observing block in August 2015. A non-facility instrument, it is currently operated using IDL scripts written by Gemini science team members and operated in blocks rather than in the queue. The instrument is performing well and its popularity appears to be increasing.

4.2.2 Gemini South

GPI

Vibrations induced by GPI's own cold-heads have been present since its first installation on the telescope; these vibrations feed through to the telescope optics and affect performance. After various attempts to use tuned passive vibration dampers failed, we installed active vibration dampers on the cold-heads and realized a factor of ten decrease in the vibrations in the lab. Optomechanically, the instrument is working well, with the exception of the Pupil Plane Mask, which contains apodizers and the Non Redundant Mask. This mechanism became mechanically unreliable in mid-year and has been fixed in one position (H) to avoid the worst case in which it gets stuck in an intermediate position and blocks the beam. We are working to determine the possibility of an in-situ repair without dismantling the instrument. For 2016A, five out of approximately 40 proposals request the other filter, K2.

Turnover of GPI-trained science staff led us to schedule GPI in blocks rather than continuously in the queue. This block scheduling combined with bad weather resulted in a poor completion rate of GPI programs in the queue. Six of the eleven programs accepted into band 1 in 2015A were not started. We have intensified the training effort, doing nighttime training from the base facility. Our aim is that training status should not be a limiting factor as early as 2016A.

FLAMINGOS-2

FLAMINGOS-2 (F2) has been operated in imaging and long slit modes without major faults. The gate valve baffle positioning issue reported on previously was successfully remedied during a planned instrument stand-down in March 2015, and the thermal background level in spectroscopy returned to nominal as a result. The new K-long spectroscopic filter, which extends R3000-grism spectroscopy from the previous Ks band (1.9-2.3 microns) to a broader 1.9 – 2.5 microns, plus a 6 arcmin slit mask were also installed during this shutdown.

GMOS-S

The most significant issue with GMOS-S has been with the new Hamamatsu deep-depletion CCDs and associated electronics. The "saturation effect" which suppressed channel background levels in the vicinity of hot pixels, bad columns, bright stars or arc lines, was cured in August 2015 by upgrading the controller video boards; this was the culmination of a major development effort that will also be employed in the GMOS-N CCD upgrade. The "charge smearing effect", seen originally in 2014 but absent for most of 2015A, reappeared in May on CCD 1 but disappeared spontaneously by the end of July. We carried out tests and inspections inside the camera dewar during the 2015B telescope shutdown, and replaced the detector cable for CCD 1. GMOS-S has been operating very well since this work was completed.

GeMS

By late 2014 we had traced and fixed the image elongation problem originating in Canopus optical alignment. As mentioned in the previous annual report, the work required on this and on the laser put back GeMS sustainability efforts into 2015. The single most significant accomplishment in that area was the completion of the commissioning of the "spare" GeMS real-time computer. The laser remains a major source of concern. Its power and beam quality have tended historically to degrade to a level at which operation becomes very difficult or even impossible. We brought in external experts to work on the laser and by mid-2015 it was running reasonably stably at a power output of 30W (compared to the specified 50W). GeMS operation presented a major, but decreasing overhead through 2015, as procedures were improved and the required staffing level in summit night-time operations dropped. The March 2015 run was very successful and the smoothest operationally since commissioning in 2013. Performance was affected by telescope-induced vibrations in the first half of 2015; we succeeded in partially mitigating these in software until the problem was traced to the secondary mirror unit and remedied.

We canceled the September 2015 GeMS run due to the major Chilean earthquake. It would in any case have been a very low efficiency run as the weather was poor. We later canceled the November 2015 run, after a major effort to recover the laser from misalignment suffered during the earthquake. The completion rate of GeMS programs in 2015B will be poor. We continue to bring in external experts to work with our own laser staff to recover the GeMS laser. We expect to be operational again at the start of Semester 2016A.

4.3 Science User Support Department

The Science User Support Department (SUSD) was formed in late 2014 to create a collaborative community of users and staff and consolidate post-observing support. The mission of the SUSD is to enable Gemini Principal Investigators to produce world-class scientific results in a timely manner. Areas of attention include data archiving and reduction, interactions with the National Gemini Offices (NGOs), and oversight of the HelpDesk and Data Reduction User Forum systems. As an additional community-building activity, we hosted a Bring-Your-Own-Data Workshop in concert with the UCG at the Future and Science of Gemini Meeting in Toronto. Some 30 participants plus about 5 staff members broke up into five groups to discuss a variety of data reduction issues [*e.g.*, GMOS multi-object spectroscopy (MOS) sky subtraction and GSAOI distortion correction], to share suggestions, and to make connections. Many participants felt it was beneficial to swap data reduction experiences and learn from others. We have begun efforts to increase participation in the Data Reduction User Forum to enhance this collaborative Gemini data reduction community. We have collected additional suggestions for improvement from inside Gemini, NGOs and UCG, and are identifying changes to implement.

Observatory staff now support US PIs through Phase II. In return, the US NGO undertakes a program of work in support of the entire Partnership, agreed on a six-monthly schedule with Gemini. Examples of work completed in 2015 include a data reduction workshop at the January 2015 AAS that was so successful it is to become an annual event, reorganization of the US NGO web pages with an emphasis on data reduction support, and refurbishment and preparations for a return of Phoenix to Gemini South as a visiting instrument.

Data reduction software development efforts have concentrated on finishing the Quality Assessment Pipeline (QAP), part of Gemini's Transition Program, providing tools for nighttime assessment. Imaging modes are complete with one exception (GSAOI). Key user data reduction software deliveries (Gemini IRAF) include tools that the GMOS-South Hamamatsu CCDs require.

4.4 New Observing and Proposal Modes

Large and Long Programs (LLPs) continued essentially unchanged from the previous year, offering up to 20% of the observing time from the participating Partners (US, Canada, and Argentina), for programs that require larger-than-typical amounts of time, extended execution (*e.g*., for monitoring), or both. LLPs are carried out, by default, in the "Priority Visitor" mode, in which a team comes to the telescope for more than their allocated time in the semester and observes their own program at their own discretion and queue programs otherwise. We continued the development of documentation to enable visiting LLP teams to carry out observations in the regular queue in their "excess" time, and we released it to users at Gemini North in 2015A. LLPs remained popular for new programs to begin observations in 2015B, with an oversubscription rate exceeding 5.

The Fast Turnaround (FT) mode offers a monthly proposal deadline and relies on peer review (by the proposers) to evaluate the proposals. This novel program enables an initial idea to produce data in as little as one month. We require a minimum rating of any accepted proposal, even if time is available, and the review process includes many opportunities for user feedback. Up to 10% of Partner time on Gemini North was made available from the beginning of the year, and as of October, Gemini South is also open to FT. Observing commenced in March 2015, employing dedicated nights set aside for the purpose. With experience, we found that it was good for both FT and regular queue programs to enable "trading" of time between the FT and regular nights, and once it also became clear that the standard of refereeing from the FT peer review process was consistent with that in the normal Time Allocation Committee process we merged the FT programs into queue nights, no longer dedicating nights specifically for one or the other. Users have responded very positively to this new mode, and the first scientific results have been published.

4.5 Telescopes and Enclosures

4.5.1 Image quality

A concerted effort has been put into mitigating intermittent image quality issues seen at Gemini North over the past few semesters, involving staff from Operations Division and the Telescope/AO Department. These issues were traced to two dominant sources:

1. Primary mirror mount vibrations induced by the cold-heads (GNIRS in particular). Software that introduces a cancelling motion into the secondary mirror system has been completed and put into regular operational use in 2015A, for targets where 200-Hz guiding is possible. The vibrations can be minimized at source by fixing the Cassegrain rotator at zero degrees, but that is not always an option.
2. Telescope misalignment that caused a varying focus across the plane of the peripheral wavefront sensors. We worked to measure and correct these offsets in 2014B and 2015A, and as a result significant adjustments were made at both sites. This has resulted (by 2015A) in better image quality, with no dependence on guide star location in the focal plane.

4.5.2 Mirror coatings

Both telescope shutdowns in semester 2015B completed successful mirror coatings; in the North we coated the secondary mirror and in the South, the primary. Gemini North staff coated the GN secondary with only remote support from the Gemini coating engineer, and Gemini South staff coated the primary (a much bigger operation) with on-site involvement of the Gemini North optical engineer and local staff from both NOAO-South and SOAR.

4.5.3 Gemini North dome shutter

One night was lost in December 2014, when a link in the shutter drive chain sheared, probably a remnant of 14A shutter failures. We developed remediation plans and have received an external, independent report. We have implemented the majority of the recommendations from the report, which include mechanical modifications and changes in regular maintenance and testing procedures.

4.5.4 Condensation issues at Gemini South

Significant time has been lost in previous years to condensation in conditions of high humidity and dew point during southern summer. This is a design consequence of the cooling system developed for Gemini North, which did not take into account the difference in ambient temperature at the two sites. We mitigated the problem during the October shutdown by systematically increasing the coolant temperature in the circuit leading to the top end control computer, enlarging the pipework to provide greater flow rate, and improving the air flow in the computer crate itself.

4.5.5 Gemini South power supply

Gemini South operations were plagued by approximately 20 commercial power cuts during 2015A. Some of these interruptions were not “clean”, causing disruption to the instruments. Work continues on the Cerro Pachón transformer and 2015B has seen a significant improvement. We have also taken delivery of a second generator to provide more reliable, long-lived power in the event commercial outages.

4.5.6 Gemini South earthquake and recovery

A magnitude 8.3 earthquake struck northern Chile on September 16, 2015, approximately 150 kilometers from the Gemini South telescope. Operations staff repaired and recovered the telescope, its systems, and instruments. They worked through systematic procedures based on Gemini’s previous experience with the 2006 magnitude 6.7 earthquake in Hawai‘i that damaged Gemini North. Recovery of the altitude and azimuth bearings required the most effort. Repair time and continuing aftershocks halted scientific observations for 11 nights. We will further report on the impact of this closure on program completion in the 2016 submission, which will cover semester 2015B.

4.6 Storage and Archiving

We finished development of the new Gemini Observatory Archive[2] and released it to users. The new archive replaced the CADC-hosted Gemini Science Archive (GSA) on schedule in November 2015. Table 4-3 on the following page shows the final set of operational statistics for the GSA.

[2] https://archive.gemini.edu/searchform

Period	Helpdesk tickets resolved	Dealt with by GS Obsv. Staff	Site Hits	Queries	Fits images ingested (all)	New rows in science table	Proprietary data users	Uptime	Total file size (Gb)	Total download (Gb)
Oct-Dec 2014	32	1	58903	25332	73167	12627	1616	99.42%	25915	1143
Jan-Mar 2015	36	4	84250	43271	54951	13361	1661	99.40%	26897	4890
Apr-Jun 2015	31	0	69583	26141	70819	16861	1697	98.71%	27289	6547
Jul-Sep 2015	28	0	68843	28598	45596	1923	1726	98.72%	28796	5108

Table 4-3: Statistics of the Gemini Science Archive for the past four complete quarters.

4.7 Operations Metrics.

The statistics in this section refer to demand and performance in the last two complete semesters: 2014B and 2015A. Approved science programs, all in modes, for these semesters are listed in Appendix D.

Weather losses were a significant factor in 14B at Gemini North. Hurricanes Iselle and Ana cost 3 nights in each of August and October. Iselle was the strongest tropical cyclone to make landfall on the Big Island of Hawai‘i in recorded history. High winds and later, fog, ice and snow, cost further extended periods in November, December and January. In spite of this, Gemini North Band 2 completion rates (Figure 4-1) rebounded from their previous low values. In March 2015, Chile suffered a damaging storm, which suspended science operations for an extended period. A number of nights were lost to high humidity in the southern summer and power interruptions as described above (§4.5.4 and 4.5.5). The completion rates of LLPs and FT programs in a given band are similar to the rates of the semester-allocated programs, being subject to the same weather and closure challenges.

4.7.1 Telescope Time Usage

Tables 4-4 and 4-5 show top-level time and fault distributions and science usage.

Semester	Site	Science	Engineering & Commissioning	Fault loss	Weather loss	Shutdown
14B	North	62%	3%	3%	25%[a]	7%
	South	62%	5%	6%	20%	8%
15A	North	66%	4%	3%	27%	0%
	South	66%	4%	5%	25%	0%

[a] Note that at present, band 4 observing time in the south is not counted as weather loss; in the north it is. This reflects significant differences in the north and south weather patterns and the presence of niche instrumentation requiring particular conditions in the south.

Table 4-4: Overall operational statistics, semesters 2014B and 2015A. Science time–the time spent observing science programs and calibrations—is distributed among Bands 1, 2, and 3 according to weather conditions and program priorities within the semester.

Semester	Category	North	South
14B	Computer/Software	19%	12%
	Instruments & AO Facilities	33%	47%
	Telescope & enclosure	47%	41%
15A	Computer/Software	24%	9%
	Instruments & AO Facilities	29%	44%
	Telescope & enclosure	47%	47%

Table 4-5: Categorized fault distribution, semesters 2014B and 2015A.

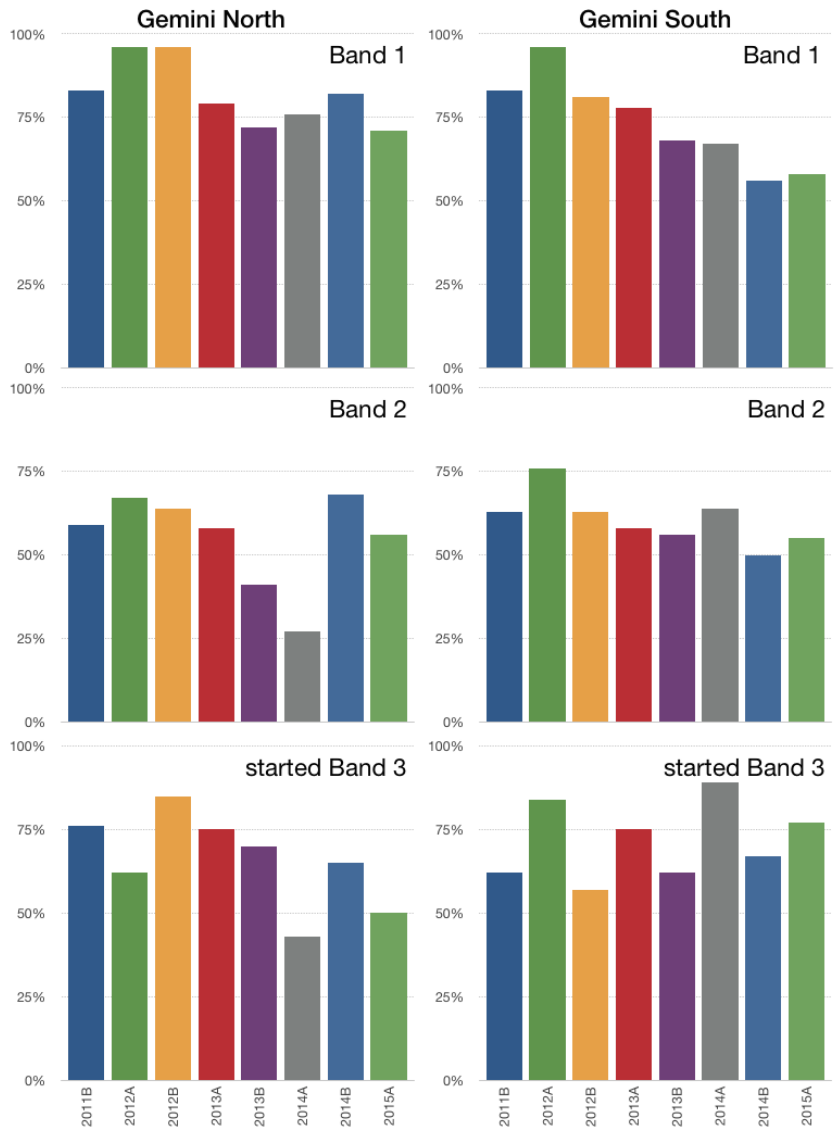


Figure 4-1: Completion statistics for GN and GS. 2014B and 2015A are represented by the bars at the right of each group. Note that Band 1 completion rates in the final two semesters may improve as some Band 1 programs have rollover status. Bands 1 and 2 show the fraction of programs that were completed to 100% of allocated time. Band 3 shows the fraction of *started* programs that were completed to at least 75% of allocated time.

4.7.2 Oversubscription and Demand

Oversubscription rates of the two telescopes by Partner are shown in Figure 4-2. These rates refer to regular semester-based queue and visitor proposals, and are calculated as the ratio of the total time PIs request to the total advertised available science time. These rates do not account for the time required for standard calibrations. Such calibrations vary by instrument, resulting in an effective factor of between 5% and 10% that is not part of the over-subscription rates shown. (The difference between the telescopes is a consequence of the different instruments used, with the infrared instruments generally having larger overheads for calibration.) In addition, because programs are approved to fill 80% of the queue time available, these values further underestimate the effective oversubscription (*i.e.*, a proposer's success rate) by a factor of 25%. The distribution of time allocated by instrument is shown in Figure 4-3. In addition to these semester allocations, the oversubscription rate for LLPs was 5.2 in 2014B and 5.0 in 2015A, and for FT XX in 2015A (the first semester of this program).

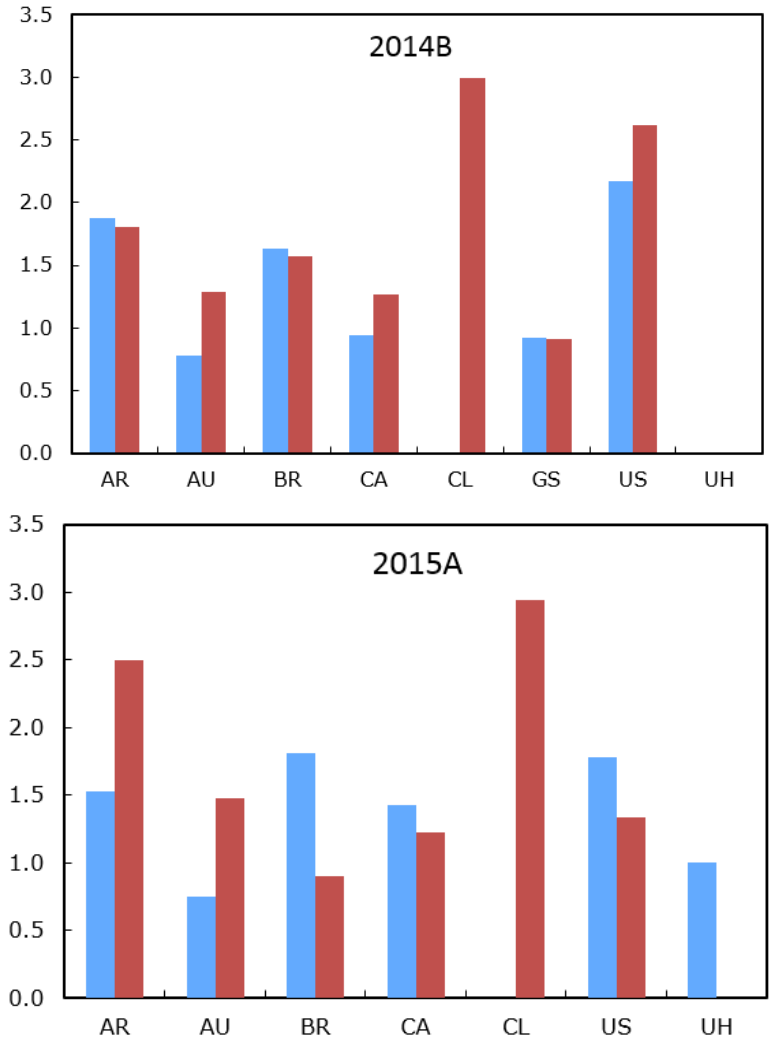


Figure 4-2: Oversubscription of Gemini North (blue) and South (red) for Semesters 2014B and 2015A, by Partner. We do not include the Subaru exchange program, as the oversubscription of that time is a significant function of the finally-adopted number of exchange nights, or allocations through LLP and FT programs.

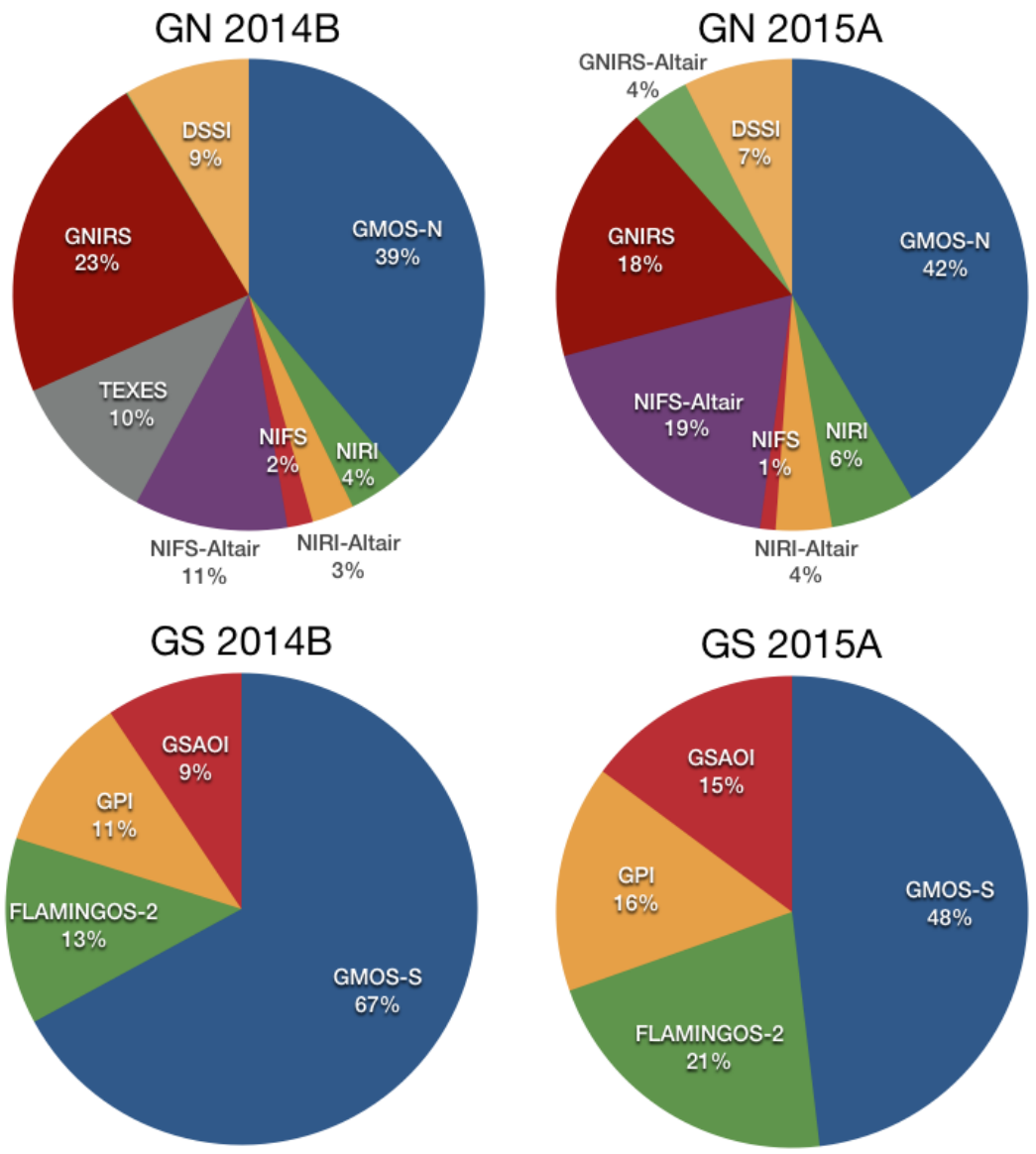


Figure 4-3: Allocations by instrument for semesters 2014B (left) and 2015A (right), including visitor instruments.

4.8 Operational Model Review

We have systematically reviewed the principles of science operations at Gemini. The time is right for this exercise after nearly 15 years of operations and significant changes over recent years: the reduction in staffing that is a consequence of the budget reduction and Transition Program; the move to base facility operations; the introduction of new types of proposing and observing programs; and support for visiting instruments, among others. Scientific staff conducted the review with the goal of identifying simplifications and efficiencies.

The following three principles guided the review:

1. maximize Gemini's science outcomes;
2. make the observatory as user-inclusive as possible; and
3. make operations as lean as possible.

Six working groups are carrying out the review, each focusing on one aspect: capabilities and modes; proposals and review; Phase II and scheduling; day and night operations; post-observing; and communications. The review was largely complete by the end of the year, and we will evaluate the results in early 2016. We will select the most advantageous proposals to implement in 2016.

4.9 Transition Program

The objective of the Transition Program is, by the end of 2015, to operate a sustainable, scientifically competitive observatory on an operations budget having buying power reduced by nearly 25%. Over the last three years, we have been implementing spending reductions of $6.5M compared with the 2012 budget. Gemini management examined the Observatory's core mission, identified the principal services that ought to be delivered, and restructured the operations accordingly to define the program.

The budget savings result from three activities:

1. reducing staff ("Labor" in Fig. 4-4);
2. generally reducing non-labor expenses where possible ("General non-labor" in Fig. 4-4); and
3. implementing projects either to support operations with a smaller staff or to achieve additional yearly savings ("TP non-labor" in Fig. 4-4).

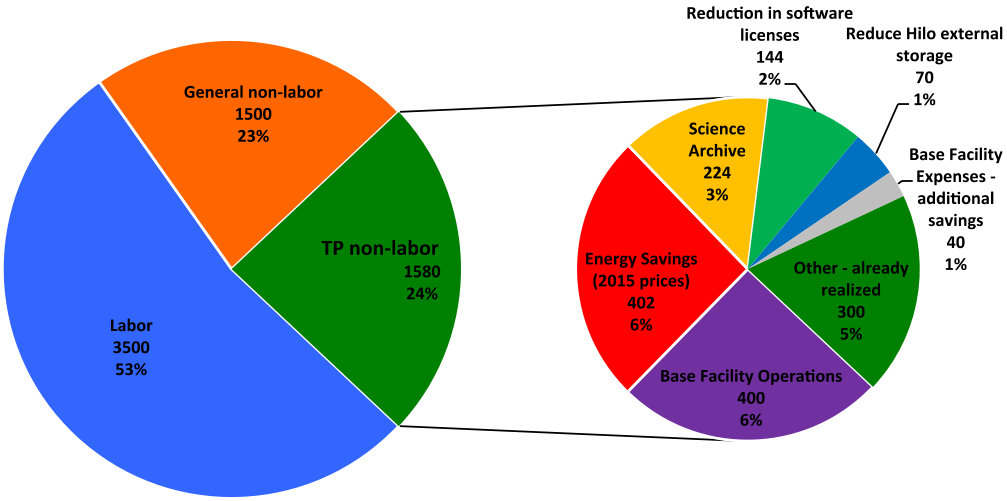


Figure 4-4: Distribution of the O&M budget reductions; amounts are in $1000. The expected savings from the Transition Program projects ("TP non-labor" on the left) is detailed on right.

The management of the Transition Program remained a top priority for the Observatory in 2015, the last complete year of its execution. We are on track to meet the required savings in all areas.

4.9.1 Staffing Reductions

The final post-transition level staffing of 160 FTEs will be reached in late 2017, a change from 212 FTEs in 2011. (This number included 14 administrative and human resources employees who are now paid through a non-labor charge to AURA.) We have continued to track the staffing closely during 2015, although we have not been able to keep all positions filled. In early 2015 we canceled hiring for any remaining temporary positions related to the Transition Program as the length of employment of these positions would be too short to make them attractive for well-qualified applicants. We instead focused on retaining current staff as well as rehiring for positions that became vacant due to voluntary departures from long-term positions. All staff members whose contracts will end as a consequence of the Transition have received notice. We plan for the staffing level to decrease slowly from the current 178 FTEs to around 166 FTEs by the end of 2016. The remaining FTE reduction will be achieved by elimination of the current temporary positions that support the Transition Program and other projects.

4.9.2 General Non-Labor Budget

We had established principles to reduce non-labor budgets, with specific plans for savings in the areas of supplies, travel, and computers. We successfully executed these plans, achieving reductions of $560k in these areas compared to 2013 actual expenses. Supplies and equipment accounts for the greatest fraction of the total, $400k. We will continue to apply these methods and have plans for further $720k savings in these areas in 2016.

4.9.3 Transition Program Projects

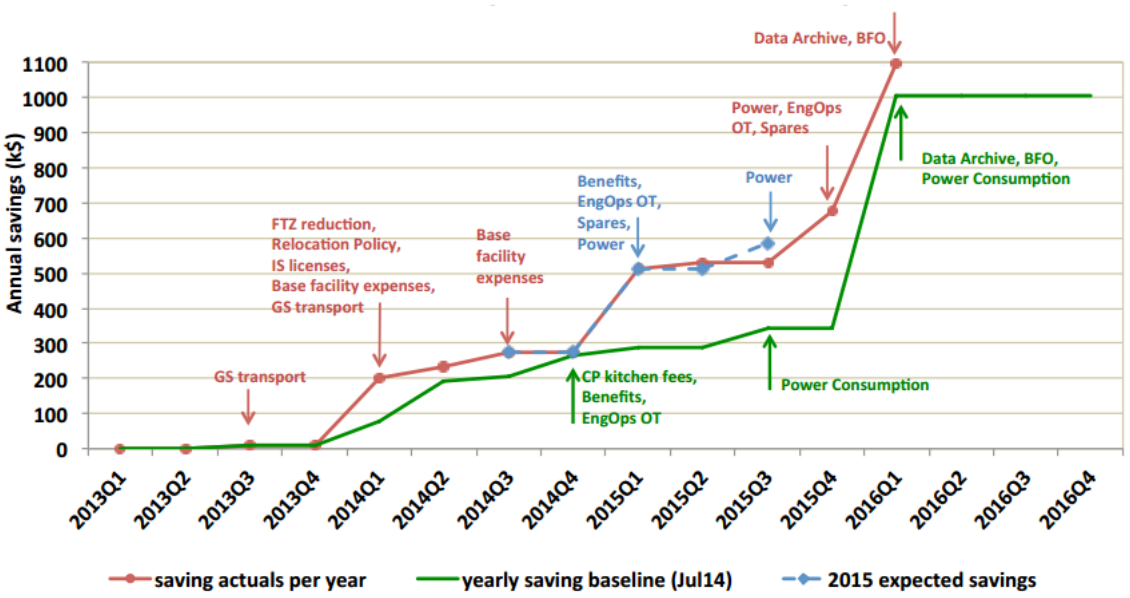


Figure 4-5: Transition Program non-labor savings. Current savings at end of 2015Q4 is $1.1Mk annually (red solid line). The blue dashed line shows our estimates as of late 2014. The slightly lower savings by 2015Q3 is due to a delay in obtaining the final approval from the Hawai'i utility company on the Maunakea photovoltaic system. The green line shows baseline savings planned, including discounts for confidence at the time of planning.

In Figure 4-5 we show the status of the annual non-labor savings as of the end of 2015Q4. The savings are at $1.1M annually (red line). The small shortfall relative to our prediction for 2015 Q3 as part of the 2015 budget process (blue line) is due to a delay in the final inspection of Maunakea photovoltaic system by the local utility company. This inspection was done in December 2015 and the savings of $61k annually have now taken effect. The other large savings that took effect as of the end of the year came from the Gemini North Base Facility Operations ($200k) and the Gemini Observatory Archive ($224k).

The Transition Program strategic map (Figure 4-6) shows the status of the projects as of December 2015. The two remaining software projects (*Real-Time Software Upgrade* and *Telescope Control Console Software*) will be executed starting in 2016, but as part of normal Operations. Four projects will have ongoing activity during 2016: *Base Facility Operations*, *Reduce Base Facility Expenses*, and the two energy savings projects. (See Section 8.4 for 2016 plans and goals for these.) All other projects are complete. The progress and status relative to the 2015 program plan follow, and remaining work for 2016 is detailed in Section 8.4.

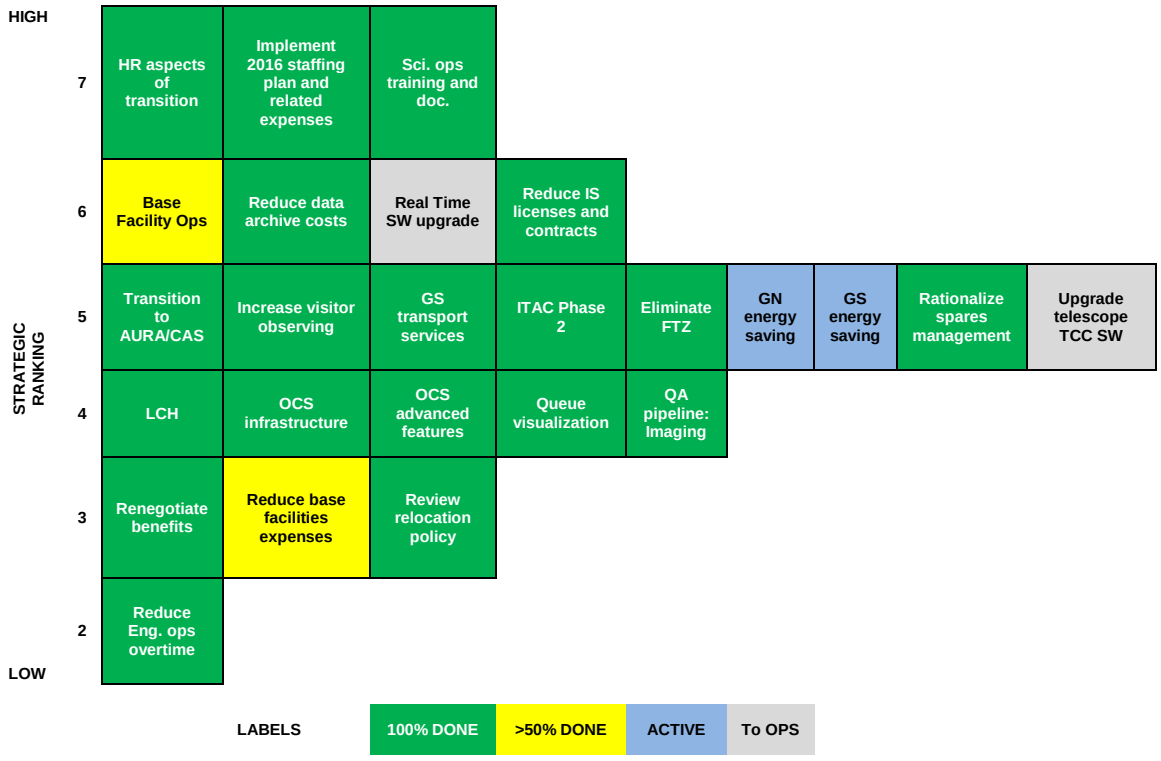


Figure 4-6: Transition Program strategic map as of December 2015.

Base Facility Operations

The implementation at Gemini North is essentially complete. After two months of base-like operations with observers still at the summit (confined to the control room), final testing with full operation from the base facility started in mid-November and quickly proceeded to operations without any backup support at the summit. Final handover of the project's products to operations will happen in January 2016. The planning for the implementation of BFO at Gemini South has started and will be complete in 2016Q4.

Reduce Data Archive Costs
We have completed the implementation of the in-house archive, the Gemini Observatory Archive. Testing by external users started in September 2015 as planned. All current users were notified of the change in November. The full switchover to the Gemini Observatory Archive was done in connection with the December 2015 software release.

GN/GS Energy Savings
We have completed the installation of the Maunakea photovoltaic panels. The Gemini South chiller has been replaced as planned. The work on the Gemini North cooling equipment (summit chiller replacement and HBF air conditioning system) is part of a large contract on energy savings and replacement of aging equipment, the result of our Gemini North Energy Audit. The construction related to this contract will extend into 2016. In early 2015 we identified funds to install photovoltaic panels at HBF and at Cerro Pachón as well. This construction also goes into 2016.

Eliminate FTZ
In early 2015 we received the final design and cost estimate for the implementation of additional storage at the Maunakea summit facility. The cost estimate was high ($634k) and the possible savings from completely vacating the Free Trade zone (FTZ) was only $27k per year. We changed the approach to lease a smaller FTZ space and cancel the construction on Maunakea. The total annual savings relative to the original FTZ use meet the required savings from this project ($70k/year).

Increase Visitor Observing
We produced documentation to support priority visitors at both sites. Roughly 15% of the nights in 2015 had Priority Visitors at both sites. During 2015B, half of the Gemini North Priority Visitor nights were run with support from one Gemini staff (the operator) as planned, while at Gemini South the first trials with only one Gemini staff as support took place in December. This Transition Program project is now complete.

4.10 Administration and Facilities

The Administration and Facilities Group (AFG) in the North and South provided a wide range of administrative and facility support services to employees and telescope users. The Observatory achieved significant advances in diverse AFG categories in 2015. We cite two examples: infrastructure and travel.

Facilities & Infrastructure:
We continued to seek opportunities for energy-saving initiatives in 2015. We improved computer rooms at all four sites (i.e., two summits and two bases). At the Southern Base Facility (SBF) alone, this provided a $50K reduction in energy consumption (Figure 4-7). We also replaced the SBF building HVAC system, saving Gemini 50% in running costs.

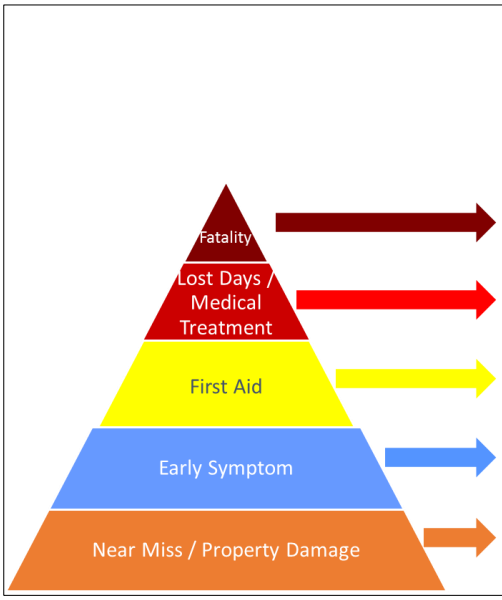
Figure 4-7: SBF data center improvements enhance efficiency.

Travel services
The use of the new AURA CAS system enhanced internal control and efficiency of the travel request process and travel expense reporting.

4.11 Safety

The Safety team worked closely with staff and supervisors during 2015 in achieving further reduction of the number and lost time of safety incidents (see Figure 4-8). The reduction of safety risk at Gemini was verified by workers' compensation auditors and drove savings of $50k in workers' compensation insurance in 2015.

The Safety team distributed the revised Safety Manual of the Gemini Observatory, both physically at GN and GS as well as online. Completion of Level A Safety Awareness training increased to 65% in 2015; this was the result of improved training materials and managers' actions to promoting compliance.



	2015		2014		2013		2012	
	Cases	Lost Days	Cases	Lost Days	Cases	Lost Days	Cases	Lost Days
Fatality	0	0	0	0	0	0	0	0
Lost Days / Medical Treatment	2	5.5	1	7	2	28	2	185
First Aid	2	0	1	0	1	0	6	0
Early Symptom	1	0	1	0	0	0	1	0
Near Miss / Property Damage	6	0	7	0	3	0	5	0

Figure 4-8: Safety incidents for the period 2012 – 2016.

As part of the security plan and to support the core value of keeping the safety of people and assets, the Observatory developed emergency response procedures and required all employees to train and certify their awareness of the emergency preparedness and response procedures. Gemini introduced electronic access control at the Gemini North telescope facility to increase security.

4.12 External Relations

Gemini Observatory remains committed to support our users in service to the broader goal of producing scientific results. We assist them throughout the scientific lifecycle, from initial idea through analysis, leading to final publication of results. As Gemini provides public access to diverse astronomer users around the world, we aim to make the Observatory and its capabilities accessible. We describe here high-level activities between Gemini and our users. Additional details of specific interactions in the course of executing observing programs appear in Sections 4.4 and we describe the regular communications program for users and the general public in Section 6.2.

2015 marked the regular triennial meeting of Gemini's user communities. The name and program reflect the special focus this year on developments to come: "The Future and Science of Gemini Observatory" convened in Toronto, Canada in June. 2015 had the largest attendance ever, reflecting the interest and enthusiasm of our users, instrument builders, and other stakeholders to continue to advance together. Partners presented their perspectives, and astronomers had many exciting science results to share. The sessions included interactive discussions that provided useful input as we plan our future. The Users' Committee for Gemini (UCG) met immediately following. This body serves as a regular conduit for communication, and their key focus this year was the user-contributed Data Reduction User Forum.

Korea successfully participated as a limited-term Gemini Partner in 2015, through the Korea Astronomy and Space Science Institute (KASI). A national time allocation committee reviewed proposals, and Gemini staff provided technical assessments. The observations were executed in four designated blocks of time, one each semester at each telescope site. Select Korean astronomers conducted observations on behalf of their broader community.

Members of the Gemini Directorate make an effort to attend the national astronomy meetings of our Partners. Gemini had a strong presence at the American Astronomical Society meeting in Seattle, Washington, in January. Individuals also attended the annual Sociedad Chilena de Astronomía (SOCHIAS) meeting in Puerto Varas in March, the Canadian Astronomical Society (CASCA) meeting in Hamilton, Ontario, in May; the Astronomical Society of Australia in Fremantle, Western Australia, in July; and the Reunión Anual of the Argentinian Astronomical Society in La Plata, Buenos Aires, in September.

We successfully launched the second fellowship directly with a Gemini Partner, the CONICYT-Gemini Fellowship, with the Chilean Comisión Nacional de Investigación Científica y Tecnológica (CONICYT). (The joint fellowship with Brazil also continued in 2015.) The first CONICYT-Gemini Fellow, Verónica Firpo, is now in residence at Gemini South. Dr. Firpo will conduct a program of research and support over three years, spending time both at Gemini and a host university, Universidad de La Serena.

5 Instrumentation and Facility Development

The Development Division consists of three departments: Instrumentation; Telescope and Adaptive Optics (TAO); and Systems Engineering. The Instrumentation and TAO departments deliver new and upgraded scientific capabilities to the observatory; the Systems Engineering department supports overall observatory infrastructure and project execution.

The Instrumentation department is able to support two large and two smaller efforts each year. In 2015, we saw the Gemini High-resolution Optical SpecTrograph (GHOST) through its critical design review, concluded the feasibility studies that will lead to specifications for our next new instrument, called Gen 4#3, installed new CCDs into GMOS-S, launched our first general call for current instrument upgrades, and helped bring the GRACES instrument into operations.

The TAO department works to stabilize and improve our adaptive optics (AO) facilities, making them accessible to all users, and also maintains telescope performance to deliver seeing improvements for all Gemini observations. The TAO department supported the work on a new natural guide star sensor (NGS2) for the Gemini Multi-Conjugate Adaptive Optics System (GeMS) and launched an effort to replace the GeMS laser with something more reliable and easier to operate.

5.1 GPI

The Development effort on GPI is complete, and GPI has been handed over to Operations. We offer GPI as a regular instrument to Gemini observers. See Sections 3 and 4 for examples of its successful scientific use during 2015.

5.2 GMOS CCD Upgrade

The Gemini GMOS team had installed new Hamamatsu fully-depleted CCDs into GMOS-S in 2014. During commissioning, the team discovered two system anomalies that reduced performance in some types of observations. In 2015, we worked with the controller vendor Astronomical Research Cameras (ARC) and traced one anomaly to a problem in the video controller boards. ARC provided us with updated boards that resolved the problem with some additional control software modifications. The second anomaly was intermittent. We were unable to reproduce the problem in the lab or in the instrument itself and the problem has not recurred. After completing the work, we verified the new video boards are performing well. The GMOS-S detector system is now operating to its original specifications. We plan to conclude the work on GMOS-S before installing similar CCDs into GMOS-N; we will install in GMOS-N in 2016.

5.3 GHOST

GHOST is designed to offer simultaneous, high-resolution spectroscopy with R > 50,000 (for two objects plus sky) and R > 75,000 (for one object plus sky only) from 363 to 950 nm. We currently estimate GHOST will be available to the Gemini community for science use in 2018. The GHOST team—Australian Astronomical Observatory (AAO), National Research Council of Canada Herzberg (NRC-H), and the Australian National University (ANU)— completed their preliminary design review in December 2014 and held their first critical design review in December 2015. An additional subsystem review of the spectrograph enclosure and mechanics is scheduled for early 2016.

5.4 GRACES

After demonstrating the capability of the GRACES high-resolution optical spectrograph in 2014, we made several improvements to the instrument in 2015 to improve operational and optical efficiency. We installed a new enclosure over the spectrograph that allows easier transitions to and from the GRACES mode and makes the instrument more stable overall. Additionally, we recoated two mirrors for better reflectivity and redesigned some mounts to remove some optical vignetting. As a result, we increased the sensitivity of GRACES by ~0.5mag in both spectroscopic modes, and the spectral resolution is now more uniform across each order. Sensitivity (defined as the magnitude that gives a signal to noise of 1 after a one-hour exposure) increased from 20.9 and 21.9 in single and double fiber modes to 21.4 and 22.4, respectively. Figure 5-1 shows how GRACES performs when optimized for red throughput compared to the HIRES spectrograph at the W. M. Keck Observatory and UVES at the Very Large Telescope (VLT).

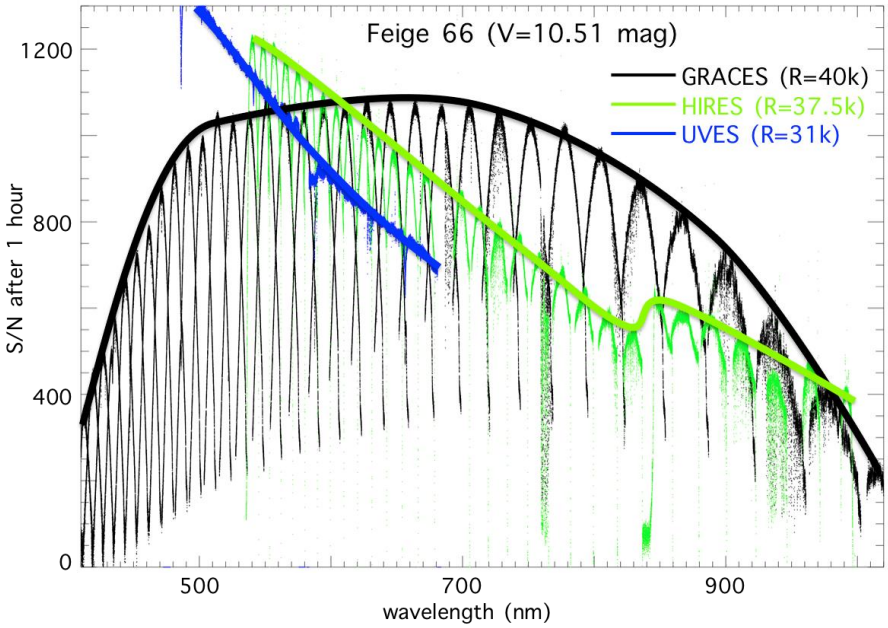


Figure 5-1: A comparison of GRACES after 2015 performance increases (black line and data points) with Keck's HIRES (green) and the VLT's UVES (blue) based on real observations of Feige 66 taken at each telescope under similar conditions.

5.5 GIFS and Gen4#3

We launched the Gemini Instrument Feasibility Studies (GIFS) in 2014, receiving eight proposals and selected four of them for non-competitive studies. Each team delivered their final study report in October 2015, after making in-person presentations at the Toronto Future and Science of Gemini Observatory meeting and at Gemini shortly after submitting their draft reports. These reports are now public and are available on the Gemini web site[3].

[3] http://www.gemini.edu/sciops/future-instrumentation/gifshomepage

The four studies presented a variety of science cases that could be performed with these instruments that would help keep Gemini scientifically current and relevant as new astronomical surveys and capabilities come online in the 2020s. The studies verified that we could build an instrument with our desired baseline capability of optical-infrared moderate-resolution spectroscopy within our desired cost and schedule budgets. In addition, each team proposed several enhancements to our baseline capability that will inform the requirements we provide for the design and build call for Gen 4#3 in 2016. Each of the designs is interesting in its own right, and together, they demonstrate a range of possible instruments to consider for Gen 4#3. We list the key features of the four instrument concepts here.

OCTOCAM: Led by the Instituto de Astrofísica de Andalucía, OCTOCAM is an 8-arm imager and spectrograph covering 0.37 to 2.35 μm. It offers potential integral field spectroscopy and spectropolarimetry modes.

MOVIES: Led by the National Research Council of Canada Herzberg, MOVIES is a broad bandwidth, moderate resolution (R=3,000–10,000) dual arm optical and near infrared (NIR) échelle spectrograph that simultaneously covers 0.36 - 2.45μm. MOVIES also allows for simultaneous imaging and the use of electron multiplying CCDs (EMCCDs) for enhanced sensitivity for dim objects.

GMOX: Led by the Johns Hopkins University, GMOX is a three-arm multi-object imager and spectrograph that provides R=5,000 spectroscopy from 0.35 to 2.5 μm. Additionally GMOX offers higher resolution modes and many configuration options through its use of a digital micromirror device.

GEONIS: Led by Caltech, GEONIS is an R=4,000 long slit, dual arm spectrograph and imager with simultaneous coverage from 0.40 to 1.6μm. GEONIS also provides a 7' slit designed primarily for transiting exoplanet observations. GEONIS can also accommodate EMCCDs for higher sensitivity.

5.6 Altair

This year, we advanced two projects to enhance the usage of the Gemini North adaptive optics system, Altair. One effort will enable GMOS-N to be used with Altair in a "super-seeing" mode. We have received the new dichroic (to divide the light between Altair and GMOS-N), and we plan to commission the mode in 2016. Second, we ordered and received a new dichroic for the infrared instruments (NIRI and GNIRS) that extends in the *L* and *M* bands when using Altair. Unfortunately, the dichroic filter we received was made with the wrong cutoff wavelength. The manufacturer agreed to make a new filter at no cost to us, so we are awaiting the replacement, expected by early 2016.

5.7 GeMS and GeMS Laser

GeMS Laser

The primary aims for purchasing a new laser for GeMS are to increase its availability and to decrease its support requirements so we can offer GeMS more routinely at Gemini South. We released a call for proposals for the new laser in October 2015. We received proposals in December and we expect to make an award in 2016.

NGS2

Throughout 2015, we worked with ANU to deliver a new "Natural Guide Star Next Generation Sensor" (NGS2) to GeMS. The goal for the project is to improve our limiting guide star brightness by 1.5 magnitudes to enable 2.5 times more sky coverage while making the system easier to use and support. The ANU team is building a new system to meet these objectives using an EMCCD camera built by Nüvü Camēras. We plan for delivery and installation in 2016.

DM0

GeMS was designed to have three Deformable Mirrors (DMs), conjugated one each at 0, 4.5, and 9.0 km, but during the commissioning, DM0 failed. GeMS now operates with only two DMs (using the former DM4.5 to conjugate at ground level). A failure of one of the remaining DMs would leave the system either inoperable or delivering very poor performance. We are therefore procuring a new DM0 to serve first as a spare, then later as the third DM needed to bring GeMS to its full performance capability. This effort was low priority in 2015. Nonetheless, we finalized a contract for the needed electronics. We are close to completing the contract for the mirror itself and expect to have it signed and executed in 2016. The mirror and electronics should arrive in 2016; we plan to install them to complete the GeMS three-mirror system after the new laser is installed.

5.8 Interface Control Documents

Interface Control Documents (ICDs) are critical to help ensure that delivered instruments interface properly to the Gemini telescope and environment. In 2015, we essentially completed Gemini's ICDs; they now need only to be updated as systems evolve.

5.9 Instrument Upgrades

In order to keep our current instruments competitive as they age and to provide more opportunities for community instrument teams and scientists to work with Gemini, we launched an instrument upgrade program in 2015. In October, we issued a call for proposals soliciting one or more targeted instrument upgrades within a total budget cap of $200,000. Proposals are due in December 2015, and we will make a selection and begin work on the first project(s) in 2016. Selection criteria focus on the scientific value of the work to the Gemini community, the risk involved, and the availability and amount of needed Gemini resources. In late 2016, we plan to repeat the call with an increased budget to allow for slightly more ambitious projects as well.

5.10 Additional Development Work

Our plans to upgrade the Acquisition and Guider (A&G) units at each site and the detector controller for GNIRS and NIRI remained largely on hold in 2015, as planned. The main work completed in the A&G project was to identify and test several options for new mechanism controllers to replace the currently used obsolete controllers. We made no significant progress in the detector controller project and will continue on this project on a best efforts basis in 2016. Our best efforts goal in 2016 will be to have a working controller in an engineering environment, with operational software work to occur later.

6 Public Outreach, Communications, and Broadening Participation

6.1 Regular Outreach Programming

Gemini's ongoing outreach programming builds on over a decade of lessons learned and established best practices. In 2015, our local outreach programming impacted our local host communities at multiple levels, with a particular emphasis on students, teachers, and families. We show total participation in these programs in Table 6-1.

Journey Through the Universe

Gemini North's longest-running local outreach program Journey Through the Universe (JTTU) completed its 12th year in 2015 serving our Big Island community. The established partnership with the Hawai'i Department of Education provides a strong synergy with educators and benefits Gemini as well as thousands of local students. During the past year the program expanded beyond the traditional emphasis on a week of intensive classroom visits (which is still at the program's core), to include events throughout the year: educational workshops, career awareness events, and a new student imaging program using Gemini data.

Figure 6-1: Gemini's Maria Antonieta Garcia helps students make a scale-model solar system with clay as part of an activity during the 2015 Viaje al Universo program in Chile.

Activity/Event	Participants
Career brochure distribution	10,110
Journey Though the Universe, Hawai'i	7,558
Viaje al Universo, Chile	6,675
StarLab (Hawai'i and Chile)	1,882
AstroDay, and other events	9,320
Live from Gemini (Hawai'i)	167
Summit Tours (Hawai'i and Chile)	559
Total	**36,271**

Table 6-1: Participation in outreach events.

Viaje al Universo

The Gemini South version of JTTU completed its 5th successful year in 2015 and continues to evolve. A key challenge was a strike at local public schools that required an emphasis on local private schools for classroom presentations. A highlight in the 2015 Gemini-organized program was a visit by the Spanish "Big Van: Science on Wheels" troupe who shared their interactive blend of performance and humor with students and families throughout our Gemini South host community in La Serena, Chile.

StarLab

Gemini's StarLab portable planetarium program continues to provide educators and students access to the nighttime sky via technology that can visit local classrooms. In 2015 we initiated the transition at Gemini South to an educator "training-and-loan" system (this system has been in place at Gemini North for several years). In preparation, we have upgraded the StarLab equipment and replaced key components. We plan full implementation in 2016.

AstroDay
Gemini's annual celebration of AstroDay continued at both sites. Each site partnered with multiple local observatories and educational institutions to informally expose our communities to our work, including a new partnership in Chile to celebrate the National Day of Astronomy that began this year.

6.2 Key 2015 Outreach Activities

In additional to the regular annual programs described above, we successfully accomplished our specific objectives for 2015, listed in Table 6-2.

Conferences and Meetings

Title	Completion
Regular annual programs and activities	
Journey Though the Universe, Hawai'i	100%
Viaje al Universo, Chile	100%
StarLab (Hawai'i and Chile)	100%
AstroDay (Hawai'i and Chile)	100%
Issue press or image releases (minimum 8)	100%
Publish GeminiFocus quarterly + annual year in review	100%
Issue e-newscasts for users monthly	100%
Library services	100%
Specific 2015-planned activities	
Support conferences and events	100%
Establish press officer internship	100%
Develop demos and incorporate IYoL in programs	100%
Expand Live from Gemini and test student use of data	100%
Produce updated Careers Brochure, including 6 new staff profiles	80%
Analyze electronic access to media	95%
Deliver web/tablet virtual tour	70%
Additional unplanned activities	
Maunakea crisis communications	
New image lithographs	
"Introduction to Gemini" printed brochure	

Table 6-2: 2015 plan completion for Public Information and Outreach.

As planned, Gemini had a strong presence at a number of conferences throughout the year, starting with the January American Astronomical Society (AAS) meeting in Seattle, Washington. Gemini South staff were deeply engaged with the Chile-US Astronomy Education Outreach Summit in Chile in March and an associated Astronomy in Chile Educator Ambassadors Program in late June. June also held the Future and Science of Gemini meeting in Toronto, Canada (described in Section 4.12).

Gemini participated with other Maunakea Observatories and with other NSF programs at the 2-week-long International Astronomical Union's General Assembly in Honolulu (a joint meeting with the AAS). In October, Gemini supported and participated in the Society of Women Engineers meeting in Nashville, Tennessee, hosting a panel on engineering

careers in astronomy. Finally, also in October, we participated in the National Indian Education Association convention in Portland, Oregon, with the AURA Corporate office.

Public Relations Internship
We initiated the planned annual Public Relations Internship at Gemini North. This position addresses many needs of the PIO department while providing valuable experience for an early-career communications professional. Our intern participated in the White House Astronomy Night in Washington, DC, in August, supporting the NSF-led exhibit and live-tweeting the event (Fig. 6-3).

Live from Gemini
This virtual fieldtrip program continued to evolve in 2015, and now Hawai'i students use Gemini data to create images. This hands-on work has proven extremely successful with teachers and students. We expect the program to continue and will pursue a partnership with the Canada-France-Hawaii Telescope's student observations program targeting more local Hawai'i schools.

Career Brochure – Version 2.0
The second iteration of Gemini's popular Career Brochure began development in 2015 with production of new staff videos and expanded interview summary sheets. We will include these in the second version of this publication and companion website, to be published during the first half of 2016.

Virtual Tour
Content for the tablet-based virtual tour is complete. After testing the prototype, we will release the tour for the public.

Press Releases
During the past year nine press releases were disseminated that were either produced or supported by the Gemini Observatory, exceeding our goal of eight. All press releases and web features are archived at the Gemini website.[4]

Figure 6-2: Gemini Public Relations Intern Alexis-Ann Acohido participated in the White House Astronomy Night.

Social and Electronic Media
Gemini continues to expand our social and electronic media presence, impact, and influence. During 2015, our social media following grew: by almost 20% in Facebook "Fans" (from 5,490 to 6,426) and by a factor of two on Twitter (from 550 to 1,016). In addition, Gemini's public blog (initiated in late 2014) is lively with a heavy rotation of posts for both the public and our user community. To track and improve our impact in social media, we actively monitor selected key metrics such as "non-bounce rate" of the public blog (persistent views of the website) and "average reach" (number of individuals who viewed Gemini-created electronic media; Figure 6-3). Approximately 50% of all Gemini social media posts target the communication needs of our astronomer user community; the other half are tailored to the general public. The user-focused posts range from monthly reminders on Fast Turnaround and other proposal deadlines, to news on instrumentation and other scientific resources.

[4] http://www.gemini.edu/sciops/releases

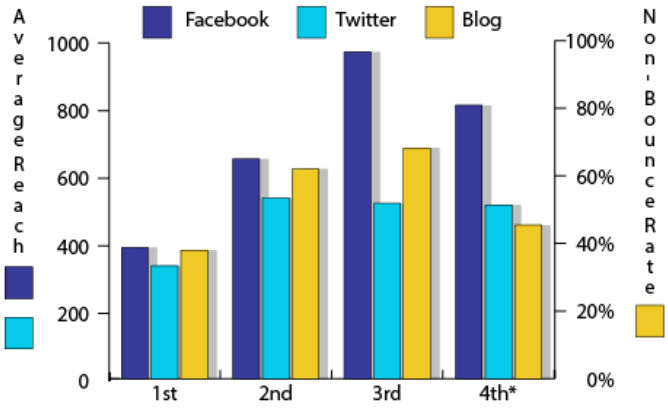


Figure 6-3: Social media "Average Reach" data for Twitter and Facebook, and "non-bounce rate" data for the public blog are plotted by quarter.

GeminiFocus

Gemini's quarterly newsletter continues to serve as a primary communications tool for our users. We publish quarterly as an electronic publication [5] . The annual "Year in Review" issue is also disseminated as a hard copy, both in its entirety and as a tri-fold table of contents. According to our metrics, most readers consume the entire publication, rather than specific articles, and they do not exhibit significant decline in reading content farther from the front page.

e-newscasts

We collect and disseminate these monthly news briefs, specifically for users. [6] We significantly updated the process and distribution in 2015, including more modern web-based distribution and production (MailChimp), as well as the integration of several graphical and design improvements to encourage increased readership and "open rates."

6.3 Additional Opportunities

In addition to the planned activities, we also took good advantage of several unanticipated events and opportunities during 2015.

The greatest single unexpected activity was Gemini's involvement in crisis communications related to protests on Maunakea due to the attempted construction start of the Thirty Meter Telescope project. This work has a direct impact on Gemini's future on Maunakea as it will influence future lease negotiations and overall local community support for astronomy on Maunakea and Hawai'i.

Image Lithographs

A total of 18 new 8.5x11" image (lithograph) sheets for public dissemination were created. They will be printed and distributed at public sites such as the Maunakea Visitors Information Station and public tourist observatories in Chile (Figure 6-4).

[5] archived at: http://www.gemini.edu/node/27
[6] archived at: http://www.gemini.edu/enewscast

Figure 6-4: Sample lithograph of the Gemini image of polar ring galaxy NGC 660. Information on back (right) includes a description of the image and background information on the Gemini telescopes.

Introduction to Gemini Brochure

We created a new "overview of Gemini" brochure for users, key stakeholders, and potential new partners and funders. This magazine-sized tri-fold is extremely popular and serves as a useful communications tool for many audiences, including our user community.

We also hosted two Artists in Residency at Gemini North and shepherded the publication of a book on Maunakea astronomy.

6.4 Broadening Participation and Workforce Development

Gemini continues to value diversity and workforce development as a key strategic priority. We introduced several new initiatives and acting in this area during 2015. Gemini hosted the AURA Workforce and Diversity Committee in Hilo in May[7]. The appointed Diversity Advocates (DAs) of each AURA Center continue as part of this committee, and we added two Diversity Advocates to work across the AURA Centers based in La Serena. The Chilean DAs initially focused on defining their role and are now developing training for all staff about what diversity means in Chile, working in conjunction with Human Resources.

Department / Specialty	Funding By	Educational Skill Level	Intern Program	2015 Interns
Engineering / Technical / Science	Akamai	Undergraduate	Akamai	1
Engineering / Technical	Gemini	Undergraduate / Graduate	Univ. of Victoria	3
Science	AGUSS	Undergraduate	AGUSS	3
Science/Engineering	Gemini	Various	Internal	14
Engineering	IINSPIRE	Undergraduate	IINSPIRE	2
Science	CAPE	Graduate	Internal/non-paid	1
Engineering	AURA/Gemini	Undergraduate / Graduate	Chilean Universities	2

Table 6-3: Gemini interns 2015.

[7] http://www.aura-astronomy.org/diversity.asp

Gemini continued to develop workforce pipeline initiatives during 2015. The number of internships increased by about 40%, to 26, with interns coming through partner countries, local initiatives in La Serena and Hilo, and directly in Gemini internal programs.

7 Administration and Finance

7.1 Finance

In coordination with the Senior Financial Analyst and the CFO, the Finance team works with budget managers and directors in developing and analyzing budgets, staffing and compensation plans. They process all budget input and monthly expenditures. In 2015 the team implemented a "scratchpad" budget model to carry detailed justifications of all account budgets in a single repository. Gemini Finance implemented a new interface process to transfer payroll and HR data more efficiently and securely, and they developed controls to verify that accounting, payroll, and procurement data are transferred accurately between Gemini and CAS business systems.

7.2 Organization and Staffing

There are currently 175 employees on a Full Time Equivalent (FTE) basis; 51% of the staff members are based in Hilo and 49% are based in La Serena. Table 7-1 shows the distribution by Division. Staff turnover is currently about 9% on an annualized basis.

Division	FTE
Administration	18.6
Development	18.2
Operations	122.6
Deputy Director	12.5
Directorate	6.0
Total	**175**

Table 7-1: 2015 staffing.

7.3 Budget

7.3.1 Partner Contributions

The schedule of contributions for the Gemini Observatory budget is governed by a set of Administrative Guidelines; *i.e.* agreements made among the members of the Gemini International Partnership including NSF. These agreements clarify the members' partnership shares and the timing for the payment of contributions. Table 7-2 shows the distribution of the Gemini cost shares under the current Partnership.

Partner	Cost Share
United States	65.50%
Canada	18.65%
Australia	6.21%
Argentina	3.11%
Brazil	6.53%
Total	100.00%

Table 7-2: Partners' cost shares.

Table 7-3 sets forth 2015 actual contributions by partner for Operations and Maintenance (O&M), Instrument Development Fund (IDF), and the combination of the O&M and IDF funds, including contributions from limited-term participants. Throughout, values are given in US$1000, except where noted.

Contributions	O&M	IDF	Total
US	18,022	2,590	20,612
Canada	5,009	615	5,624
Australia	1,667	-	1,667
Argentina	856	263	1,119
Brazil	1,798	-	1,798
Korea*		1,350	1,350
Total	**27,352**	**4,819**	**32,170**

*Limited-term arrangement in 2015.

Table 7-3: 2015 actual contributions by Partner.

We use O&M funds to support the day-to-day activities involved in operating the telescopes and facilities. Broadly speaking, these activities are science support, engineering, instrumentation support, administration (including operations costs for base facilities, fleet and mountain infrastructure), information systems, research, public information, safety and the directorate. The IDF is dedicated to renewal and improvement of instrumentation and telescope facilities, primarily executed as contracts to teams within the Partnership and spent over multiple years. Previously, a dedicated Facilities Development Fund (FDF) was used for these expenditures. Its remaining balance will be part of the IDF.

7.3.2 Financial Results for the Year of 2015

Table 7-4 gives the summary of expenditures in terms of the funding sources. Values through the end of 2015Q4 are actuals.

in $ 000 / *Fund*	Dec-2014 Commits	2015 Budget	2015 Budget Authority	2015 Actual	2015 Commits	2015 Actual & Commits	Remaining Balance ($)	Remaining Balance ($)
O&M - Non TP	1,094	28,772	29,866	27,298	901	28,200	1,666	5.60%
O&M - TP	489	1,218	1,707	1,195	2,718	3,913	-2,206	-129.20%
Total O&M	**1,583**	**29,990**	**31,573**	**28,494**	**3,619**	**32,113**	**-540**	**-1.70%**
IDF	**1,694**	**4,467**	**6,162**	**2,117**	**5,322**	**7,440**	**-1,278**	**-20.70%**
FDF	**184**	**657**	**841**	**36**	**151**	**187**	**654**	**77.80%**

Note: TP = Transition Program

Table 7-4: 2015 Actual vs Budget Expenditures – O&M, IDF and FDF; actual through Q4.

7.3.3 2015 Budget vs Actual Variance Analysis

Total O&M 2015 estimated expenses and commitments are $540K or 1.7% *greater* than the 2015 spending authority approved in the Board resolution 2015.B.1, and this total exceeds Partners' O&M contributions by $4.76M. As part of the Transition Program, this cash deficit is balanced from carry-forward that has accumulated during past years.

Figure 7-1 on the next page presents the 2015 budget versus actuals variance analysis (labor and non-labor) by variance driver. Overall, the key factors driving O&M spending changes outside the TP in 2015 are: (1) unplanned devaluation of Chilean Peso of 14.3% (from CLP560 to CLP 640 per USD 2015 annual average exchange rate), which leads to

a $731k effect in labor and $275k non-labor); (2) reduction of 2015 labor costs due to reduced FTEs (net decreasing labor costs of $609k); (3) budget underrun due to electricity and facilities savings of $519k achieved earlier than originally planned; (4) reduced indirect costs of $297k caused by the declining O&M cost basis, and (5) increasing O&M labor and non-labor costs due to transferring Instrument Development support costs from IDF/FDF to O&M ($901k increase).

With net savings in 2015 and the opportunity to implement additional Transition Program projects for long-term savings, sustainability, and infrastructure improvement, we included a net 2015 non-labor budget increase of $2,658k. O&M projects of $260k includes telescope operations workstations, GS projects for correcting vibration, and replacement of Cerro Pachón storage containers. The remaining budget addition of $2,398k funds equipment and the service cost of developing new energy systems at Gemini North and South.

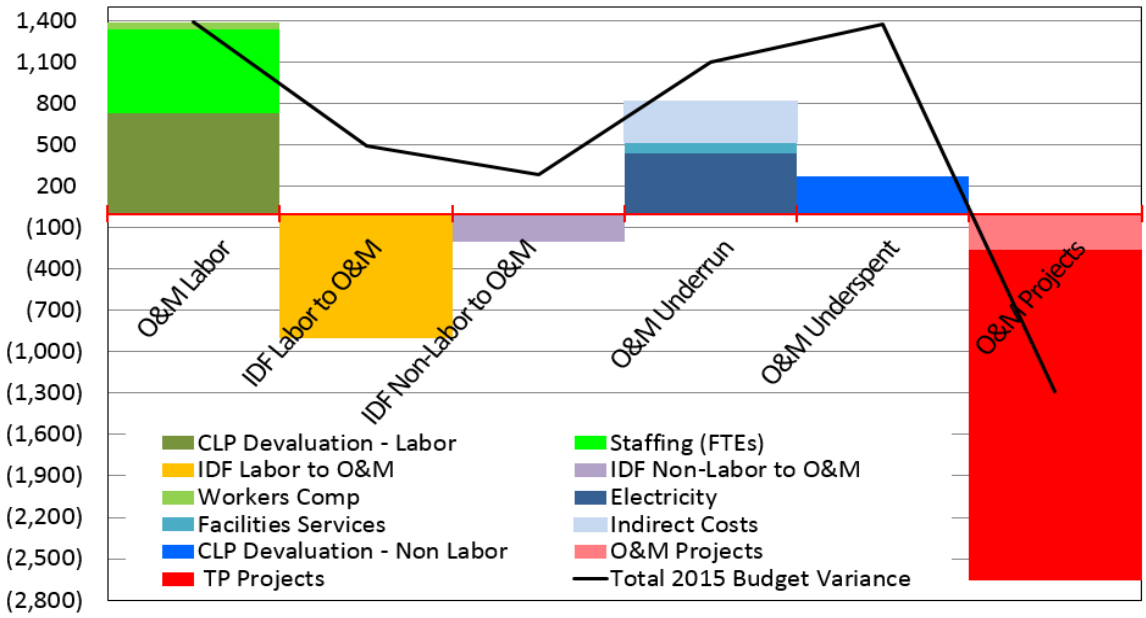


Figure 7-1: 2015 budget vs actuals variance analysis (labor and non-labor).

For IDF and FDF, the 2015 expenses are $2,350K and $621K below the 2015 approved budget. We had moved total Gemini internal IDF support costs of $1.1M to O&M, freeing more IDF for external procurements. We allocated staff resources to Transition Program activities and to support the highest priority Development projects, GHOST and GIFS/Gen4#3, which defers $407K to 2016 IDF instrumentation projects and upgrades budget. We similarly deferred low-priority FDF projects (A&G and GeMS improvements) and carried over spending of $402K to 2016. We also suffered IDF 2015 budget variance of $292k from contract delays (NGS2 project with ANU and Altair upgrades design with NRC-HIA). The summary of IDF 2015 budget vs actual expenditures is shown in Table 7-5. Values through the end of 2015Q4 are actuals.

IDF Project	Budget	Actual	Remaining Balance ($)	Remaining Balance ($)
Prog. Support	$1,461	$22	$1,440	97%
GEN 4#3	$380	450	($70)	-18%
Inst. Upgrades	$171	$0	$171	100%
GHOST	$1,611	$1,053	$559	35%
AO Upgrades	$368	$69	$299	81%
GMOS	$476	$346	$130	27%
GRACES	$0	$16	($16)	-
GPI	$0	$162	($162)	-
Total	**$4,467**	**$2,117**	**$2,350**	**53%**

Table 7-5. IDF 2015 budget vs actual expenditures as of Q4-2015.

8 Program Plan for 2016

8.1 Overview of 2016

Gemini's highest priority remains to operate the Observatory to enable our users' scientific advancement. We continue with regular operations against the backdrop of developing new capabilities and concluding the work on Gemini's Transition to a lower budget, enabling long-term Observatory sustainability with fewer staff members. All milestone dates throughout are 2016 unless otherwise noted and budget figures in this section are in US dollars.

8.1.1 Observatory Budget 2016–2018 Overview

We will continue to manage the Observatory budget in two categories: 1. Operations and Maintenance (O&M – spent on an annual basis); and 2. Instrument Development Fund (IDF - used for long-term, multi-year instrumentation and adaptive optics projects).

The final year of spending in the Facilities Development Fund (FDF) was 2015. The Gemini Board, supported by the Gemini Finance Committee, reviews and approves the details of the budget every November for the subsequent year. Table 8-1 presents the 2015 forecast, the approved 2016 budget, and plans for 2017 and 2018 in these categories. The IDF budget in a given year is not exactly aligned with the income in these categories given the multi-year nature of the financed projects.

	2015 Actual	2016 Budget	2017 Budget	2018 Budget
Operations and Maintenance (O&M)	31,275,167	27,300,000	27,898,558	28,456,529
Instrument Development Fund (IDF)	2,176,033	5,761,133	5,980,960	3,514,043
Facilities Development Fund (FDF)	46,564	0	0	0
Total	**33,497,764**	**33,061,133**	**33,879,518**	**31,970,572**

Note: 2015 actual through Q3; estimated for Q4.

Table 8-1: Budget overview, by fund, 2016–2018.

8.1.2 Staffing Plan

Table 8-2 shows the staffing plans for 2016–2018, as FTEs integrated over each calendar year. Most of the planned effort remains within defined Divisions: Operations staff support operations activities and Development staff support instrument and facility development projects. Engineering effort contributes to Development projects at the 10% level. The most significant departure from this regular structure is Base Facility Operations, to which we allocate 6 FTEs in 2016, primarily from Engineering with smaller contributions from Science Operations. Base Facility Operations in Gemini South and other contracts associated with the Transition expire during 2016, so only 2017 reflects post-transition steady-state values.

	2016 Plan	2017 Plan	2018 Plan
ADMINISTRATION +	**17.6**	**17**	**17**
Accounting	2	2	2
Facilities & Admin	13	13	13
Safety	2.6	2	2
DEVELOPMENT	**17**	**12.5**	**11.5**
Tel/Adaptive Optics	6.5	5.5	4.5
Sys. Engineering	6.7	5	5
Instrumentation	3.8	2	2
OPERATIONS	**117.4**	**112.8**	**111.2**
Engineering-S	10.4	10	10
Engineering-N	10	9	9
ISG	13	12	12
SCISOS-S	10	10	10
SCISOS-N	10	10	10
SCI-Astronomers-S	12.9	12.6	12.2
SCI-Astronomers-N	12.2	11.6	11
Software	15	14.6	14
Spotters	0.5	-	-
Summit Crew-S	12.4	12	12
Summit Crew-N	11	11	11
DEPUTY DIR	**12.8**	**12.5**	**12.5**
Library	0.5	0.5	0.5
PIO	6	6	6
SCI User Support	6.3	6	6
DIRECTORATE	**6**	**6**	**6**
GRAND TOTAL	**170.7**	**160.8**	**158.2**

Table 8-2: Staffing plan 2016 – 2018.

8.1.3 Economic Assumptions through 2018

Table 8-3 sets forth budget assumptions; these economic ratios are based on updated inflation and foreign exchange (FX) rate forecasts from the International Monetary Fund. We include these economic assumptions, including their effect on labor costs, in the planned budgets.

Year	2016	2017	2018
US inflation	2%	2%	2%
Chile inflation	4.60%	4.60%	4.60%
FX rate CLP/USD	640	640	640

Table 8-3 Budget assumptions 2016–2018.

8.1.4 Operations & Maintenance (O&M) Budget 2016 to 2018

The Operations and Maintenance (O&M) budget supports the day-to-day activities involved in operating the telescopes and facilities. Table 8-4 shows the O&M budget by cost categories for the period 2016 - 2018.

Cost Category	2016	2017	2018
Total Labor	17,739,633	16,882,980	16,992,246
Supplies & Equipment	1,089,041	1,121,712	1,155,364
Travel	952,791	981,375	1,010,816
Recruiting & Relocation	58,000	58,990	60,010
Professional Fees	1,531,005	1,531,030	1,493,408
Meeting, Conferences, Prof. Dev.	311,833	321,187	330,823
Computer Software & Equip.	539,854	556,049	572,731
Facilities	649,134	668,608	688,666
Maintenance	182,069	187,531	193,157
Utilities	1,298,602	1,337,560	1,377,687
Meals and Lodging	366,694	377,695	389,025
Total Site Costs	2,496,498	2,571,393	2,648,535
Spares	370,810	381,934	393,392
Other	502,036	1,355,668	1,292,581
Indirect Costs	986,169	1,021,042	978,025
Subcontracts	614,829	633,274	652,272
Total Non-Capital Expenditures	27,192,500	27,416,636	27,580,203
Computer	-	-	379,946
General	107,500	481,922	496,380
Vehicles	-	-	-
Total Capital Expenditures	107,500	481,922	876,326
TOTAL EXPENDITURES	**27,300,000**	**27,898,558**	**28,456,529**

Table 8-4: O&M budget by cost categories for the period 2016–2018, values in USD.

8.1.5 Instrument Development Fund (IDF) Budget 2014-2017

The IDF is used for instrumentation and adaptive optics systems. Table 8-5 presents the IDF 2016 - 2018 spending plan by instrument project, defined in §5 above. The additional account line for program support contains the budget for contracted work to support future instrument upgrades.

IDF Projects	2016	2017	2018
AO-UPGRADES (Altair, Canopus)	121,000	272,000	223,000
GEN 4#3	195,000	1,230,000	1,805,000
GHOST	3,114,000	2,010,000	789,043
GMOS (CCD upgrades)	42,000	-	-
INSTRUMENTS UPGRADE	287,000	482,500	482,500
PROGRAM SUPPORT	80,000	80,000	80,000

GeMS DM0	460,500	69,500	31,000
A&G System Development	583,133	744,460	103,500
LGSF upgrades	878,500	1,092,500	-
TOTAL GEMINI	**5,761,133**	**5,980,960**	**3,514,043**

Table 8-5: IDF spending for the years 2016 – 2018 by instrumentation project.

The Facilities Development Fund (FDF) will not continue after 2015, and FDF unspent funds will be transferred to IDF. The FDF was established to support enhancements to the telescopes and adaptive optics infrastructure. It will be used in the 2016 IDF budget to support a) the Acquisition and Guiding (A&G) system development – a multi-year project started in 2012; and b) the upgrade of the Laser Guide Star Facility (LGSF) infrastructure at Gemini South – including replacement of the laser.

8.2 Science and Engineering Operations in 2016

8.2.1 Regular Operations

Regular day-to-day and night-to-night Operations is the Observatory's top priority. It includes the following items.

- Maintain the instruments and telescopes in working order consistent with the requested science time on sky; monitor performance and take remedial action as needed.
- Run the International Time Allocation Committee (ITAC) process to combine the national TAC results into an executable queue and visitor program consistent with available time, conditions, and instrumentation.
- Support the user community (in conjunction with the NGOs) in preparing their observations for the telescope.
- Provide web-based documentation suitable for PI reference on instrumentation, software and Observatory processes.
- Execute queue observing programs on behalf of the community as required; currently this equates to more than 80% of the observing.
- Support visiting observers in their execution of their own and others' programs on the telescopes.
- Ensure integrity of data (headers & quality control information) entering the Gemini Observatory Archive.
- Support visiting instruments as needed and as possible.
- Propose and execute continual improvements in instrumentation, telescope, and enclosure to maintain performance levels.
- Propose and execute continual improvements in operations software on behalf of the community and for internal usability, to maintain performance levels. These packages include: proposal preparation software; ITAC (queue filling) software; observation preparation software for successful proposals; multiobject mask generation software; observation execution software for use at the telescope; and data flow software to move data into the Observatory archive.
- Propose and execute continual improvements in operations processes on behalf of the user community, with guidance and input from the appropriate committees.
- Provide expertise and input to the Development Division in carrying out major enhancements of instrumentation.
- To ensure economical operations and a consistent interface with the user community, maintain approximate symmetry between the processes, equipment, and staffing at the two Gemini sites.

- Staff the “third” and final level of a helpdesk to respond to queries from the user community. (The first two levels are (i) NGOs and (ii) instrument specialists at the NGOs.)

A regular system of preventive and corrective maintenance supports the first requirement of maintaining the instruments, telescopes, and enclosures in working order. Preventive maintenance is carried out at the summits on a regular schedule (daily, weekly, etc. depending on the system) using a system of work orders. More major items requiring additional staffing are handled by planning on a variety of timescales. A central list of major maintenance work is held by the Heads of Engineering Operations and is discussed weekly among engineering managers and at the quarterly planning meetings. Items are tracked according to progress or completion, and new needs are evaluated before adding to the list and determining a possible schedule. This list and the associated resource requests are input to the monthly resource leveling meeting (which covers all Observatory activities) to ensure that the work schedule is consistent with other activities.

8.2.2 Science and Engineering Operations Core Projects and Goals

In addition to this regular operations support, in 2016 we will undertake a number of projects to improve longer-term sustainability impact or to improve service to users. These goals are once again limited, as in 2016 implementing Base Facility Operations at Gemini South will be a major effort.

Develop an Observatory-wide Obsolescence Mitigation Plan

Studies in 2015 have given us a better understanding of the number and nature of the obsolescence issues facing the observatory after 15 years in operation. We will set priorities and develop the plan to mitigate these risks over the coming 5 years. (Q2)

Operations Software Upgrades and Obsolescence Management

In 2016 we will upgrade and replace obsolete software components. The Sequence Executor, which takes observations from the observing database and executes them on the telescope and instruments, is written in Tcl/TK and unsupportable in the future, as well as being incapable of running calibrations on one instrument while observing with another. We aim to complete its replacement in 2016, possibly as early as Q2. We will commence work on the Telescope Control Console (TCC) after the Sequence Executor and may have it complete by Q3. (Telescope operators use the TCC, but it suffers as a detailed, engineering-oriented interface.) Finally we will begin the Real-Time Software upgrades, an obsolescence management project. (Our current low-level control software runs in an older EPICS version.) The full project will last two years, and we will make a start within 2016.

Science Operations Model Upgrade

Set priorities based on input from the 2015 Science Operations review (Q2). Implement one or more high priority recommendations as time and effort permit. Milestones will be set once the working groups report (at the end of 2015).

Upgrade the Cerro Pachón Network Link

Base Facility Operations requires a reliable, fast link between La Serena and Cerro Pachón. We have an improved microwave link in place and during 2016 will commission a fiber optic link, which will also be employed by the Large Synoptic Survey Telescope (LSST; Q4, but dependent on LSST planning also).

Commission the FLAMINGOS-2 MOS mode
Multi-object spectroscopy is the remaining uncommissioned mode of FLAMINGOS-2. The outstanding issues are a mechanical problem with the on-instrument wavefront sensor (OIWFS; Q2) and the actual commissioning of the MOS mode (Q3).

8.3 Science User Support Department in 2016

The mission of the Science User Support Department (SUSD) is to enable Gemini Principal Investigators to produce world-class scientific results in a timely manner. The SUSD leads post-observing user support. The staff maintain a data reduction package for the user community that enables astronomers to remove instrumental signatures from data obtained using Gemini facility instruments, and they support users in its use. The SUSD maintains communications between the Observatory and the National Gemini Offices and ensures that NGO staff members receive appropriate training. Specific goals for 2016 follow.

- Implement new post-observing communication strategy, including regular support for the Data Reduction User Forum, post-observing contact with PIs, and improvements to the regular support mechanism that the Helpdesk currently provides.
    - Technical and structural improvements (Q1)
    - Utilize dedicated non-staff contributors to Forum (Q2)
    - Implement post-observing contact with PIs (Q3)
    - Define requirements for external Helpdesk (Q4)
- Improve data reduction software documentation and cookbooks.
    - Evaluate inventory and cookbook template (Q1)
    - Define specific plans for cookbooks and documentation (Q2)
- Complete final imaging mode of QAP (GSAOI; Q1)
- Complete quick-look tool for quality assessment of spectroscopic observations (Q1).
- With STScI, repackage the STScI- and Gemini-developed software within Ureka using Conda (Q2). Use of Conda will allow the user to stay more up-to-date with third-party Python packages such as numpy and matplotlib (among hundreds of others).
- Update Gemini IRAF for new GMOS-N Hamamatsu CCDs (Q3) and F2 MOS mode (Q4). This will be one of the last releases of Gemini IRAF.

8.4 Transition Program in 2016

Our goal is to complete the projects within the Transition Program that are still being executed and thus fully close the program by the end of 2016.

Base Facility Operations at Gemini South
Implement BFO at Gemini South, taking advantage of lessons learned from the implementation at Gemini North. The main areas of work recognize differences in (1) the layout of the support building; (2) power, network and phone connections; and (3) laser operations. Key milestones during 2016 are remote access to observing floor (Q2), remote access to summit plant room plus computer room and to eliminate outside activities (Q3), and full system testing (Q4).

GN Energy Savings
Execute large contracts: (A) related to the Gemini North Energy Audit; and (B) installation of HBF photovoltaic system.

(A) The following energy savings measures and replacements of cooling equipment are included in the energy-audit-related contract.

1. Lighting and energy management systems improvements, including replacement of HBF and MK lighting with LEDs
2. Installation of fluid cooler (Maunakea)
3. Replacement of transformers with premium efficiency models
4. Installation of variable frequency drive pump (Maunakea)
5. Replacement of Maunakea chiller
6. HBF HVAC upgrades and replacements

We provide a rough timeline for the work in Table 8-6.

Description	Estimated period of construction	Estimated duration of construction
GN Energy Audit Implementation	Jan-Dec 2016	12 months
Design of items covered by GN Energy Audit	Jan-Mar 2016	3 months
Lighting system & controls (HBF)	Mar-May 2016	1 month
Lighting systems & controls (summit)	Apr-Jun 2016	1 month
Transformer replacement (HBF)	May-Jun 2016	A few days
Transformer replacement (summit	May-Jun 2016	A few days
HVAC upgrades (HBF)	Jul-Sep 2016	1.5 months
Energy management upgrades (HBF)	Sep-Oct 2016	A few days scattered in period
Fluid cooler (summit)	Sep-Oct 2016	3 weeks
Chiller replacement (summit)	Oct-Nov 2016	3 weeks

Table 8-6: Timeline for construction related to the Gemini North Energy Audit.

(B) Our contractor has finalized the design of the 100kW HBF photovoltaic system and has submitted it to the County of Hawaii for a building permit. In addition we need approval from UH Hilo before construction can start. We expect construction to start in early April and complete by mid-2016, weather and inspections permitting.

Reduce Base facility Expenses
Modify SBF to create 15 offices and new lab space. Vacate Casa 8 and reduce usage of Casa Verde. (Q3)

The two software projects *Real-Time Software Upgrade* and *Telescope Control Console Software* will be executed as part of normal Operations.

8.5 Instrumentation and Facility Development in 2016

The 2016 plans for instrumentation and facility development build on several substantial on-going projects. We list principal objectives for the year in Table 8-7, including those for a number of lower priority projects we will execute on a best-efforts basis. We expect to make substantial progress on many of these projects, understanding that any and/or all of them may be postponed or altered to accommodate increased needs for any of the higher priority projects.

Project	2016 Plan
GHOST	• Start Build Phase
Gen4#3	• Start contract negotiations with selected teams
GeMS Laser	• Select and complete contract for purchase • Start work for necessary internal modifications for new laser
GMOS CCDs	• Install and commission new CCDs into GMOS-N
Instrument Upgrades	• Select and begin project(s) from 2015 call • Launch 2016 call with expanded budget
NGS2	• Receive, install and commission NGS2
The projects below are lower priority and may be delayed to ensure progress on the above.	
A&G	• Develop new mechanism controller • Develop new wavefront detector system for higher sensitivity
Altair	• Start contracted work to replace the realtime computer to allow for higher performing algorithm implementation • Receive and install filters for GMOS-N + Altair use.
DM0	• Complete contract for DM0 • Test DM0 and electronics at manufacturers
IR Detector Controller	• Develop ARC controller in-house • Develop requirements for software needed to support new controller

Table 8-7: 2016 plans for Gemini's Development Division.

GHOST

In 2016, GHOST should be completing its design stage and starting the build phase with the following milestones. The primary deliverables for the Final Design Review are machine-ready drawings and procurement details.

Spectrograph and Enclosure CDR	Q1
Final Design Review	Q1
Start Build Phase	Q2

Gen4#3

We will release the call for proposals for the design and build of Gen4#3 in 2016. We will make a selection and finalize contracts with the selected team(s) subject to NSF approval. We hope the selected team(s) can start work by the end of the year, but the contracting negotiation and approval may push work start into early 2017.

Release Design and Build RfP	Q2
Make down-select	Q4

GeMS Laser

There are two major milestones in the GeMS laser procurement project for 2016: signing a contract for the new laser and beginning our internal effort to make local modifications

to accept the new laser. We estimate it will take a year to receive the new laser after we make a selection.

Select Vendor	Q1
Start internal modification project	Q1

GMOS CCDs
We believe we have resolved all the technical challenges with the new Hamamatsu detector system through its installation into GMOS-S. We are planning for installation in 2016Q3, but this could extend into 2016Q4. Some additional logistical and operational risks remain with this schedule.

Instrument Upgrades
We expect to select our first round of instrument upgrade projects in 2016Q1. We expect each project to last about a year.

NGS2
We plan for a 2016 delivery and integration of NGS2 into GeMS. However, the research and development nature of the project itself and the challenges of arranging the integration with an active instrument introduce schedule risk.

Accept delivery of NGS2	Q3
Integration and testing	Q4

8.6 Administration and Facilities and Safety in 2016

8.6.1 Finance and Administration

Administration provides cost-effective administrative support and delivers timely and accurate information to management and governance. The Administration and Facilities Group (AFG) supports in the areas of facilities, infrastructure, fleet, administration, visitor services, and travel services to staff and visitors. The Finance team delivers financial guidance and information to management to support executing budgets within the Board authorized limits. Specific goals for 2016 follow, to be completed by the end of the year.

Budgetary responsibility
Finish 2016 within [-2%; +3%] of the requested O&M Budget ($27.30M). Continue to promote the accountability among the budget account managers.

Integration of Shared Services
Support strong partnership with AURA CAS and other Administration and Facilities services providers (NOAO-S and MKSS) With CAS, identify risks and their mitigation in the domain of accounting and contracting. Review and revise the NOAO-S Service Level Agreements for 2017 in view of BFO and power savings.

Instrument Development Fund management
Develop a long term Instrumentation reporting system that meets IDF reporting needs of management, governance, and future Partners.

8.6.2 Safety

The Safety program assures a safe and healthy environment for employees and visitors. Gemini's working culture explicitly emphasizes safety of people and equipment. Safety will fully integrate safety into the Observatory operational activities, and will work jointly with partner telescopes on Cerro Pachón and Maunakea to establish shared Safety programs that combine best practices and resources. Specific goals to complete by the end of 2016 follow.

Staff Safety
Continue delivering Safety standards and services at the highest level, and meet the goal of an observatory-wide 90% completion of the mandatory safety training.

Safety operations and Management structure.
Implement long-term Safety operations and management structure around the synergies with Maunakea and Cerro Tololo/Cerro Pachón partner telescopes.

8.7 Public Information and Outreach in 2016

We will continue our regular local outreach programming, including JTTU, Viaje, AstroDay, StarLab, media relations, publications, user communications support, library services, and science result tracking. We also identify the following specific activities to complete in 2016.

- Unify user communications at both sites by introducing regular processes and balance quantity of content for users and the public.
- Expand media relations resources and public relations capabilities, with annual public information internship (beginning Q3) and limited-term (2-year), entry-level, public information assistant position (beginning Q1). Continue limited engagement in Maunakea/TMT and related crisis communications, including ongoing dissemination of information to key stakeholders.
- Complete integration of common outreach objectives for core Gemini South outreach programming. Transition StarLab in Chile to “train and loan” model (as done in Hawaii) by June.
- Complete addition of eight new staff profiles in Career Brochure and post video interviews on companion website (Q2). Produce a minimum of four additional 8.5x11” in-depth profile sheets (Q2).
- Complete tablet-based virtual tour production and install in both Gemini lobbies (Q3).
- Develop and implement new publication tracking procedures that include improved data on archival use of Gemini data (Q2).

8.8 Gemini External Relations in 2016

- North American institutional visits: Director Road Trip for general information about Gemini’s new operations, instruments, and opportunities (Q1); Development Road Trip with focus on instrument-building institutions (Q3)
- Directorate attendance at Partner national astronomy meetings
- Support Gemini Board in development of strategic vision exercise
- Lead the development of memoranda of understanding with any new limited-term Partners

Appendix A. Acronyms and Abbreviations

A&G	Acquisition and Guiding units
AAO	Australian Astronomical Observatory
AFG	Administration and Facilities Group
AGUSS	Australian Gemini Undergraduate Summer Studentship
Altair	Altitude Conjugated Adaptive Optics for Infrared
ANU	Australian National University
AO	Adaptive Optics
ApJ	Astrophysical Journal
ARC	Astronomical Research Cameras
AURA	Association of Universities for Research in Astronomy, Inc.
CADC	Canadian Archive and Data Centre
CAPE	Coordination for the Improvement of Higher Education Personnel
CAS	(AURA) Central Administrative Services
CCD	Charge-Coupled Device
CFHT	Canada-France-Hawaii Telescope
CONICYT	Comisión Nacional de Investigación Científica y Tecnológica
CP	Cerro Pachón
DR	Data Reduction
DSSI	Differential Speckle Survey Instrument
EMCCD	Electron-Multiplying Charge-Coupled Device
ESPaDOnS	Echelle Spectro-Polarimetric Device for the Observation of Stars
FDF	Facilities Development Fund
FITS	Flexible Image Transport System
FTE	Full-Time Equivalent
FTZ	Foreign Trade Zone
GeMS	Gemini Multi-conjugate Adaptive Optics System
Gen4#3	Gemini's next facility class instrument (Generation 4, #3)
GHOST	Gemini High-resolution Optical SpecTrograph
GIFS	Gemini Instrument Feasibility Studies (for Gen4#3)
GMOS	Gemini Multi-Object Spectrograph
GMOS-N	Gemini Multi-Object Spectrograph-North
GMOS-S	Gemini Multi-Object Spectrograph-South
GN	Gemini North
GNIRS	Gemini Near-Infrared Spectrograph
GPI	Gemini Planet Imager
GRACES	Gemini Remote Access to Canada-France-Hawaii ESPaDOnS Spectrograph
GS	Gemini South (or Gemini Staff, only in time allocation listing)
GSA	Gemini Science Archive
GSAOI	Gemini South Adaptive Optics Imager

HBF	Hilo Base Facility
ICD	Interface Control Document
IDF	Instrument Development Fund
IFU	Integral Field Unit
IINSPIRE	Iowa Illinois Nebraska STEM Partnership for Innovation in Research and Education
IR	Infrared
ITAC	International Time Allocation Committee
IYoL	International Year of Light
KASI	Korea Astronomy and Space Science Institute
LCH	Laser Clearing House
LGSF	Laser Guide Star Facility
LLP	Large and Long Program
MCAO	Multi-Conjugate Adaptive Optics
MK	Mauna Kea
MNRAS	Monthly Notices of the Royal Astronomical Society
NGO	National Gemini Office
NGS2	Natural Guide Star Wavefront Sensor upgrade project (for Gemini South)
NIFS	Near-Infrared Integral Field Spectrometer
NIR	Near-infrared
NIRI	Near Infrared Imager and Spectrometer
NOAO-S	National Optical Astronomy Observatory-South
NRC-H	National Research Council of Canada, Herzberg Institute for Astronomy
NSF	National Science Foundation
NTAC	National Time Allocation Committee
O&M	Operations and Maintenance (budget fund)
OCS	Observatory Control Systems
PI	Principal Investigator
PIO	Public Information and Outreach
Q1	Quarter 1
QAP	Quality Assessment Pipeline
SOS	Science Operations Specialist
STAC	Science and Technology Advisory Committee
STEM	Science, Technology, Engineering, and Mathematics
SUSD	Science User Support Department
TAC	Time Allocation Committee
UCG	Users' Committee for Gemini
US	United States
VLT	Very Large Telescope
z	Redshift

Appendix B. Publications by Staff

B.1 Staff Refereed Publications

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Margheim, Steven J.[3]. The Close Binary Central Star of the Planetary Nebula PHR J1602-4127. *AAS, #225*. 1/2015.

Ladjal, Djazia[2]. 3D Versus 1D Radiative Transfer Modeling of Planetary Nebulae. *AAS, #225*. 1/2015.

Bergmann, Marcel[6]. Characterizing Transiting Exoplanet Atmospheres with Gemini/GMOS: First Results. *AAS, #225*. 1/2015.

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Geballe, T. R.[2]. Gas in the CMZ toward the Galactic nucleus studied by H3+ and CO spectra. *AIP Conference Proceedings*, 1642:377-379. 1/2015.

Appendix C. Publications by Users

See notes for methodology.[89]

Caso, J. P., Richtler, T. Deconstructing the Antlia cluster core. *Astronomy and Astrophysics*, 584:A125, 12/2015.

Chené, A.-N., Ramírez Alegría, S., Borissova, J., O'Leary, E., Martins, F., Hervé, A., Kuhn, M., Kurtev, R., Consuelo Amigo Fuentes, P., Bonatto, C., Minniti, D. Massive open star clusters using the VVV survey. IV. WR 62-2, a new very massive star in the core of the VVV CL041 cluster. *Astronomy and Astrophysics*, 584:A31, 12/2015.

Shih, H.-Y., Stockton, A. A Compact Group of Galaxies at z = 2.48 Hosting an AGN-driven Outflow. *The Astrophysical Journal*, 815:50, 12/2015.

de Jaeger, T., González-Gaitán, S., Anderson, J. P., Galbany, L., Hamuy, M., Phillips, M. M., Stritzinger, M. D., Gutiérrez, C. P., Bolt, L., Burns, C. R., Campillay, A., Castellón, S., Contreras, C., Folatelli, G., Freedman, W. L., Hsiao, E. Y., Krisciunas, K., Krzeminski, W., Kuncarayakti, H., Morrell, N., Olivares E., F., Persson, S. E., Suntzeff, N. A Hubble Diagram from Type II Supernovae Based Solely on Photometry: The Photometric Color Method. *The Astrophysical Journal*, 815:121, 12/2015.

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[8] Gemini maintains an up-to-date database of papers based wholly or in part on Gemini data that appear in the main refereed astronomical research journals. These journals consist of: *The Astrophysical Journal, The Astronomical Journal, Astronomy & Astrophysics, Astrophysical Journal, Publications of the Astronomical Society of the Pacific, Icarus, Science* and *Nature*. In a few exceptional and well-assessed cases, we also count papers from "secondary" journals.

[9] Gemini's qualifying criterion is the same as that used by Hubble Space Telescope and European Southern Observatory. To qualify, papers based on their output, must employ in an original way an image, spectrum or data set produced by Gemini to derive new scientific results. No attempt is made to fractionate papers per telescope used in the case of papers based on the use of two or more other facilities. Hence, the same paper may be counted several times, for example by Gemini, Keck and Subaru, if it includes data from any of these telescopes.

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Bresolin, F., Kennicutt, R. C. Abundance gradients in low surface brightness spirals: clues on the origin of common gradients in galactic discs. *Monthly Notices of the Royal Astronomical Society*, 454:3664-3673, 12/2015.

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Appendix D. Science Programs 2014B and 2015A

2014B Scientific Programs – Gemini North

Band	Gemini ID	PI Name	Partners	Instrument	Title	Time
C	GN-2014B-C-1	Takahashi	Subaru	NIRI	Study of the structure of Jovian atmosphere by Galilean satellites eclipse	1.00 NT
C	GN-2014B-C-2	Herrera	Subaru	NIRI	How do galaxy mergers induce star formation?	1.00 NT
1	GN-2014B-LP-1	Fraser	LP	GMOS-N	COL-OSSOS: COLours for the Outer Solar System Object Survey	49.00 HR
1	GN-2014B-LP-2	Kasliwal	LP	GMOS-N	Rapid Spectroscopy of Elusive Transients and Young Supernovae	27.10 HR
1	GN-2014B-LP-3	Werk	LP	GMOS-N	Where Accretion Meets Feedback: A Galaxy Redshift Survey in HST/COS Quasar Fields (North)	13.50 HR
1	GN-2014B-Q-1	Akras	BR	NIRI	Probing the molecular hydrogen of small-scale structures in planetary nebulae	3.00 HR
1	GN-2014B-Q-2	Alexandersen	CA	GMOS-N	Plutino colours: a matter of size? (Finishing off)	8.00 HR
1	GN-2014B-Q-3	Aller	UH	GNIRS	Finding the Elusive Substellar Members of Young Moving Groups	25.00 HR
1	GN-2014B-Q-4	Allers	US	GNIRS	Clouds and Non-Equilibrium Chemistry in Brown Dwarf and Exoplanet Atmospheres	8.00 HR
1	GN-2014B-Q-5	Banzatti	US	TEXES	Water vapor in planet-formation regions: pinpointing the effects of variable UV radiation	10.20 HR
1	GN-2014B-Q-6	Barber	US	NIRI	Do Massive Stars Have Planets?	2.30 HR
1	GN-2014B-Q-7	Bate	AU	GMOS-N	Galactic cannibalism in action: Andromeda's South-West Cloud	9.00 HR
1	GN-2014B-Q-8	Cenko	US/CA	GMOS-N	Tidal Disruption Flares as Probes of Super-Massive Black Holes and Accretion Physics (North)	3.00 HR
1	GN-2014B-Q-9	Chapman	CA	GNIRS	The origin of multiplicity in sub-mm sources: physical associations or line-of-sight projections?	28.00 HR
1	GN-2014B-Q-10	Cucchiara	US/Ge/AU	GMOS-N	Exploring the first stars with rapid GRB follow-up observations (North)	15.60 HR
1	GN-2014B-Q-11	Cummings	US	GMOS-N	Search for Binaries in the Extended Horizontal Branch of NGC 6791	6.80 HR
1	GN-2014B-Q-12	Desert	US	GMOS-N	Comparative Exoplanetology of Hot-Jupiter Prototypes (North)	17.56 HR
1	GN-2014B-Q-13	Diamond	US	GNIRS	Late-time near-infrared spectroscopy of SN 2014J	2.50 HR
1	GN-2014B-Q-14	Emery	US	GNIRS	Where did the Trojan asteroids form? Constraints from composition and size distributions	16.00 HR
1	GN-2014B-Q-15	Fan	US	GNIRS	A Fifteen-billion Solar Mass Black Hole at the End of Reionzation?	1.30 HR
1	GN-2014B-Q-16	Farihi	US	GNIRS	The IR Excess at the Massive WD 0236+498: Planet?	1.30 HR
1	GN-2014B-Q-17	González	AR	GMOS-N	Exploring the faint galaxy content and the globular cluster systems of the Pegasus I Group.	2.30 HR
1	GN-2014B-Q-18	Guenther	US	NIFS	Proto-stellar jets in the making	6.00 HR
1	GN-2014B-Q-19	Hagelberg	UH	GMOS-N	The atmosphere of a hot Saturn exoplanet: composition, clouds and their connection to stellar activity	12.00 HR
1	GN-2014B-Q-20	Hagele	AR	GMOS-N	Understanding the complex gas kinematics of compact, rapidly growing galaxies in the local Universe	3.60 HR

2014B Scientific Programs – Gemini North (continued)

1	GN-2014B-Q-21	Howell	US	DSSI	Characterization of the Properties of Binary Exoplanet Host Stars	30.00 HR
1	GN-2014B-Q-22	Jorgensen	Ge	GMOS-N	Stellar populations in the Lynx Super Cluster at redshift 1.26	12.00 HR
1	GN-2014B-Q-23	Kane	US	DSSI	Searching for Wide-Binary Companions to Exoplanet Host Stars	20.00 HR
1	GN-2014B-Q-24	Lee	US	GMOS-N	M31 as distance anchor	30.00 HR
1	GN-2014B-Q-25	Liu	US	GMOS-N	Quasar Feedback at the Peak of the Galaxy Formation Epoch	10.00 HR
1	GN-2014B-Q-26	Mackey	AU	GMOS-N	Andromeda's Outcasts -- A Search for Exceptionally Remote Globular Clusters in M31	9.30 HR
1	GN-2014B-Q-27	Magill	Ge	GMOS-N	Observations of rare optical transient	4.00 HR
1	GN-2014B-Q-28	Mann	US	GNIRS	Prospecting in Ultracool Dwarfs: Measuring the metallicity of L dwarfs	14.20 HR
1	GN-2014B-Q-29	Marinello	BR	GNIRS	Strong FeII AGN Emitters in the Near-Infrared	6.00 HR
1	GN-2014B-Q-30	Martioli	BR	NIFS	Following-up the exoplanet companion around 55Cnc	6.00 HR
1	GN-2014B-Q-31	McConnell	UH	NIFS	Black Hole Safari + MASSIVE	15.00 HR
1	GN-2014B-Q-32	Moskovitz	US	GMOS-N	Mission Accessible Near-Earth Objects Survey (MANOS) (North)	22.50 HR
1	GN-2014B-Q-33	Nishiyama	Subaru	NIFS	Gas Cloud Accretion onto the SMBH SgrA* and Formation of Jet 3	7.50 HR
1	GN-2014B-Q-34	Parker	US	GMOS-N	Targeted Recovery of 2014A Candidate Kuiper Belt Objects for New Horizons Flyby	6.00 HR
1	GN-2014B-Q-35	Paron	AR	NIRI	Studying the origins of misaligned molecular outflows towards a massive YSO: a jet precession case?	4.30 HR
1	GN-2014B-Q-36	Pereira	US/CA/CL	GMOS-N	LoCuSS: Pre-processing within X-ray-selected groups infalling into z~0.2 clusters (North)	5.33 HR
1	GN-2014B-Q-37	Pontoppidan	US	TEXES	Where is the nitrogen in inner protoplanetary disks?	14.00 HR
1	GN-2014B-Q-38	Proctor	BR	GMOS-N	Spatially resolved stellar population parameters of three fossil group first-ranked galaxies	5.00 HR
1	GN-2014B-Q-39	Rodney	US	GMOS-N	The Next Frontier: High-Redshift Supernovae in the HST Frontier Fields (North)	5.00 HR
1	GN-2014B-Q-40	Salyk	US	TEXES	Where is the Water Vapor in Transition Disk DoAr 44?	3.00 HR
1	GN-2014B-Q-41	Sand	US	GNIRS	Constraining Type Ia Supernova Physics with Near-Infrared Spectroscopy (North)	9.00 HR
1	GN-2014B-Q-42	Scholz	CA	NIRI	Rapid Target of Opportunity Gemini Infrared Observations of Magnetars in Outburst	4.50 HR
2	GN-2014B-Q-43	Akras	BR	NIRI	Probing the molecular hydrogen of small-scale structures in planetary nebulae	12.30 HR
2	GN-2014B-Q-44	Alexandroff	US	NIFS	Quasar feedback at the peak of the galaxy formation epoch	4.60 HR
2	GN-2014B-Q-45	Aller	UH	GNIRS	Refining Spectral Diagnostics for Ages of Brown Dwarfs	18.50 HR
2	GN-2014B-Q-46	Beck	AU Rejected: US	NIFS	Understanding the Launching Mechanism in Young Star Jets	2.00 HR
2	GN-2014B-Q-47	Cellone	AR	GMOS-N	Looking for atmospheric signatures in the exoplanet Qatar-1b	4.00 HR
2	GN-2014B-Q-48	Childress	AU	GMOS-N	Nebular Spectra of Nearby Supernovae (North)	4.80 HR
2	GN-2014B-Q-49	Cucchiara	US/Ge	GMOS-N	Exploring Exotic Stellar Deaths with Standard TOO GRB Follow-Up Observations (North)	4.00 HR

2014B Scientific Programs – Gemini North (continued)

2	GN-2014B-Q-50	Daemgen	CA	NIFS,NIRI	Protoplanetary disk lifetimes revisited - The frequency of disks around single stars and binary components as a function of age.	17.00 HR
2	GN-2014B-Q-51	Dametto	BR	NIFS	Two-Dimensional Stellar Populations in Active Galaxies using NIFS	6.70 HR
2	GN-2014B-Q-52	Desert	US	GMOS-N	Comparative Exoplanetology of Hot-Jupiter Prototypes (North)	17.56 HR
2	GN-2014B-Q-53	Drahus	US	GMOS-N	The Activated Asteroid P/2012 F5 (Gibbs)	10.00 HR
2	GN-2014B-Q-54	Ebeling	UH	GMOS-N	Jellyfish: Violent galaxy evolution in very massive clusters	5.00 HR
2	GN-2014B-Q-55	Esplin	US	GNIRS	Searching for the Bottom of the Initial Mass Function (North)	2.70 HR
2	GN-2014B-Q-56	Ferrero	AR	NIRI	Searching for the HH 31counter-jet in the IRAS 04248+2612 protostar	4.00 HR
2	GN-2014B-Q-57	Geballe	Ge	GNIRS	H3+ absorption in the nucleus of NGC1068	3.00 HR
2	GN-2014B-Q-58	Heinis	US	NIRI	Probing the faint end of the redshift~6 Quasars luminosity function	12.60 HR
2	GN-2014B-Q-59	Ho	US	GNIRS	Did the Primordial Cores of Massive Elliptical Galaxies Have a Bottom-heavy IMF?	16.00 HR
2	GN-2014B-Q-60	Howell	US/CA	GMOS-N	The LCOGT Supernova Key Project (North)	15.00 HR
2	GN-2014B-Q-61	Kimball	AU	NIFS	Outflows and feedback in the most luminous QSOs in the Universe	19.50 HR
2	GN-2014B-Q-62	Lunnan	US	GMOS-N	The Beast's Lair: Observing the Host Galaxies of High-Redshift Superluminous Supernoave from Pan-STARRS1	5.00 HR
2	GN-2014B-Q-63	Maccarone	US	GMOS-N	Determining the mass of a putative heavy stellar black hole	7.50 HR
2	GN-2014B-Q-64	Milisavljevic	US	GMOS-N	A Search For Time-Varying Diffuse Interstellar Bands in Moderate Resolution Supernova Spectra (North)	8.00 HR
2	GN-2014B-Q-65	Montet	US	Dssi	Probing Fundamental Properties of Pre-Main Sequence M Dwarfs	3.00 HR
2	GN-2014B-Q-66	Moskovitz	US	GMOS-N	Mission Accessible Near-Earth Objects Survey (MANOS) (North)	22.50 HR
2	GN-2014B-Q-67	Najita	US	TEXES	The HCN/Water Ratio in Inner Disks: A Chemical Signature of Planetesimal Formation?	6.50 HR
2	GN-2014B-Q-68	Peeters	CA	NIRI	Photo-chemical evolution of PAHs	4.70 HR
2	GN-2014B-Q-69	Petric	Ge	GNIRS	Growing Black Holes and their Hosts	17.50 HR
2	GN-2014B-Q-70	Phillips	US	GNIRS	Near-Infrared Spectroscopy of Type Ia Supernovae	10.00 HR
2	GN-2014B-Q-71	Reipurth	UH	GNIRS	Orphaned Protostars and Ejected Brown Dwarfs	11.00 HR
2	GN-2014B-Q-72	Reipurth	UH	GMOS-N	The Outburst of Re50N: Accretion Event or Dust Clearing?	11.00 HR
2	GN-2014B-Q-73	Richardson	CA	GNIRS	The Undermassive Triple System delta Orionis	2.00 HR
2	GN-2014B-Q-74	Ridgway	US	GNIRS	On the importance of the AGB phase in Galaxy Evolution	22.00 HR
2	GN-2014B-Q-75	Rogerson	CA	GMOS-N	Spectroscopic monitoring of high-velocity rapidly-varying BAL quasars (North)	18.20 HR
2	GN-2014B-Q-76	Rudy	US	NIRI	Giant Flares and Non-Thermal Activity in the Crab Nebula	3.50 HR
2	GN-2014B-Q-77	Sardane	US	GMOS-N	Mapping cool, metal-rich gas around z<0.08 galaxies	10.00 HR
2	GN-2014B-Q-78	Schirmer	US/Ge/AU	GMOS-N	Characterizing quasar ionization echoes - towards long-term AGN light curves (North)	12.17 HR
2	GN-2014B-Q-79	Scholz	CA	NIRI	Target of Opportunity Gemini Infrared Observations of Magnetars in Outburst	13.50 HR

2014B Scientific Programs – Gemini North (continued)

2	GN-2014B-Q-80	Stockton	UH	GMOS-N	GMOS IFU Spectroscopy of the Ly-? Extended Emission around TXS 2332+154	8.00 HR
2	GN-2014B-Q-81	Stovall	US	GMOS-N	Constraining the Nature of PSR J0636+5129's Companion	3.80 HR
2	GN-2014B-Q-82	Wang	US	DSSI	What Causes the Migration of Hot Jupiters?	5.00 HR
2	GN-2014B-Q-83	Winkler	US	GMOS-N	Supernova Remnants in the Most Fertile Galaxy: NGC 6946	20.70 HR
3	GN-2014B-Q-84	Arias	AR	GNIRS	Disentangling the population of evolved massive stars in the galaxy M33	8.60 HR
3	GN-2014B-Q-85	Beers	Ge/US	GMOS-N	Missing metal-poor stars from the HK and Hamburg/ESO Surveys (North)	55.00 HR
3	GN-2014B-Q-86	Chambers	UH	GNIRS	GNIRS spectroscopy of new Pan-STARRS high z quasars	21.00 HR
3	GN-2014B-Q-87	Elvis	US	GMOS-N	A kinematic Survey of the Narrow Line Region in nearby Active Galaxies	10.00 HR
3	GN-2014B-Q-88	Gagné	CA	GMOS-N	Spectroscopic confirmation of very low-mass stars, brown dwarfs and planetary-mass candidates in nearby, young moving groups (North)	3.00 HR
3	GN-2014B-Q-89	Henry	US	DSSI	Searching for Companions to Nearby Stars on Solar System Scales	30.00 HR
3	GN-2014B-Q-90	Hodapp	UH	GNIRS	The Rapidly Variable YSO L1634 IRS2: Spectroscopy	3.00 HR
3	GN-2014B-Q-91	Hsieh	US	GMOS-N	Physical Characterization of Active Asteroids P/2012 T1, P/2013 R3, and 233P	3.00 HR
3	GN-2014B-Q-92	Inami	US	NIFS	Star formation in giant clumps in NGC 1961: A local analog of high-z normal star-forming galaxies?	8.10 HR
3	GN-2014B-Q-93	Kellogg	CA	GNIRS	Determining Dust Content in New Peculiar L and T Dwarfs	16.00 HR
3	GN-2014B-Q-94	Lacy	US	TEXES	A Study of the NGC 7538 IRS 1 HIgh-mass Star Formation Region	4.00 HR
3	GN-2014B-Q-95	Mason	Ge	GNIRS,NIRI	Definitive detection of thermally-pulsing AGB star signatures in local post-starburst galaxies	5.00 HR
3	GN-2014B-Q-96	Sales	BR	GMOS-N	Mapping the Inner Structure of OH Megamaser Merger Galaxies	9.50 HR
3	GN-2014B-Q-97	Taylor	AU	GMOS-N	Mapping the Dark Matter Halo Around an Individual Galaxy	14.00 HR
3	GN-2014B-Q-98	Tendulkar	US	GMOS-N	Solving the dilemma of PSR J0214+5222's companion	3.70 HR
3	GN-2014B-Q-99	Trafton	US	TEXES	Investigating the Response of the Unknown Source of Uranus' Thermospheric Emission to Seasonally Changing Insolation	21.00 HR
3	GN-2014B-Q-100	Tremblay	US	GMOS-N	A Sleeping Giant Awakened: Reignition of AGN Activity, Reborn Star Formation, and a Multiphase Outflow in one of the Largest Radio Galaxies Known	3.70 HR
3	GN-2014B-Q-101	Weidmann	AR	GMOS-N	Determining the actual nature of weak emission line stars in the nucleus of Planetary Nebulae	3.70 HR
4	GN-2014B-Q-102	Beers	BR	GMOS-N	Missing metal-poor stars from the HK and Hamburg/ESO Surveys (North)	30.00 HR

2014B Scientific Programs – Gemini South

Band	Gemini ID	PI Name	Partners	Instrument	Title	Time
1	GS-2014B-LP-1	Balogh	LP	GMOS-S	The GOGREEN Survey of dense galaxy environments at 1<z<1.5	39.80 HR
1	GS-2014B-LP-2	Fritz	LP	GMOS-S	Probing the dark halo of the Milky Way with GeMS/GSAOI	27.40 HR
1	GS-2014B-LP-3	Masiero	LP	GMOS-S	Followup of newly discoverd Near-Earth objects from the NEOWISE survey	8.00 HR
1	GS-2014B-LP-4	Werk	LP	GMOS-S	Where Accretion Meets Feedback: A Galaxy Redshift Survey in HST/COS Quasar Fields (South)	10.40 HR
2	GS-2014B-LP-5	Buckley-Geer	LP	GMOS-S	Spectroscopic Confirmation and AO imaging Follow-Up of Dark Energy Survey Strong Lensing Systems and Spectra for Photometric Redshift Calibration	75.00 HR
1	GS-2014B-Q-1	Ammons	US	GSAOI	A Test of GEMS Astrometric Precision for Exoplanet Detection and Mass Measurement	1.50 HR
1	GS-2014B-Q-2	Baron	CA	Flamingos2	Wide Imaging Search for Benchmark Planets	34.10 HR
1	GS-2014B-Q-3	Bian	AU	GMOS-S	Probing Circumgalactic Median and Gas Kinematics through an Einstein Ring	12.00 HR
1	GS-2014B-Q-4	Cenko	CA/US	GMOS-S	Tidal Disruption Flares as Probes of Super-Massive Black Holes and Accretion Physics (South)	3.00 HR
1	GS-2014B-Q-5	Cieza	CL	GPI	GPI observations of Young, Nearby, and Dusty A-type Stars	8.00 HR
1	GS-2014B-Q-6	Cucchiara	AU/Ge	GMOS-S	Exploring the first stars with rapid GRB follow-up observations (South)	3.60 HR
1	GS-2014B-Q-7	Currie	CA/US	GPI	A GPI Investigation of Clouds and Chemistry in Planets Orbiting HR 8799	5.50 HR
1	GS-2014B-Q-8	Demaio	US	GMOS-S	Baryon Fractions in Galaxy Groups	5.90 HR
1	GS-2014B-Q-9	Desert	US	GMOS-S	Comparative Exoplanetology of Hot-Jupiter Prototypes (South)	7.44 HR
1	GS-2014B-Q-10	Hardy	CL	GPI	The first detection of a second-generation substellar companion	2.00 HR
1	GS-2014B-Q-11	Ireland	AU	GPI	Exoplanets Scupting the UX Tau Transitional Disk?	3.00 HR
1	GS-2014B-Q-12	Jiang	US	GMOS-S	Spectroscopic Identification of Three Lyman_alpha Emitters at z ~ 7	19.80 HR
1	GS-2014B-Q-13	Kannappan	US	GMOS-S	REsolved Spectroscopy Of a Local VolumE:\\ The RESOLVE Survey in Stripe 82	22.00 HR
1	GS-2014B-Q-14	Kasliwal	CA/AU/US	GMOS-S	Rapid Spectroscopy of Elusive Transients and Young Supernovae (South)	3.03 HR
1	GS-2014B-Q-15	Knight	US	Flamingos2	Multi-scale investigation of the coma of comet 67P/Churyumov-Gerasimenko: Combined Gemini and Rosetta study of early activity	8.00 HR
1	GS-2014B-Q-16	Kraus	US	GPI	Imaging disk asymmetries and planet formation in a pre-transitional disk	8.00 HR
1	GS-2014B-Q-17	Leggett	Ge/US	Flamingos2	Exploring the 300K Brown Dwarfs	17.00 HR
1	GS-2014B-Q-18	Mora	CL	GMOS-S	Zooming into the recent star formation event in the infalling dwarf Irregular galaxy NGC 1427A	10.00 HR
1	GS-2014B-Q-19	Moskovitz	US	GMOS-S	Mission Accessible Near-Earth Objects Survey (MANOS) (South)	6.50 HR
1	GS-2014B-Q-20	Nagar	CL	GMOS-S	A kinematic Survey of the Narrow Line Region in nearby Active Galaxies	7.50 HR

2014B Scientific Programs – Gemini South (continued)

1	GS-2014B-Q-21	Pereira	CL	GMOS-S	LoCuSS: Pre-processing within X-ray-selected groups infalling into z~0.2 clusters (South)	6.00 HR
1	GS-2014B-Q-22	Perez	CL	GPI	Mapping the protoplanetary disk in EP Cha: planet formation and dust evolution at a critical age	1.50 HR
1	GS-2014B-Q-23	Pforr	US	GMOS-S	A GMOS spectroscopy survey of Herschel sources in the CANDELS UDS field	35.20 HR
1	GS-2014B-Q-24	Rest	US	GMOS-S	Spectrophotometric Time Series of η~Carinae's Great Eruption	14.30 HR
1	GS-2014B-Q-25	Richtler	CL	GMOS-S	Isolated ellipticals - key objects for the dark matter problem?	12.00 HR
1	GS-2014B-Q-26	Rodney	US	GMOS-S	The Next Frontier: High-Redshift Supernovae in the HST Frontier Fields (South)	5.00 HR
1	GS-2014B-Q-27	Sand	US	Flamingos2	Constraining Type Ia Supernova Physics with Near-Infrared Spectroscopy (South)	12.80 HR
1	GS-2014B-Q-28	Sesto	AR	GMOS-S	The evolution of the massive eary-type galaxies in Eridanus supergroup through their old stellar systems.	7.00 HR
1	GS-2014B-Q-29	Shih	Ge	GMOS-S	Outflows and Stellar Populations of Gigahertz Peak Radio Sources (South)	6.00 HR
1	GS-2014B-Q-30	Steiner	BR	GMOS-S	LLP - The Gemini Survey of Galactic Nuclei - GSGN	17.00 HR
1	GS-2014B-Q-31	Stubbs	US	GMOS-S	Spectroscopy of Galaxies in Massive Clusters: \\ Galaxy Properties and Dynamical \\ Cluster Mass Calibration	20.00 HR
1	GS-2014B-Q-32	Tinney	AU/US	GSAOI	MCAO Astrometry and Binarity of WISE Y dwarfs	12.90 HR
1	GS-2014B-Q-33	Trujillo	Ge	GMOS-S	Distant Solar System Objects	1.00 HR
1	GS-2014B-Q-34	Willott	CA	GMOS-S	Cosmic reionization probed by lensed Lyman break galaxies	13.00 HR
2	GS-2014B-Q-35	Bauer	CL	GMOS-S	Resolving the peak of the Cosmic X-ray Background: Optical Follow-up for the NuSTAR Serendipitous Survey	5.00 HR
2	GS-2014B-Q-36	Benson	US	GMOS-S	Slaying Systematics: Maximizing Cosmological Power from HST-Measured Weak Lensing Masses of High-Redshift Clusters	25.00 HR
2	GS-2014B-Q-37	Biller	US	GPI	Exometeorology: Searching for Weather on Beta Pictoris b	17.00 HR
2	GS-2014B-Q-38	Childress	AU	GMOS-S	Nebular Spectra of Nearby Supernovae (South)	6.40 HR
2	GS-2014B-Q-39	Christiaens	CL	GPI	Companions and spiral arms in the disk of Herbig AeBe disks with large gaps	4.00 HR
2	GS-2014B-Q-40	Cortesi	BR	GMOS-S	Formation of isolated S0 galaxies	7.50 HR
2	GS-2014B-Q-41	Cucchiara	Ge/US	GMOS-S	Exploring Exotic Stellar Deaths with Standard TOO GRB Follow-Up Observations (South)	4.00 HR
2	GS-2014B-Q-42	Cúneo	AR	GMOS-S	Spectroscopic metallicities of polluted visible component atmosphere in black hole binary systems	1.50 HR
2	GS-2014B-Q-43	de Souza Angelo	BR	GMOS-S	Multi-object spectroscopy of open cluster remnants: the cases of ESO425-SC15 and Ruprecht 3	3.00 HR
2	GS-2014B-Q-44	Demarco	CL	GMOS-S	Spectroscopic confirmation of an evolved galaxy cluster candidate at z=2.3	13.50 HR
2	GS-2014B-Q-45	Desert	US	GMOS-S	Comparative Exoplanetology of Hot-Jupiter Prototypes (South)	7.44 HR

2014B Scientific Programs – Gemini South (continued)

2	GS-2014B-Q-46	Eigenthaler	CL	GMOS-S	Spatially resolved stellar population parameters of three fossil group first-ranked galaxies	7.50 HR
2	GS-2014B-Q-47	Gagné	CA	Flamingos2, GMOS-S	Spectroscopic confirmation of very low-mass stars, brown dwarfs and planetary-mass candidates in nearby, young moving groups (South)	7.90 HR
2	GS-2014B-Q-48	Graham	CA/US	GPI	Astrometry of Beta Pic with GPI	3.30 HR
2	GS-2014B-Q-49	Hayward	Ge	GSAOI	Deep GeMS/GSAOI Imaging of the Orion Nebula Cluster	6.00 HR
2	GS-2014B-Q-50	Hillwig	Ge/US/CL	GMOS-S	Determining Stellar Parameters of Eclipsing Binary Central Stars of Planetary Nebulae	15.20 HR
2	GS-2014B-Q-51	Howell	CA/US	GMOS-S	The LCOGT Supernova Key Project (South)	15.00 HR
2	GS-2014B-Q-52	Kannappan	US	GMOS-S	REsolved Spectroscopy Of a Local VolumE:\\ The RESOLVE Survey in Stripe 82	17.00 HR
2	GS-2014B-Q-53	Kuncarayakti	CL	GMOS-S	GMOS-S IFU spectroscopy of nearby supernova explosion sites	9.00 HR
2	GS-2014B-Q-54	Lira	CL	Flamingos2	Reverberation Mapping of high-z QSOs: the final stages	1.50 HR
2	GS-2014B-Q-55	Lorenzo de Oliveira	BR	GMOS-S	Chromospheric Activity in Old Open Cluster: NGC 2243	6.60 HR
2	GS-2014B-Q-56	Marois	US/CA	GPI	GPI detailed spectroscopic and astrometric characterization of HR 8799cde.	10.00 HR
2	GS-2014B-Q-57	Milisavljevic	US	GMOS-S	A Search For Time-Varying Diffuse Interstellar Bands in Moderate Resolution Supernova Spectra (South)	4.00 HR
2	GS-2014B-Q-58	Moskovitz	US	GMOS-S	Mission Accessible Near-Earth Objects Survey (MANOS) (South)	6.50 HR
2	GS-2014B-Q-59	Piatti	AR	GMOS-S	Unveiling the origin of the LMC clusters NGC1928 and NGC1939	3.00 HR
2	GS-2014B-Q-60	Posselt	US	Flamingos2	Confirming a substellar companion candidate around a neutron star	5.70 HR
2	GS-2014B-Q-61	Rogerson	CA	GMOS-S	Spectroscopic monitoring of high-velocity rapidly-varying BAL quasars	13.40 HR
2	GS-2014B-Q-62	Salter	AU	GPI	Imaging and Spectroscopy of Long Period Companions to Doppler Planet Search Stars	7.00 HR
2	GS-2014B-Q-63	Schirmer	Ge/US/AU	GMOS-S	Characterizing quasar ionization echoes - towards long-term AGN light curves (South)	24.33 HR
2	GS-2014B-Q-64	Stubbs	US	GMOS-S	Spectroscopy of Galaxies in Massive Clusters: \\ Galaxy Properties and Dynamical \\ Cluster Mass Calibration	20.00 HR
2	GS-2014B-Q-65	Wright	CA	GPI	Unveiling the Inner Regions of Circumstellar Envelopes and Winds of AGB Stars	6.00 HR
3	GS-2014B-Q-66	Becerra Gonzalez	CL	GMOS-S	Revealing the nature of unidentified gamma-ray sources (South)	3.40 HR
3	GS-2014B-Q-67	Beers	US/Ge	GMOS-S	Missing metal-poor stars from the HK and Hamburg/ESO Surveys (South)	55.00 HR
3	GS-2014B-Q-68	Bosch	AR	GMOS-S	Tracking massive binary frequency in different environments	8.80 HR
3	GS-2014B-Q-69	Bussmann	US	GMOS-S	Completing Gemini-South Optical Imaging of ALMA Lensed SMGs Discovered by Herschel	4.40 HR
3	GS-2014B-Q-70	Clayton	US	Flamingos2	Using 16O/18O to Determine the Evolutionary History of the R Coronae Borealis Stars	14.30 HR
3	GS-2014B-Q-71	de Souza Angelo	BR	GMOS-S	Multi-object spectroscopy of open cluster remnants: the cases of ESO425-SC15 and Ruprecht 3	3.00 HR

2014B Scientific Programs – Gemini South (continued)

3	GS-2014B-Q-72	Gagné	CA	Flamingos2, GMOS-S	Spectroscopic confirmation of very low-mass stars, brown dwarfs and planetary-mass candidates in nearby, young moving groups (South)	30.00 HR
3	GS-2014B-Q-73	Gelino	US	Flamingos 2	Photometric Follow-up of AllWISE Brown Dwarf Candidates	16.80 HR
3	GS-2014B-Q-74	Hernandez-Jimenez	BR	GMOS-S	Could flattened metallicity gradients of interacting galaxies be due to falling gas from the galactic disk ?	3.10 HR
3	GS-2014B-Q-75	Homan	US	GMOS-S	The puzzling mass donor in the Galactic halo X-ray binary MAXI J0556-332	3.10 HR
3	GS-2014B-Q-76	Knight	US	GMOS-S	Multi-scale investigation of the coma of comet 67P/Churyumov-Gerasimenko: Combined Gemini and Rosetta study of early activity	12.50 HR
3	GS-2014B-Q-77	Mendes de Oliviera	BR	GMOS-S	Stars outside galaxies: a census of intergalactic HII regions in the tidal debris of the merger galaxy Arp284	8.10 HR
3	GS-2014B-Q-78	Parisi	CL	GMOS-S	Accurate Ages, Metal Abundances and Kinematics of a Large Sample of Small Magellanic Cloud Star Clusters and Surrounding Fields	11.00 HR
3	GS-2014B-Q-79	Peixinho	CL	GMOS-S	Searching for the primordial proto-planetary gradient through cis-Plutino resonant Kuiper Belt Objects	6.20 HR
3	GS-2014B-Q-80	Pinilla-Alonso	US	Flamingos2	Near-Infrared photometry of BOs and Centaurs in support of Spitzer Space Telescope data	17.50 HR
3	GS-2014B-Q-81	Richtler	Ge	GMOS-S	Isolated ellipticals - key objects for the dark matter problem?	10.00 HR
3	GS-2014B-Q-82	Rodriguez	CL	GMOS-S	Characterizing Young Stars Near the Earth	10.00 HR
3	GS-2014B-Q-83	Sweet	AU	GMOS-S	Falling rotation curves in tidal dwarf galaxies	14.00 HR
4	GS-2014B-Q-84	Ahumada	AR	GMOS-S	A new template spectral library of Large Magellanic Cloud's star clusters	2.80 HR
4	GS-2014B-Q-85	Beers	BR	GMOS-S	Missing metal-poor stars from the HK and Hamburg/ESO Surveys (South)	30.00 HR

2015A Scientific Programs – Gemini North

Band	Gemini ID	PI Name	Partners	Instrument	Title	Time
C	GN-2015A-C-1	Tsumura	Subaru	NIRI	Vertical structure of Jovian haze based on deep Galilean satellite eclipses	10.00 HR
C	GN-2015A-C-2	Wilson	US	GMOS-N	Spatially Resolving the Circumgalactic Medium at z=0.2-0.9	2.00 NT
C	GN-2015A-C-3	Narita	Subaru	GMOS-N	Probing Transit Spectra of the Youngest Hot Jupiter	5.00 HR
C	GN-2015A-C-4	Griffith	US	GMOS-N	Elementary Abundances of Planetary Systems	10.00 HR
FT	GN-2015A-FT-1	Lunnan	US	GMOS-N	Late-Time Spectroscopy of the Extraordinary Superluminous Supernova PS1-14bj	3.00 HR
FT	GN-2015A-FT-2	Maksym	US	GMOS-N	Spectral Evolution and Host of an X-ray Bright Tidal Flare at Only 90 Mpc	4.20 HR
FT	GN-2015A-FT-3	Van Kerkwijk	CA	GNIRS	Late time Near Infrared spectroscopy of SN2014J	3.00 HR
FT	GN-2015A-FT-8	Scarlata	US	GMOS-N	Ionized gas conditions in the first known OVI emitting starburst galaxy	5.50 HR
FT	GN-2015A-FT-9	Lacy	US	GNIRS	Weighing the super-massive black hole in luminous QSO J1554+1937	1.40 HR

2015A Scientific Programs – Gemini North (continued)

FT	GN-2015A-FT-14	Milisavljevic	US	GMOS-N, GNIRS	The Unprecedented Supernova Metamorphosis of SN 2014C	3.30 HR
FT	GN-2015A-FT-17	Romani	US	GMOS-N	The PSR J2030+4415 Bowshock: Close or Fast?	2.00 HR
FT	GN-2015A-FT-18	Meech	UH	GMOS-N	Enigmatic Novel PanSTARRS Discoveries-Testing Solar System Formation Models	1.33 HR
FT	GN-2015A-FT-19	Hsieh	US	GMOS-N	Search for Sublimation-Driven Dust Emission from Asteroid (24) Themis	2.60 HR
1	GN-2015A-LP-1	Fraser	LP	GMOS-N, NIRI	COL-OSSOS: COLours for the Outer Solar System Object Survey	23.50 HR
1	GN-2015A-LP-2	Kasliwal	LP	GMOS-N	Rapid Spectroscopy of Elusive Transients and Young Supernovae	27.10 HR
1	GN-2015A-LP-3	Werk	LP	GMOS-N	Where Accretion Meets Feedback: A Galaxy Redshift Survey in HST/COS Quasar Fields (North)	39.35 HR
1	GN-2015A-LP-4	Balogh	LP	GMOS-N	The GOGREEN Survey of dense galaxy environments at 1<z<1.5 (North)	16.00 HR
1	GN-2015A-Q-1	Tremblay	US	GMOS-N	Mapping the wreckage of a gas-rich major merger in a strong-lensing galaxy cluster	4.00 HR
1	GN-2015A-Q-2	Takamiya	UH	GMOS-N, NIFS	Abundance and SFR of the z = 0.68 sub-DLA toward SDSS J233544.18+150118.3	1.50 HR
1	GN-2015A-Q-3	Storchi-Bergmann	BR	NIFS	NIFS survey of feeding and feedback processes in nearby Active Galaxies	15.00 HR
1	GN-2015A-Q-4	Stalder	UH	GMOS-N	Photometric Redshift Determination of 1 < z < 1.5 MaDCoWS	7.00 HR
1	GN-2015A-Q-5	Smith Castelli	AR	GMOS-N, NIRI	Multiwavelength study of star-forming dwarf galaxies in dense environments (North)	2.24 HR
1	GN-2015A-Q-6	Seth	AU/US	NIFS	A Survey of Massive Black Holes in Ultracompact Dwarf Galaxies	21.20 HR
1	GN-2015A-Q-7	Scholz	CA	NIRI	Rapid Target of Opportunity Gemini Infrared Observations of Magnetars in Outburst (North)	5.00 HR
1	GN-2015A-Q-8	Sand	US	GNIRS	Constraining Type Ia Supernova Physics with Near-Infrared Spectroscopy (North)	13.50 HR
1	GN-2015A-Q-9	Sanchez-Janssen	CA	GMOS-N	Unveiling the kinematics of the giant loop around the spiral galaxy NGC4216: a laboratory to investigate satellite accretion and the dark matter profile?	15.00 HR
1	GN-2015A-Q-10	Saha	US	GMOS-N	Establishing a Network of DA White Dwarf SED Standards (North)	15.35 HR
1	GN-2015A-Q-11	Rudy	US	NIRI	Giant Flares and Non-Thermal Activity in the Crab Nebula	3.50 HR
1	GN-2015A-Q-12	Rovero	AR	GMOS-N	Redshift measurement of the BL-Lac gamma-ray blazar PKS 1424+240	1.80 HR
1	GN-2015A-Q-13	Nielsen	US	GMOS-N	Probing the intragroup medium with bent double lobed sources	4.00 HR
1	GN-2015A-Q-14	Moskovitz	US	GMOS-N, GNIRS	Mission Accessible Near-Earth Objects Survey (MANOS) (North)	22.50 HR
1	GN-2015A-Q-15	Menendez-Delmestre	BR	GMOS-N	Probing for Galaxy Overdensities around Distant Dusty Starbursts	9.00 HR
1	GN-2015A-Q-16	Melin	US	GNIRS	The influence of the Sun on Saturn?s polar ionosphere	10.50 HR
1	GN-2015A-Q-17	Meech	UH	GMOS-N	MBC 238P/Read Phase Function	5.50 HR
1	GN-2015A-Q-18	McDermid	AU	GMOS-N	Australia's 2015 Gemini Astronomy Contests	1.00 HR
1	GN-2015A-Q-19	McConnell	UH	GMOS-N	Twin Monsters in Coma? The Black Hole Mass of NGC 4874	9.00 HR

2015A Scientific Programs – Gemini North (continued)

1	GN-2015A-Q-20	Horch	US	DSSI	Defining the Metal-Poor Mass-Luminosity Relation	4.90 HR
1	GN-2015A-Q-21	Henry	US	DSSI	Searching for Companions to Nearby Stars on Solar System Scales	40.00 HR
1	GN-2015A-Q-22	Hayashi	Subaru	NIFS	Direct verification of AGN feedback in active radio galaxies at z~2.5	15.00 HR
1	GN-2015A-Q-23	Gullikson	US	NIRI	Stellar Companions to A and B stars: Follow up Observations	5.70 HR
1	GN-2015A-Q-24	Guenther	US	NIFS	Proto-stellar jets in the making	3.00 HR
1	GN-2015A-Q-25	Ebeling	UH	GMOS-N	eMACS: Massive galaxy clusters at z > 0.5 from the PS1 3? survey	12.00 HR
1	GN-2015A-Q-26	Cote	CA	GMOS-N	Measuring Mass-to-Light in Nearby Dwarf Spheroidal Galaxies (North)	12.77 HR
1	GN-2015A-Q-27	Cidale	AR	NIRI	On the structure and kinematics of the nebulae around the star MWC137	2.80 HR
1	GN-2015A-Q-28	Chambers	UH	GNIRS	Near IR spectroscopy of new z~6 quasars discovered by Pan-STARRS	18.00 HR
1	GN-2015A-Q-29	Bowler	US	NIFS	Spectroscopic Confirmation of the Planetary Companion ROXs12 b	7.00 HR
1	GN-2015A-Q-30	Bentz	US	NIFS	A Stellar Dynamical Black Hole Mass for the Nearby Seyfert Galaxy NGC5273	13.80 HR
1	GN-2015A-Q-31	Bassett	AU/CA	GMOS-N	Local Counterparts to High-Redshift Turbulent Galaxies: What are the Stellar Kinematics?	24.50 HR
1	GN-2015A-Q-91	Hwang	KR	GMOS-N	Pre-imaging for KASI MOS programs - North 2015A	1.00 HR
1	GN-2015A-Q-92	Lee	KR	GMOS-N	Pre-imaging for KASI MOS programs - North 2015A	1.00 HR
1	GN-2015A-Q-93	Narita	Subaru	GMOS-N	Pre-imaging for Classical Program	1.00 HR
1	GN-2015A-Q-94	Griffith	US	GMOS-N	Pre-imaging for Classical Program	1.00 HR
1	GN-2015A-Q-201	Kim	KR	GMOS-N	An Off-nucleus Active Intermediate-mass Black Hole in NGC 5252	0.50 NT
1	GN-2015A-Q-202	Rey	KR	GMOS-N	Disentangling formation of blue-cored dwarf elliptical galaxies in the cluster environment: Kinematical perspective	1.00 NT
1	GN-2015A-Q-203	Shin	KR	GNIRS	A Search for Chemically Young QSOs in High-z Universe	1.00 NT
1	GN-2015A-Q-204	Woo	KR	GMOS-N	AGN feedback in action: extreme gas outflows in type 2 AGNs	1,00 NT
1	GN-2015A-Q-205	Hwang	KR	GMOS-N	Mass Function of Star Clusters in Spiral Galaxy M51	1.00 NT
2	GN-2015A-Q-32	Tucker	US/AU	GMOS-N	Catching Supernovae in the Act with KEGS (Kepler Extra-Galactic Survey) (North)	11.20 HR
2	GN-2015A-Q-33	Tetarenko	CA	NIFS	Identifying the Counterpart of Two Candidate Black Hole X-ray Binaries	4.60 HR
2	GN-2015A-Q-34	Sung	US	NIFS	Mass Accretion Rate of Very Low Luminosity Objects	2.50 HR
2	GN-2015A-Q-35	Storchi-Bergmann	BR	NIFS	NIFS survey of feeding and feedback processes in nearby Active Galaxies	5.00 HR
2	GN-2015A-Q-36	Stockton	UH	GMOS-N	Metallicities of Young Radio Jet-Driven Outflows	4.00 HR
2	GN-2015A-Q-37	Stern	US	GNIRS	Spatially Resolving the Kinematics of the ~100 uas Quasar Broad Line Region Using Spectroastrometry	15.00 HR
2	GN-2015A-Q-38	Sharon	US	GMOS-N	?Resolving the Star Formation in Distant Galaxies? ? supporting ground-based spectroscopy for a large HST program	4.80 HR

2015A Scientific Programs – Gemini North (continued)

2	GN-2015A-Q-39	Scholz	CA	NIRI	Target of Opportunity Gemini Infrared Observations of Magnetars in Outburst (North)	13.13 HR
2	GN-2015A-Q-40	Sawicki	CA	GNIRS	Dead monsters: GNIRS spectroscopy of ultra-massive quiescent galaxies at high redshift	20.00 HR
2	GN-2015A-Q-41	Repetto	BR	GMOS-N	Exponential pseudobulge kinematic properties in NGC 3367.	1.90 HR
2	GN-2015A-Q-42	Perlmutter	AU/US	GMOS-N	See Change: Testing for time-varying dark energy with z > 1 supernovae and their massive cluster hosts (North)	10.50 HR
2	GN-2015A-Q-43	Oio	AR	GMOS-N	Unveiling the kinematics on SDSS J093643.13+505249.6	5.10 HR
2	GN-2015A-Q-44	Mould	AU	NIFS	The dynamics and excitation of circumnuclear disks in radio galaxies.	5.00 HR
2	GN-2015A-Q-45	Moskovitz	US	GMOS-N, GNIRS	Mission Accessible Near-Earth Objects Survey (MANOS) (North)	22.50 HR
2	GN-2015A-Q-46	Montet	US	DSSI	Fundamental Parameters of Pre-Main Sequence M Dwarfs	11.90 HR
2	GN-2015A-Q-47	Meyer	CA	NIFS	A NIFS near-infrared probe of the variable IMF in early type galaxies	8.00 HR
2	GN-2015A-Q-48	Melin	US	GNIRS	The influence of the Sun on Saturn?s polar ionosphere	3.50 HR
2	GN-2015A-Q-49	McDermid	AU/CA	GMOS-N	The Nuclear to Global Connection: a Detailed View of Stellar Nuclei in a Sample of Virgo Ellipticals	14.00 HR
2	GN-2015A-Q-50	Mason	US	GMOS-N	Nearby velocity-offset AGN: signposts of double supermassive black holes?	17.00 HR
2	GN-2015A-Q-51	Mason	BR	NIFS	The care and feeding of small black holes	3.00 HR
2	GN-2015A-Q-52	Martins	BR	NIFS	Unveiling the massive stellar population of W51A	8.20 HR
2	GN-2015A-Q-53	Marinello	BR	GNIRS	Unraveling the excitation mechanisms of AGN ultra-strong FeII emitters (North)	4.60 HR
2	GN-2015A-Q-54	Lunnan	US	GMOS-N	The Beast's Lair: Observing the Host Galaxies of High-Redshift Superluminous Supernovae from Pan-STARRS1	2.00 HR
2	GN-2015A-Q-55	Leggett	US	GNIRS, NIRI	Characterizing new late-T and Y dwarfs at the faint limits of WISE (North)	15.50 HR
2	GN-2015A-Q-56	Krafton	US	GMOS-N	Late-Time Dust Formation in Core-Collapse Supernovae (North)	9.90 HR
2	GN-2015A-Q-57	Kellogg	CA	GNIRS	Determining Cause of Dustiness in New Peculiar L and T Dwarfs	4.00 HR
2	GN-2015A-Q-58	Keeney	US	GMOS-N	Confirming the Discovery of Massive 10^6 K Gas Reservoirs in Spiral-Rich Galaxy Groups	22.00 HR
2	GN-2015A-Q-59	Howell	US/CA	GMOS-N	The LCOGT Supernova Key Project (North)	15.00 HR
2	GN-2015A-Q-60	Ho	US	GMOS-N	Studying Galaxy Disk Structures and its Relation with Gas Accretion in z=0.15-0.3 Galaxies	7.20 HR
2	GN-2015A-Q-61	Hinkle	US	NIFS, NIRI	The Nascent Planetary Nebula around Sakurai's Object (North)	3.00 HR
2	GN-2015A-Q-62	Haines	CA/US	GMOS-N	LoCuSS: Pre-processing within X-ray-selected groups infalling into z~0.2 clusters (North)	9.80 HR
2	GN-2015A-Q-63	Hagelberg	UH	GMOS-N	Probing the clear atmosphere of a hot Neptune	13.20 HR
2	GN-2015A-Q-64	Glikman	US	GNIRS	Dust-Reddened Quasars as Probes of Feedback and Co-Evolution	11.10 HR
2	GN-2015A-Q-65	Gallagher	US/CA	GNIRS	Looking for Feedback Signatures in Quasar Outflows	14.90 HR
2	GN-2015A-Q-66	Cook	US	NIFS	Spectral Variablility of Charon	19.00 HR

2015A Scientific Programs – Gemini North (continued)

2	GN-2015A-Q-67	Caballero	US	NIFS	Young Companions to Massive Stars in Cygnus OB2	2.80 HR
2	GN-2015A-Q-68	Brotherton	US	GNIRS	Rest-Frame Optical Properties of Luminous z~3 Quasars: Testing Mass and Redshift Improvements	7.50 HR
2	GN-2015A-Q-69	Brittain	US	NIFS	HI emission lines from Herbig Ae/Be: A spectro-astrometric study with GEMINI/NIFS	4.00 HR
2	GN-2015A-Q-70	Bassino	AR	GMOS-N	Evolutionary history of isolated elliptical galaxies through their globular cluster systems	6.20 HR
2	GN-2015A-Q-71	Aller	UH	GNIRS	Finding the Elusive Substellar Members of Young Moving Groups	30.00 HR
2	GN-2015A-Q-72	Alexandroff	US	GNIRS	Rest-frame optical spectra of high-redshift, dusty, galaxy-wide quasar outflow candidates	10.50 HR
2	GN-2015A-Q-206	Jeong	KR	GMOS-N		1.00 NT
3	GN-2015A-Q-73	Tokovinin	US	DSSI	Testing multiple-star formation with speckle at Gemini-N	7.00 HR
3	GN-2015A-Q-74	Titov	AU	GMOS-N	A search of radio sources at high redshift	15.00 HR
3	GN-2015A-Q-75	Schmitz	US	GMOS-N	Central Kinematics of Giant Low Surface Brightness Galaxies	7.50 HR
3	GN-2015A-Q-76	Schlaufman	US	GMOS-N	An All-Sky Search for the Brightest Metal-Poor Stars (North)	45.84 HR
3	GN-2015A-Q-77	Sardane	US	GMOS-N	Mapping cool, metal-rich gas around z < 0.08 galaxies	30.10 HR
3	GN-2015A-Q-78	Sales	BR	GMOS-N	The Inner Structure of OH Megamaser Merger Galaxies IRAS16399-0937 (North)	13.50 HR
3	GN-2015A-Q-79	Ouellette	CA/US	GMOS-N	The Dynamical Properties and Velocity Function of Virgo Cluster Galaxies (North)	32.10 HR
3	GN-2015A-Q-80	Miller	US	GMOS-N	Globular Cluster Spectroscopy of dEs in the Local Volume (North)	20.00 HR
3	GN-2015A-Q-81	Lianou	CA	GMOS-N	Emission-line sources at the periphery of the Local Group: VV124	5.80 HR
3	GN-2015A-Q-82	Leggett	US	GNIRS, NIRI	Characterizing new late-T and Y dwarfs at the faint limits of WISE (North)	5.50 HR
3	GN-2015A-Q-83	Lee-Waddell	CA	GMOS-N	Confirming a tidal dwarf galaxy in the NGC 3166/9 group	3.00 HR
3	GN-2015A-Q-84	Howell	US	DSSI	Characterization of the Properties of Binary Exoplanet Host Stars	36.20 HR
3	GN-2015A-Q-85	de Souza Angelo	BR	GMOS-N	Investigation of Galactic open cluster remnants: the cases of Ruprecht 31 and ESO570-SC12	3.00 HR
3	GN-2015A-Q-86	Curd	US	GMOS-N	A Search for Massive White Dwarf Pulsators	12.00 HR
3	GN-2015A-Q-87	Bastien	CA	GMOS-N	Variability of the active RY Tauri bipolar jet	1.60 HR
3	GN-2015A-Q-88	Bahramian	CA	GNIRS	Near-infrared spectroscopy of unusual transient X-ray binaries	5.40 HR
3	GN-2015A-Q-89	Arias	AR	GNIRS	The interplay between pulsations and mass loss in blue supergiants	5.40 HR
3	GN-2015A-Q-90	UH	UH	NIRI, NIFS, GNIRS	Placeholder program for UH 2015A Band 3 time	32.00 HR
3	GN-2015A-Q-207	Lee	KR	GMOS	A Spectroscopy of Globular Clusters in the Merger Remnant M85	5.00 HR
3	GN-2015A-Q-208	Im	KR	NIRI	NIR Imaging of QSO Candidate at z ~ 7	5.00 HR
3	GN-2015A-Q-209	Kim	KR	NIRI	Star formation history of dwarf galaxies in the Leo I group: The origin of the large-scale HI ring	5.00 HR

2015A Scientific Programs – Gemini South

Band	Gemini ID	PI Name	Partners	Instrument	Title	Time
C	GS-2015A-C-1	Muto	Subaru	GPI	Probing a Protoplanetary Disk in Transition Phase in a Binary System HD 100453	10.00 HR
1	GS-2015A-LP-1	Werk	LP	GMOS-S	Where Accretion Meets Feedback: A Galaxy Redshift Survey in HST/COS Quasar Fields (South)	13.75 HR
1	GS-2015A-LP-2	Masiero	LP	GMOS-S	Followup of newly discoverd Near-Earth objects from the NEOWISE survey	8.00 HR
1	GS-2015A-LP-3	Fritz	LP	GSAOI	Probing the dark halo of the Milky Way with GeMS/GSAOI	20.40 HR
1	GS-2015A-LP-4	Balogh	LP	GMOS-S	The GOGREEN Survey of dense galaxy environments at 1<z<1.5 (South)	18.60 HR
2	GS-2015A-LP-5	Buckley-Geer	LP	GMOS-S	Spectroscopic Confirmation and AO imaging Follow-Up of Dark Energy Survey Strong Lensing Systems and Spectra for Photometric Redshift Calibration	12.00 HR
1	GS-2015A-Q-1	Zepf	US	GMOS-S	Long-Term X-ray and Optical Study of the Black Hole X-ray Binaries in the Elliptical Galaxies NGC 4472	14.80 HR
1	GS-2015A-Q-2	Verbiscer	US	GMOS-S	Superior Mutual Event of (79360) Sila-Nunam	7.50 HR
1	GS-2015A-Q-3	Steiner	BR	GMOS-S	LLP - The Gemini Survey of Galactic Nuclei - GSGN	17.00 HR
1	GS-2015A-Q-4	Scholz	CA	Flamingos2	Rapid Target of Opportunity Gemini Infrared Observations of Magnetars in Outburst (South)	5.20 HR
1	GS-2015A-Q-5	Sand	US	Flamingos2	Constraining Type Ia Supernova Physics with Near-Infrared Spectroscopy (South)	8.50 HR
1	GS-2015A-Q-6	Ryder	AU	GSAOI	Sealing the first supernova discovery with GeMS/GSAOI	2.30 HR
1	GS-2015A-Q-7	Ryder	AU	GSAOI	Project SUNBIRD: Supernovae UNmasked By Infra-Red Detection	10.80 HR
1	GS-2015A-Q-8	Rojo	J:US/CL	GPI	Investigating seasonal changes in Titan's meteorology through cloud monitoring with GPI	8.00 HR
1	GS-2015A-Q-9	Roediger	US/CA	GMOS-S	Towards a Panchromatic Understanding of Old Stellar Systems	30.00 HR
1	GS-2015A-Q-10	Richtler	CL	GMOS-S	Is there dark matter in NGC 3962?	12.00 HR
1	GS-2015A-Q-11	Niino	Subaru	GMOS-S	The complete metallicity measurements of long GRB host galaxies at z < 0.5 (South)	7.50 HR
1	GS-2015A-Q-12	Nagar	CL	GMOS-S	A kinematic survey of the Narrow Line Region in nearby Active Galaxies: Continuation	7.40 HR
1	GS-2015A-Q-13	Moskovitz	US	GMOS-S	Mission Accessible Near-Earth Objects Survey (MANOS) (South)	6.50 HR
1	GS-2015A-Q-14	Millar-Blanchaer	CA	GPI	Characterizing the inner regions of the GJ 581 debris disk	2.00 HR
1	GS-2015A-Q-15	Martioli	BR	GPI	Using GPI to obtain direct imaging of the massive exoplanet candidate HIP 70849 b	5.00 HR
1	GS-2015A-Q-16	Lu	US	GSAOI	Young Massive Clusters in the Milky Way	22.50 HR
1	GS-2015A-Q-17	Liu	US	GMOS-S	Spectroscopic Follow-Up of Variability Selected Binary Supermassive Black Hole Candidates	5.30 HR
1	GS-2015A-Q-18	Lira	CL	Flamingos2	Reverberation Mapping of high-z QSOs: the final stages	1.50 HR
1	GS-2015A-Q-19	Li	US	GPI	The First Polarimetric Mapping of Ceres	9.50 HR
1	GS-2015A-Q-20	Ireland	CA/US/CL/AU	GPI	The Planetary Systems of Young Massive Stars	20.00 HR
1	GS-2015A-Q-21	Graham	US/CA	GPI	Astrometry of Beta Pic with GPI	1.20 HR
1	GS-2015A-Q-22	Ghez	US	GSAOI	Using MCAO to Enable Unique Test of General Relativity at the Galactic Center	14.40 HR

2015A Scientific Programs – Gemini South (continued)

1	GS-2015A-Q-23	Escudero	AR	Flamingos2	The globular cluster color-color relations: combining optical and NIR photometry.	2.70 HR
1	GS-2015A-Q-24	Currie	CA/US	GPI	Confirming and Characterizing Two Young Planetary Companions with GPI	10.00 HR
1	GS-2015A-Q-25	Cuadra	CL	GSAOI	Star formation and dynamics at < 2.5 pc from Sgr A*	10.00 HR
1	GS-2015A-Q-26	Cote	CA	GMOS-S	Measuring Mass-to-Light in Nearby Dwarf Spheroidal Galaxies (South)	10.73 HR
1	GS-2015A-Q-27	Chen	US	GPI	Does the HR 4796 Debris Disk Contain Icy Grains?	8.00 HR
1	GS-2015A-Q-28	Caso	AR	GMOS-S	Revealing the mass profile of the brightest cluster galaxy NGC 3258	4.60 HR
1	GS-2015A-Q-29	Bowler	US	GPI	Near-Infrared Spectroscopy of the Young Substellar Benchmark PZ Tel B	3.50 HR
1	GS-2015A-Q-30	Bochanski	US	GMOS-S	The Most Distant Stars in the Milky Way	50.00 HR
1	GS-2015A-Q-31	Blakeslee	CA	GSAOI	Multiconjugate Fluctuations: A First Application of the Surface Brightness Fluctuations Method with GeMS	7.00 HR
1	GS-2015A-Q-93	Hwang	KR	GMOS-S	Pre-Imaging for Q-200	1.00 HR
1	GS-2015A-Q-94	Lee	KR	GMOS-S	Pre-Imaging for Q-203	1.00 HR
1	GS-2015A-Q-95	Shim	KR	GMOS-S	Pre-Imaging for Q-204	1.00 HR
1	GS-2015A-Q-200	Hwang	KR	GMOS-S	Measuring the Halo Mass Profile of z~0.68 Galaxy Cluster DLSCL J1055.2-0503	1.00 NT
1	GS-2015A-Q-201	Im	KR	GMOS-S	Spectroscopic Confirmation of Faint Quasars at z ~ 6	1.00 NT
2	GS-2015A-Q-32	Tuthill	AU/US	GPI	The circumbinary disk and immediate environs of post-AGB stars at high resolution and deep contrast	10.00 HR
2	GS-2015A-Q-33	Tucker	US	GMOS-S	Catching Supernovae in the Act with KEGS (Kepler Extra-Galactic Survey) (South)	11.20 HR
2	GS-2015A-Q-34	Tappert	CL	GMOS-S	Recovery of old novae	10.40 HR
2	GS-2015A-Q-35	Steiner	BR	GMOS-S	LLP - The Gemini Survey of Galactic Nuclei - GSGN	4.00 HR
2	GS-2015A-Q-36	Smith Castelli	AR	Flamingos2	Multiwavelength study of star-forming dwarf galaxies in dense environments (South)	3.76 HR
2	GS-2015A-Q-37	Shannon	AU	GMOS-S	The optical counterpart to a Fast Radio Burst	2.80 HR
2	GS-2015A-Q-38	Schworer	AU	GPI	Mapping the dust in planet-forming disks using polarimetric masking interferometry	10.00 HR
2	GS-2015A-Q-39	Scholz	CA	Flamingos2	Target of Opportunity Gemini Infrared Observations of Magnetars in Outburst (South)	13.88 HR
2	GS-2015A-Q-40	Saha	US	GMOS-S	Establishing a Network of DA White Dwarf SED Standards (South)	4.25 HR
2	GS-2015A-Q-41	Rest	US	GMOS-S	Spectrophotometric Time Series of eta Carinae's Great Eruption	14.30 HR
2	GS-2015A-Q-42	Rapson	US	GPI	Polarimetric Imaging of the Protoplanetary Disks TW Hya and V4046 Sgr	6.00 HR
2	GS-2015A-Q-43	Rajagopal	US	GMOS-S	Imaging and Astrometry of the Active Asteroid P/2010 A2	4.60 HR
2	GS-2015A-Q-44	Piatti	AR	GMOS-S	Probing the existence of tidal-dynamical effects for star clusters located in the outskirts of the LMC	3.20 HR
2	GS-2015A-Q-45	Perlmutter	AU/US	GMOS-S	See Change: Testing for time-varying dark energy with z > 1 supernovae and their massive cluster hosts (South)	29.50 HR
2	GS-2015A-Q-46	Patience	US/CA	GPI	Monitoring the Atmospheres of the HR 8799 Planets	8.00 HR

2015A Scientific Programs – Gemini South (continued)

2	GS-2015A-Q-47	Patience	CA	GPI	Characterizing the atmosphere of the imaged planet HD 95086 b with GPI	3.00 HR
2	GS-2015A-Q-48	Moskovitz	US	GMOS-S	Mission Accessible Near-Earth Objects Survey (MANOS) (South)	6.50 HR
2	GS-2015A-Q-49	Monnier	US	GPI	Imaging Planet Formation in situ with Gemini Planet Imager	10.50 HR
2	GS-2015A-Q-50	Marinello	BR	Flamingos2	Unraveling the excitation mechanisms of AGN ultra-strong FeII emitters (South)	8.30 HR
2	GS-2015A-Q-51	Lomax	US	GPI	Illuminating New Circumstellar Paramter Space Around Eta Car with GPI	4.80 HR
2	GS-2015A-Q-52	Leggett	CL	Flamingos2	Characterizing new late-T and Y dwarfs at the faint limits of WISE (South)	20.00 HR
2	GS-2015A-Q-53	Krafton	US	GMOS-S	Late-Time Dust Formation in Core-Collapse Supernovae (South)	5.50 HR
2	GS-2015A-Q-54	Knight	US	Flamingos2	Multi-scale investigation of the coma of comet 67P/Churyumov-Gerasimenko: Combined Gemini and Rosetta study of activity	7.00 HR
2	GS-2015A-Q-55	Jonker	US	Flamingos2	The unique opportunity to determine the mass of an accreting neutron star: the eclipsing accretion powered X-ray pulsar SWIFTJ1749.4-2807	9.00 HR
2	GS-2015A-Q-56	Howell	US	GMOS-S	The LCOGT Supernova Key Project (South)	9.00 HR
2	GS-2015A-Q-57	Hinkle	US	GMOS-S	The Nascent Planetary Nebula around Sakurai's Object (South)	1.00 HR
2	GS-2015A-Q-58	Haines	US/CA	GMOS-S	LoCuSS: Pre-processing within X-ray-selected groups infalling into z~0.2 clusters (South)	4.20 HR
2	GS-2015A-Q-59	Garcia-Vergara	CL	GMOS-S	The First QSO-LAE Cross Correlation Function Measurement at z ~ 4.	7.50 HR
2	GS-2015A-Q-60	Gagné	CA	Flamingos2	Spectroscopic confirmation of brown dwarfs and isolated giant planet analogs in nearby, young moving groups	20.00 HR
2	GS-2015A-Q-61	Fraga	BR/AR	GPI	A pilot study to Investigate the disks around ? Bootis stars	6.00 HR
2	GS-2015A-Q-62	Figer	US	Flamingos2	Constraining the Properties of GLIMPSE-C01 - potentially the most massive young cluster in the Galaxy	3.40 HR
2	GS-2015A-Q-63	Feldmeier	US	Flamingos2	The Milky Way nuclear star cluster as a benchmark for the structure and build-up of galactic nuclei	37.60 HR
2	GS-2015A-Q-64	Esplin	US	Flamingos2	Searching for the Bottom of the Initial Mass Function	7.20 HR
2	GS-2015A-Q-65	de Oliveira	BR	GMOS-S	Chromospheric Activity in Old Open Cluster: NGC 6253	3.20 HR
2	GS-2015A-Q-66	Cúneo	AR	GMOS-S	Chemical abundances of polluted visible component atmosphere in black hole binary systems	2.10 HR
2	GS-2015A-Q-67	Crnojevic	US	Flamingos2	Environment and the evolution at low-mass galactic scales: clues from the Cen A group	18.70 HR
2	GS-2015A-Q-68	Cheetham	AU	GPI	Hidden under the coronagraph spot: transition disk exoplanets at 5AU scales	2.00 HR
2	GS-2015A-Q-69	Burgasser	US	GMOS-S	Mass Measurements Across the Hydrogen Burning Limit: Astrometric Orbits for Spectral Binaries	22.70 HR
2	GS-2015A-Q-70	Bassett	US	GMOS-S	Local Counterparts to High-Redshift Turbulent Galaxies: What are the Stellar Kinematics?	12.00 HR
2	GS-2015A-Q-71	Baron	CA	Flamingos2	Wide Imaging Search for Benchmark Planets	20.00 HR
2	GS-2015A-Q-202	Gobat	KR	Flamingos2	Grow fast, die early: dynamical mass and stellar population of the most distant ETG	1.00 NT

2015A Scientific Programs – Gemini South (continued)

3	GS-2015A-Q-72	Winkler	US	GMOS-S	Fast SNR Shocks and Cosmic Rays: Unique Opportunities in SN1006	19.10 HR
3	GS-2015A-Q-73	Vazzano	AR	Flamingos2	Search for jet shocked excited regions towards YSOs in Gum 31	6.20 HR
3	GS-2015A-Q-74	Tinney	AU	Flamingos2	Completing the Spectrscopic Identification of WISE T and Y dwarfs	10.40 HR
3	GS-2015A-Q-75	Tappert	CL	GMOS-S	Recovery of old novae	10.00 HR
3	GS-2015A-Q-76	Sung	US	Flamingos2	Mass Accretion Rate of Very Low Luminosity Objects	0.90 HR
3	GS-2015A-Q-77	Schlaufman	US	GMOS-S	An All-Sky Search for the Brightest Metal-Poor Stars (South)	42.80 HR
3	GS-2015A-Q-78	Sargent	US	Flamingos2	Confirming Inner Galactic Bulge OH/IR Stars' Identities with Flamingos-2	5.90 HR
3	GS-2015A-Q-79	Ouellette	CA/CL/US	GMOS-S	The Dynamical Properties and Velocity Function of Virgo Cluster Galaxies (South)	27.90 HR
3	GS-2015A-Q-80	Lopes	BR	GMOS-S	The Dynamics of Interacting Galaxy Clusters (South)	3.60 HR
3	GS-2015A-Q-81	Kilic	US	GMOS-S	The First Pulsar + Pulsating White Dwarf System (South)	4.00 HR
3	GS-2015A-Q-82	Jorgensen	US	GMOS-S	RDCSJ1252-2927 - stellar populations in a massive z=1.24 galaxy cluster	30.50 HR
3	GS-2015A-Q-83	Johnston	AU	GMOS-S	The nature of the companion star in U Sco	2.30 HR
3	GS-2015A-Q-84	Jeffery	BR	GMOS-S	Deep Observations of the Open Cluster NGC 6253	4.00 HR
3	GS-2015A-Q-85	Gagné	CA	Flamingos2	Spectroscopic confirmation of brown dwarfs and isolated giant planet analogs in nearby, young moving groups	15.72 HR
3	GS-2015A-Q-86	Drahus	US	GMOS-S	Rotation of Main Belt Comets (South)	8.00 HR
3	GS-2015A-Q-87	de Souza Angelo	BR	GMOS-S	Investigation of Galactic open cluster remnants: the cases of Ruprecht 31 and ESO570-SC12	5.00 HR
3	GS-2015A-Q-88	Chené	CA/US	GMOS-S	WR 63: a new rare multiple massive star system	12.30 HR
3	GS-2015A-Q-89	Britt	US/CA	GMOS-S	Dynamical Mass Measurements of Eclipsing Candidate Black Hole Binaries Discovered in Quiescence	21.00 HR
3	GS-2015A-Q-90	Blair	US	GMOS-S	Characterizing the Young Supernova Remnant Population in M83	13.60 HR
3	GS-2015A-Q-91	Alexander	US	GMOS-S	Optical Spectroscopy of Two Gamma-ray binaries	15.70 HR
3	GS-2015A-Q-203	Lee	KR	GMOS-S	Confirmation of Galaxy Clusters embedded in Large Scale Structures at z~3	.50 NT
3	GS-2015A-Q-204	Shim	KR	GMOS-S	Search for MgII absorbing galaxies in cluster environment	.50 NT
4	GS-2015A-Q-92	Schlaufman	US	GMOS-S	An All-Sky Search for the Brightest Metal-Poor Stars (South)	26.00 HR

Appendix E. Research Staff Effort

Table E-1 lists the distribution of effort of staff who have research time allocated. Values are listed by fraction of effort, which is described in terms of the following categories.

- Day: Daytime operations (includes queue coordination, routine Head of Science Operations duties, Gemini Observatory Archive operations, and unscheduled daytime work)
- User: User support (includes direct program support, visiting observer support, response to Helpdesk, and regular semester activities to allocate programs)
- Res: Research
- Night: Nighttime support of regular science operations
- Inst: Instrument support (includes instrument maintenance, troubleshooting faults and responding to instrument quality issues, defining calibrations and checkouts, performing non-routine instrument tests, and instrument documentation)
- Other Ops: Other operations (includes scheduled non-project staff meetings, career development and training, and outreach activities
- Dev: Major development projects (includes instrument commissioning)
- Trans: Transition projects
- Ops Imp: Improvement work and small operations projects
- Mgmt: Management

NORTH

Staff Member	Day	User	Res	Night	Inst	Other Ops	Dev	Trans	Ops Imp	Mgmt	Total
Adamson, Andy	0	0	0.01	0	0	0	0	0.06	0	0.93	1.0
Chene, Andre-Nicolas	0.11	0.10	0.23	0.03	0.05	0.17	0.21	0	0.10	0	1.0
Chiboucas, Kristin	0.22	0.10	0.31	0.08	0.10	0.08	0.01	0	0.10	0	1.0
Geballe, Thomas	0.07	0.07	0.50	0.09	0.04	0.17	0	0.01	0.05	0	1.0
Gomez, Percy	0.04	0.13	0.21	0.11	0.20	0.10	0.19	0	0	0	1.0
Guyon, Katherine C.	0.05	0.25	0.06	0.21	0.15	0.19	0.08	0	0.02	0	1.0
Jorgensen, Inger	0	0	0.54	0	0	0.07	0	0.17	0	0.22	1.0
Kissler-Patig, Markus	0	0	0.05	0	0	0	0	0	0	0.95	1.0
Kleinman, Atsuko N.	0.25	0.04	0.14	0.01	0	0.09	0	0.47	0.01	0	1.0
Kleinman, Scot	0	0	0.04	0	0	0	0	0	0	0.96	1.0
Labrie, Kathleen	0	0.10	0.20	0	0	0.29	0.09	0.24	0.09	0	1.0
Leggett, Sandra	0.24	0	0.27	0	0	0.30	0	0.01	0.02	0.17	1.0
Lemoine-Busserolle, Marie	0.23	0.13	0.30	0	0.18	0.10	0	0.04	0.02	0	1.0
Lundquist, Michael*	0.02	0	0.50	0.10	0.01	0.07	0.30	0	0	0	1.0
Mason, Rachel	0.08	0.05	0.36	0.05	0	0.16	0.12	0	0.18	0	1.0

Petric, Andreea O	0.11	0.07	0.61	0	0.11	0.02	0	0	0.07	0	1.0
Placco, Vinicius M*	0.03	0.09	0.66	0	0.06	0.10	0.06	0	0	0	1.0
Shih, Hsin-Yi	0.15	0.05	0.68	0.05	0.06	0.01	0	0	0	0	1.0
Stephens, Andrew	0.09	0.08	0.11	0	0.08	0.10	0	0.18	0.36	0	1.0
Trujillo, Chadwick	0.01	0	0.27	0	0.01	0.04	0.07	0	0.01	0.58	1.0

SOUTH

Staff Member	Day	User	Res	Night	Inst	OtherOps	Dev	Trans	Ops Imp	Mgmt	Total
Andersen, Morten*	0	0.04	0.67	0.07	0.03	0.11	0	0	0	0	1.0
Angeloni, Rodolfo	0.17	0.01	0.54	0.16	0.04	0.09	0	0	0	0	1.0
Carrasco, Eleazar Rodrigo	0.05	0.06	0.34	0.12	0.17	0.26	0	0	0	0	1.0
Conn, Blair C	0.42	0.14	0.22	0	0	0.15	0	0	0.07	0	1.0
Diaz, Ruben	0.03	0.15	0.11	0.05	0.11	0.14	0.40	0	0.01	0	1.0
Garrel, Vincent	0.15	0	0.04	0	0.57	0.05	0.18	0	0	0	1.0
Gimeno, German	0.09	0.11	0.09	0.08	0.33	0.12	0.17	0	0	0	1.0
Hartung, Markus*	0	0	0.20	0	0.19	0.34	0.27	0	0	0	1.0
Hayward, Thomas	0.08	0.02	0.20	0.05	0	0.03	0.02	0	0.61	0	1.0
Hibon, Pascale*	0.08	0.09	0.13	0.17	0.03	0.26	0.25	0	0	0	1.0
Lai, Olivier*	0	0	0.55	0	0.21	0.01	0.24	0	0	0	1.0
Levenson, Nancy	0	0	0.06	0	0	0	0	0	0	0.94	1.0
Madrid, Juan*	0.17	0.09	0.60	0.04	0.01	0.08	0	0	0	0	1.0
Margheim, Steven	0	0.06	0.06	0.05	0	0.60	0.23	0	0.01	0	1.0
Miller, Bryan	0.09	0.03	0.55	0.03	0	0.14	0	0.04	0.14	0	1.0
Rantakyro, Fredrik	0.03	0.10	0.06	0.19	0.02	0.25	0.32	0.01	0.02	0	1.0
Rutten, Rene	0.10	0.04	0.02	0.06	0	0.21	0	0.01	0	0.57	1.0
Salinas, Ricardo C*	0	0	0.49	0.06	0	0.45	0	0	0	0	1.0
Schirmer, Michael	0.13	0.08	0.43	0.11	0.05	0.03	0	0	0.18	0	1.0
Sivo, Gaetano	0.23	0.01	0.11	0	0.17	0.19	0.15	0	0.14	0	1.0
Thomas-Osip, Joanna E	0	0.03	0.04	0	0	0.20	0	0	0.02	0.70	1.0
Turner, James	0	0.38	0.17	0.05	0	0.21	0	0.06	0.12	0	1.0

* Less than full-time employment during 2015. Table E-1: Research staff distribution of effort, by fraction

In addition to all staff publications that are listed in Appendix B, of note are the following special achievements:

Awards

- The 2015 AURA Science Award went to Chad Trujillo. Chad's research concentrates on the Solar System and its distant reaches, including Kuiper Belt Objects. He is an active scientist and recognized expert in the field.
- The 2015 AURA Team Award went to the Gemini Planet Imager Team at STScI and Gemini Observatory**.**
  Gemini team members were Fredrik Rantakyro, Pascale Hibon, Andrew Cardwell, and Stephen Goodsell
- The 2015 AURA Service Award went to Janice Harvey in recognition of the 10th Anniversary of Journey Through the Universe.

Invited Talks

- Rodolfo Angeloni
  - The BOMBOLO Instrument", at the XII SOCHIAS Annual Meeting, Puerto Varas, Chile (March 15, 2015)
  - "Preludio (filosófico) y variaciones (pindáricas) sobre unos temas de ciencia antigua", opening talk at the 3-days workshop "Agorá Celula Madre: Seminarios Interdisciplinario de Filosofía" at PUC, Santiago, Chile (April 27, 2015)
  - "The BOMBOLO Instrument", at Korea Astronomy and Space Science Institute (KASI), Daejeon, South Korea (December 21, 2015)
  - "The Sanduleak's star in LMC", Sejong University, Seoul, South Korea (December 23, 2015)
- Tom Geballe
  - "Adventures with H_3^+: in the Laboratory, Planets, Interstellar Clouds, the Galactic center, and beyond," at NASA Ames Research Center, Mountain View, California (April 21, 2015)
  - " New Background Sources for Studying the Galactic Center's Interstellar Gas," at the International Symposium on Molecular Spectroscopy, University of Illinois (June 24, 2015)
  - "Spectroscopy of H3+: A Unique Probe of Molecular Gas in the Milky Way and Beyond" (Invited Discourse), at the IAU General Assembly, Honolulu, Hawaii (August 13, 2015)
  - "The diffuse interstellar bands" at the University of Hong Kong: Pacific Rim Conference on Stellar Astrophysics, Hong Kong, China (December 17, 2015)
- Kathy Guyon
  - "Target of Opportunity (and Time Domain) Observations in Queue Mode at Gemini Observatory" at the Thirty Meter Telescope Science Forum: Maximizing Transformative Science with TMT, Washington, DC (June 24, 2015).
- Markus Kissler-Patig
  - "Intermediate-mass Black Holes: Potential Seeds for Supermassive Black Holes", at Symposium 'Symmetries and Phases in the Universe' 2015, Kloster Irsee, Germany (June 22-25, 2015)
  - "Reaching for the stars - New developments in ground-based astronomy", at CERN Geneva, Switzerland (July 2, 2015)

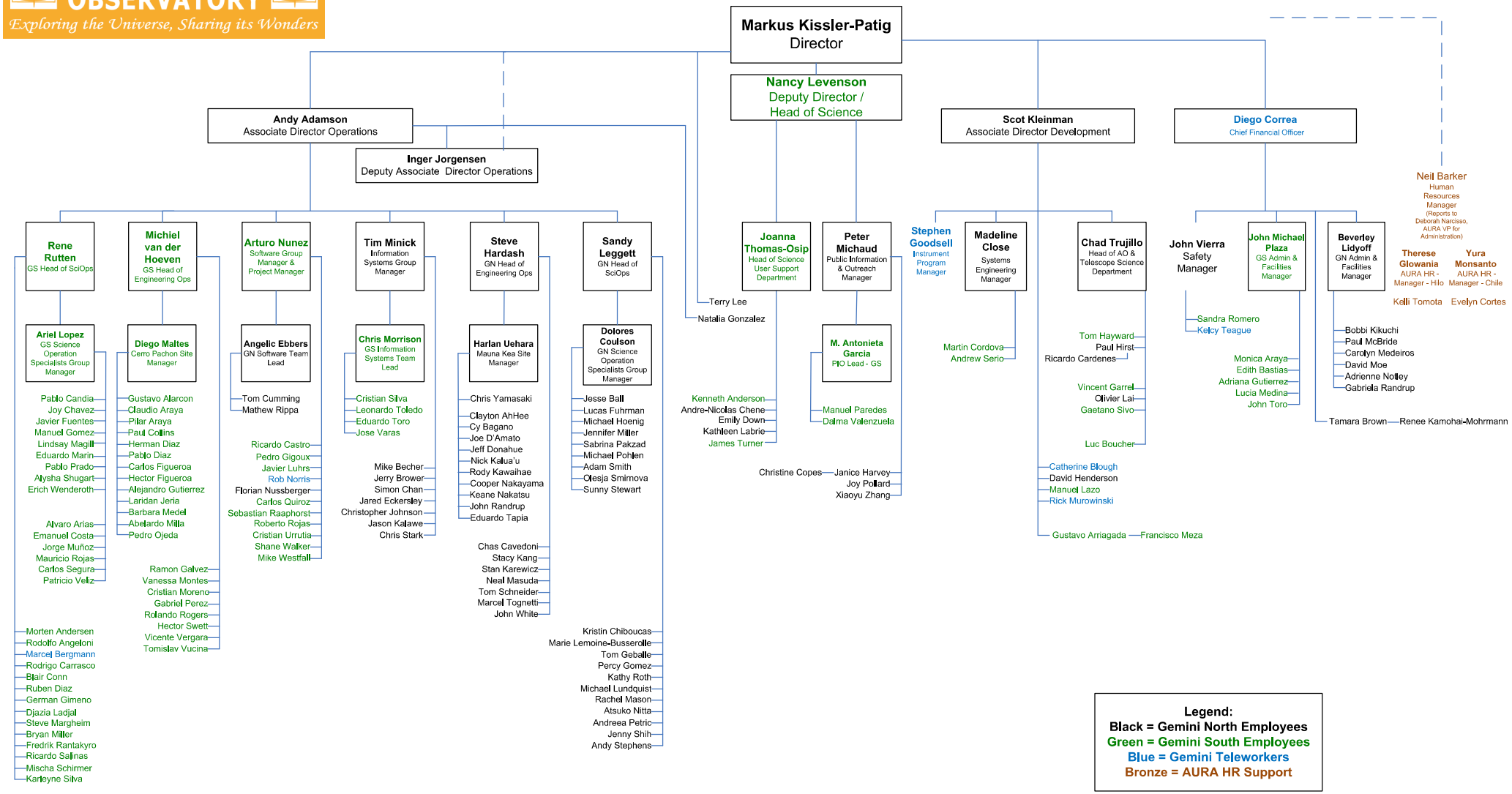
    - "National and International Strategic Planning: Ground-based Astronomy" at the Focus Meeting 11 'Global Coordination of Ground and Space Astrophysics' IAU General Assembly 2015, Honolulu, USA (August 5-6, 2015)
- Sandy Leggett
    - "Sky surveys and the bottom of the main sequence" at the Workshop on Milky Way Astrophysics from Wide-Field Surveys, London, UK (April 1, 2015).
- Nancy Levenson
    - "Observing Modes and Scheduling at Gemini," at TMT Science Forum, Washington, DC (June 23, 2015)
    - "Torus vs. Wind," at TORUS 2015: The Unification Paradigm After 30 Years, Southampton, UK (September 16, 2015)
- Andreea Petric
    - "Measuring the Cold Dust Content of Broad and Narrow-Line, Optically Luminous QSOs," at Subaru Telescope, Hilo, HI (July 9, 2015)

Appendix F. Organizational Chart

See following page.

GEMINI OBSERVATORY
Exploring the Universe, Sharing its Wonders

Exploring the Universe, Sharing its Wonders



Gemini Observatory

Effective as of December 1, 2015

Appendix G. Report Requirements

Guide to Locating Material According to Cooperative Agreement Terms and Conditions

Requirement	Description	Fulfillment
a.i	Summary of achievements, including a comparison of actual accomplishments versus goals	4,5, 6; Appendix H
a.ii	Identification of problems faced, their solutions and impact on observatory operations	4,5
a.iii	List of observing programs, with their investigators, site visitors, observers, and hours devoted to each	Appendix D
a.iv	Report on the education and public outreach activities including non-scientific visitor statistics, press releases, etc.	6, Table 6-1
b.	Scientific accomplishments of the scientific staff, as well as their activities and expectations for the calendar year	Appendices B, E
c.	Technical accomplishments of each technical department, as well as the departments' expectations for the calendar year	4, 5, 8
d.	Listing of publications and reports produced by staff and, as far as possible, the users of the observatory	Appendices B, C
e.	Table showing the division of effort, adding up to 100 percent, for all scientific staff and/or Key Personnel among major activities, such as administration, visiting observer support, scientific research, etc.	Appendix E, Table E-1
f.	Chart or other description of Gemini's organization during the new program year together with an explanation for any changes from the previous year's organization	Appendix F, 4.3
g.	Status report and plan for the new program year on the state of the Observatory	8
g.i	Scientific plans	8.2, 8.3, 8.5
g.ii	Detailed technical plans and the potential impact on the observatory of these plans	8.2, 8.3, 8.4, 8.5
g.iii	Plans with schedules, milestones, and principal activities, for all major projects	8
g.iv	Estimated budgets for all major activities	8.1

Metrics

No.	Metric	Fulfillment	Target	Result			
				GN 2014B	GN 2015A	GS 2014B	GS 2015A
1	Telescope time use (per telescope, per semester), identifying fraction of time for science, weather loss, commissioning, telescope system faults, and instrument faults	4.9, Tables 4-4, 4-5 * See text for explanation of major downtime.	<4% fault loss	2%*	2%*	6%	5%
2	over-subscription rate (per telescope, per semester)	4.8, Fig. 4-2		See Fig. 4-4			
3	Queue program completion fraction, by band (per telescope, per semester)	4.8, Fig. 4-1	Band 1 Complete: 75%	82%	71%	56%	58%
			Band 2 Complete: 60%	68%	56%	50%	55%
			Band 3 at PI Minimum: 80%	76%	47%	60%	77%
4	List of staff research and technical achievements, including prizes, awards, and invited talks	Appendix E					
5	Number of peer-reviewed publications based on Gemini data	4.1, Appendix C	190/year	205 (123 based on GN, 132 based on GS)			
6	Number of peer-reviewed publications with Gemini Observatory staff as (co-)authors	Appendix B.1	20/year	79			

Appendix H. Completion of 2015 Program Plan

The original 2015 Program Plan is included here, excerpted for brevity, and annotated with specific comments on progress in blue. We do not list optional projects undertaken on a best-effort basis, nor do we list additional activities and accomplishments during 2015. The main report body provides more explanation of these activities.

H.1 Science and Engineering Operations in 2015

Observatory operations in 2015 will continue to provide support for science users in the international Gemini community; conduct and support queue, classical, and priority visitor observing programs according to user demand; maximize scientific use of the telescopes and instruments; and maintain a data archive. Here we describe the core functions of the Operations Division and the Science User Support Department and lay out specific high-level goals for 2015.

Regular Operations
Regular, day-to-day and night-to-night Operations is the Observatory's top priority.
Completed – see §4

Science and Engineering Operations Core Projects and Goals
Unless otherwise noted, the completion of each goal is planned for the end of the year.

Mirror Recoating
Completed – see §4.6.2.

Review of operational model
Working groups established and reports due by year end (§4.9).

Fast Turnaround Programs
Completed – see §4.5.

Stabilize GeMS Operations
Some progress (§4.3.1).

Conclude dome shutter failure work
Planned work completed (§4.6.3); additional implementation of solutions to continue.

H.2 Transition Program in 2015

2015 Goals for the Transition Program

- Staffing Plan changes: Completed – see §4.10.1.
- Base Facility Operations: BFO for Gemini North completed. BFO for Gemini South on schedule for completion in 2016 – see §4.10.3.
- Reduce Data Archive Costs: Deploy in-house Science Archive (Q3); close CADC archive (Q4): Completed – see §4.10.3.
- GN/GS Energy Savings: Implement the subprojects with the highest potential for electricity savings: Maunakea (MK) photovoltaic panels (Q3), chillers at Gemini North and South summits (Q3/4), and replacement of HBF air conditioning system (Q2). MK PV panels and GS chiller completed. Contract being finalized for GN

chiller and HBF AC (and other energy savings initiatives). HBF PV and CP PV panels added to the project. See §4.10.3 for details.
- Eliminate FTZ: Completed with a continued lease of FTZ at significantly lower cost and smaller area – see §4.10.3.
- Increase Visitor Observing: Extend Priority Visitor observing to regular programs in 2015A and move in 2015B to runs supported by only one Gemini staff (the operator). Completed – see §4.10.3.

Contingency plan
Confirming that we at this point do not foresee a need to implement the contingency plan.

H.3 Instrumentation and Facility Development in 2015

The 2015 plans for instrumentation and facility development build on several substantial on-going projects. We list milestones for the year, distinguishing core goals, for which we have committed resources, and optional work, which we will complete on a best-effort basis.

Development Core Goals
GPI (§5.1)
- Complete handover to Operations (Q2) completed

GMOS CCDs (§5.2)
- Resolve saturation problem seen in the GMOS-S installation (Q1) completed
- Receive and characterize CCDs (and spare) for GMOS-N (Q2) completed
- Install new CCDs into GMOS-N (best effort) deferred to 2016

GHOST (§5.3)
- Complete critical design review (Q4)

Scheduled for December with a delta review scheduled for February.

GRACES (§5.4)
- Deliver new ESPaDOnS enclosure to CFHT (Q2)
- Handover to Operations for science use (2015B)
- Recoat two optics for improved efficiency (best effort)
- Remount optics that are currently vignetting (best effort)

Completed

GIFS and Gen4#3 (§5.5)
- Select proposals to fund for feasibility studies (Q1)
- Present in-progress GIFS studies at Future and Science of Gemini Meeting (Q2)
- Accept final reports from selected teams (Q3)

Completed

GMOS+Altair (§5.5)
- Purchase dichroic (Q2)

Completed

Altair (§5.6)
- Finalize contract and begin external realtime computer study (Q2)

Completed

GeMS (§5.7.2 and 5.7.3)
- Finalize NGS2 contract (Q1) and support external work (through Q4) completed

- Finalize procurement for spare deformable mirror and associated electronics (Q4) in progress

GeMS Laser (§5.7.1)
- Accept contracted reports (Q1)
- Develop responsive plan to replace current laser based on study reports (Q3)

Completed

Interface Control Documents (§5.8)
- Update documents needed for Gen4#3 (Q3)

Completed

Instrument Upgrades (§5.9)
- Launch external call for small projects to add enhanced capability to an existing Gemini instrument (Q3)

Completed

H.4 Administration and Facilities and Safety in 2015

We will continue to provide regular support in administration and facilities. (§4.11)

Finance and Administration
- **Finish the 2015 budget within -2% and +3% of the allocated O&M budget** O&M year-end expenses will be $1.8M or 6.0% over the approved budget, assuming major new Transition Program projects go forward. (§7.3)
- **Reporting expenses and commitments with respect to Budget** Completed (§7)
- **Support the provision of highest standard of Administrative services to the Gemini Observatory** Progress (§4.11)

Safety
- **Routine Safety Measures** Updated safety procedures; included in Safety Manual (§4.12)
- **New safety structure** §4.12; Appendix E – completed
- **Complete Safety Training** reached 65% completion (§4.12)

H.5 Public Information and Outreach in 2015

Flagship local outreach programs Journey Through the Universe in Hawaii and Viaje al Universo in Chile.
§6.1 - completed
We will maintain communications with the public and users.
§6.2 - completed

Conference and event support §6.2 - completed
Press Officer Internship §6.2 - completed
International Year of Light (IYoL) §6.2 - completed
Expansion of Live from Gemini §6.2 - completed
Career Brochure V.2 §6.2 – mostly completed

Electronics Data/Metrics Tracking §6.2 – mostly completed
Virtual Tour §6.2 – in progress

H.6 Gemini External Relations in 2015

- Integrate Korea as a limited-term partner through the Korea Astronomy and Space Science Institute (KASI);

§4.1 – completed

- Continue to seek additional limited-term or full partners;

We remain open to new partners but have not identified specific prospects for the near-term.

- Establish and fully staff the Science User Support Department;

§4.4 – completed

- Hold a successful Future and Science of Gemini meeting in June

§4.1 – completed