



2014 Annual Progress Report and 2015 Program Plan of the Gemini Observatory



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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 vast majority 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 their scientific progress, as they address problems on all scales of the universe, from the nearby objects in the Solar System to the largest cosmological structures. Gemini continues to improve its offerings as an efficient and nimble observatory that can respond to users' needs.

A 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. A third area of continuing attention in 2014 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 effect of this activity is evident in the users' science achievements. We note some of the outstanding results to give a flavor of the range of astronomical interest and use of Gemini. One highlight is the scientific use of the Gemini Planet Imager (GPI), a world-leading "extreme" adaptive optics instrument, which has enabled sensitive measurements of extrasolar planets. Other common themes in this year's science highlights are planetary science and the use of adaptive optics. Overall, the rate of peer-reviewed publication based on observations at Gemini continues to increase, and adaptive optics results appear more frequently.

Gemini began offering several new modes for proposing and observing in 2014. Large and Long Programs enable substantial scientific investigations, which exceed the previous limitations of individual Partners. The international community is encouraged to conduct their own observations on site, and a novel system of "priority visitor" observing supports these visits while mitigating against potential weather loss. Gemini also continues to support "queue" observations, which staff execute, according to user choice, which maintains access to the time domain and the rarest observing conditions as needed. The instrument complement at Gemini North was stable and supplemented with visitor instruments, which were popular among the user community. In addition to the introduction of GPI, the offerings at Gemini South were improved with new detectors in the workhorse optical imager and multi-object spectrograph. This upgrade improved performance, especially increasing sensitivity at red wavelengths. Work on the facility near-infrared imager and spectrograph at Gemini South corrected an outstanding image quality problem, and we continued to offer the unique multi-conjugate adaptive optics system with near-infrared imaging.

We completed all the high priority goals for the year within the Development Department. These included commissioning GPI and introducing it for regular science observations, completing the preliminary design review for the externally contracted facility class instrument, developing new, more flexible options for instrument procurement, and installing the new optical detectors noted above. The new instrument procurement model is being implemented with the latest facility instrument, and the call for feasibility studies has been issued. Additional optional development projects also progressed, including an experiment to use an existing high-resolution optical spectrograph at the Canada-France-Hawaii Telescope with Gemini North and contracted work to improve the Gemini South adaptive optics facility.

Gemini supports broadening participation in science and technical fields, and we communicate our activities with the general public. Our flagship public outreach programs, Journey Through the Universe in Hawai'i and Viaje al Universo in Chile, reached milestones of their tenth and fifth years, respectively. These weeklong programs attracted nearly 20,000 participants through classroom visits and public events. We released a career awareness program, with a printed brochure, dedicated website, and staff interviews to show the range of opportunities Gemini and other observatories offer. We continued to support strong communications with users through a quarterly newsletter, a monthly electronic newscast, social media, web features, and directed communications. Gemini maintained a vigorous intern program, hosting 18 interns in all areas at both sites.

Fund	2014 Actual
Operations and Maintenance (O&M)	29,579,356
Instrument Development Funds (IDF)	5,181,096
Facilities Development Funds (FDF)	747,168
Total	35,507,619

Table 1-1: 2014 budget by fund, values in US dollars.

Gemini continues to improve the rigor of budget planning and reporting. We introduced a method for dynamic budget reallocation in 2014, to ensure that funds are available to support unexpected projects. 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 2014 as planned, relying on past unspent funds to smooth the transition to a reduced budget. The most significant sources of variance compared with the original planned budget in O&M are the favorable foreign exchange rate of the United States dollar compared with the Chilean peso and hiring lag. IDF variance is due to contractors' in meeting milestones, which deferred payments. The staffing levels remained stable over the year, with an average of 181.4 full-time equivalents (FTEs; summarized in Table 1-2).

The plan for 2015 shows a concentrated focus on the most important tasks, responding to the needs of our users and limiting plans for additional projects. Regular science and engineering operations will occupy the majority of budget and effort for the year, and we will continue to deliver the facility and its instruments for the benefit of our science users. The new facility instrument procurements remain the highest priorities within Development. Base Facility Operations are the most significant effort of the Transition Program, and we will operate Gemini North from the Hilo Base Facility at the end of 2015.

Division	FTE
Administration	18.2
Development	17.9
Operations	127.2
Deputy Director	11.9
Directorate	6.1
Total	181.4

Table 1-2: 2014 staffing.

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.

This annual progress report shows the 2014 activities toward fulfilling this mission. The starting point is the twin 8-meter telescopes and their instrument capabilities that are available to the user community of the international Partnership. The Gemini user community's scientific interests range from the Solar System to the most distant galaxies and quasars, and Gemini Observatory's variety of optical and infrared imagers and spectrometers are sufficiently flexible to enable this broad range of exploration. More specialized capabilities, including new options such as the Gemini Planet Imager in 2014, are also available for general use. Overall Gemini aims to be a flexible observatory, responding to users' needs and enabling their science. Continuing innovations over the last year demonstrate this commitment to fulfill users' requirements in novel ways.

Gemini maintains four instruments and adaptive optics (AO) capabilities at each site. Three science instruments and the AO facility remain mounted and potentially available for use at any time. Gemini offers a range of proposal modes, including standard semester-based proposals that are evaluated by the Partner National Time Allocation Committees (NTACs) and a new annual opportunity to apply for Large and Long Programs, which are evaluated by a dedicated multi-partner TAC. Observations may be conducted by Gemini staff scientists as part of the queue, or by visiting astronomers, according to user choice. We introduced innovative options for visiting observers to mitigate the effects of weather loss.

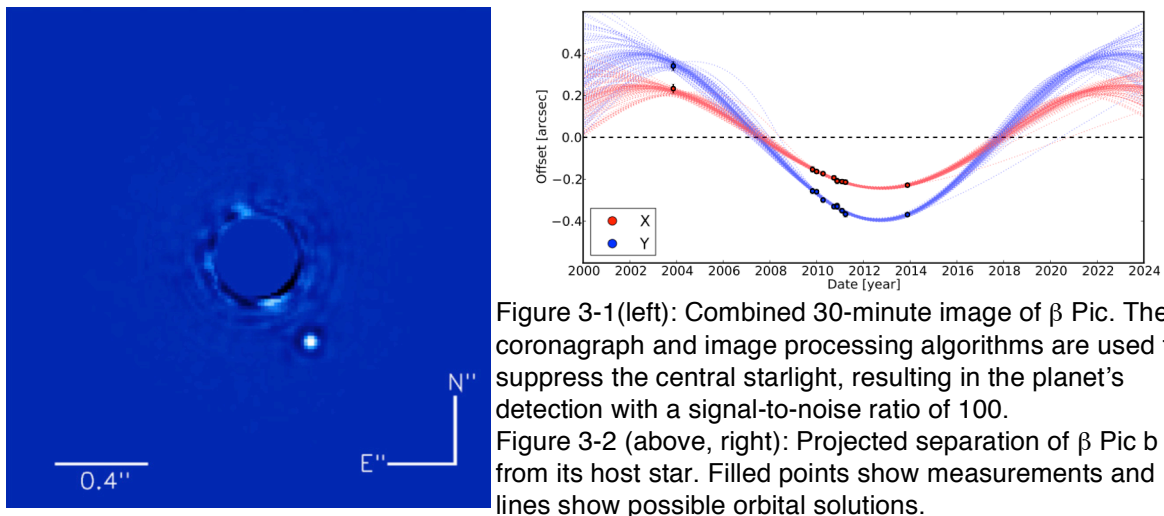
Section 3 shows some of the scientific highlights, which include results based on observations with the new Gemini Planet Imager (GPI). Section 4 reports on Operations, which covers the daily preparations and nightly use of the telescopes. Summaries of user publications and user interactions, new proposing and observing modes, and Observatory metrics are included. Progress toward executing the Transition Program, Gemini's fundamental changes in response to the loss of a 25% share partner, is also described. Section 5 shows accomplishments in instrumentation and facility development, including adaptive optics capabilities, progress on new facility-class instrumentation, and upgrades of existing instruments. The educational programs, efforts toward broadening participation, and communications for users and the general public that the Public Information and Outreach group leads appear in Section 6. Section 7 summarizes administration and finance. (A complete financial report is included as an appendix.) Section 8 contains the program plan for 2015.

3 Science Highlights

Partner community astronomers are responsible for the scientific results that make use of the Observatory. They take advantage of both telescopes and all their instruments to advance the scientific frontiers. Gemini aims to be a flexible, responsive observatory, where users' needs drive operations, and the resulting discoveries are evidence of this successful response.

3.1 First Science Results from GPI

Commissioning of the Gemini Planet Imager (GPI) was completed in 2014, and astronomers from the international Partnership and beyond have already made use of its outstanding capabilities to produce results. The first light and fundamental instrument paper led by Principal Investigator Bruce Macintosh of Stanford (Macintosh *et al.* 2014 *PNAS* 111 12661; Figure 3-1) also provides new astrometry of the planetary companion to the star Beta Pictoris, (β Pic b). The small errors in the present measurement combined with the relatively long timespan since the first observations provide the best estimate of the planet-star separation: 9.0 (+0.8, -0.4) astronomical units (AU). The corresponding period is 20.5 (+2.9, -1.3) years.



With these detailed measurements of the planet's orbit, the researchers predict that a transit is possible (though unlikely) in late 2017. Such a transit would provide unique opportunities to measure the planet's size. The orbital measurements also explain why the planet was not detected in imaging around 2007, when it would have been extremely close (in projection) to β Pic (Figure 3-2).

Currently the planet is detectable in a single 60-second exposure obtained with GPI. With previous instruments, similarly sensitive observations would have required an hour. The new work shows that the planet is not aligned with the main debris disk of the host star. Instead, it likely interacted with an inner warped component of the disk.

3.2 A Planet Far from Its Host Star

Unusually, Marie-Ève Naud (Université de Montréal) *et al.* (2014 *ApJ* 787 5) did not require extreme adaptive optics or very high contrast to directly image the planetary companion of GU Piscium (GU Psc b). This companion, which has a mass of about

$11M_{\text{Jupiter}}$, is located about 2000 AU from its host star, or 42 arcseconds on the sky (Figure 3-3). The target was selected from among a larger survey using the Gemini Multi-Object Spectrographs (GMOS) at both telescopes to search in regions of young stars for objects with very red colors. Young stars potentially host detectable planets, since the planets cool and become fainter over time, and the red colors are characteristic of their intrinsically low temperatures. Previously, members of the team had identified star GU Psc as a likely member of a young group with an age around 100 Myr (Malo *et al.* 2013 *ApJ* 762 88).

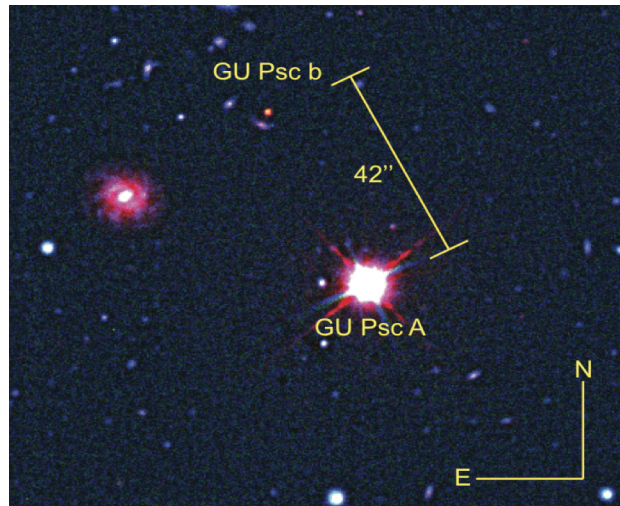


Figure 3-3: The planet GU Psc b and its star GU Psc. This image combines visible observations using GMOS on Gemini South with an IR image from the Canada-France-Hawaii Telescope. GU Psc b appears red in this image because it is brighter in the infrared than in other filters.

In the recent work, the companion, GU Psc b, was only detected in the longest wavelength visible light bandpass observed with GMOS, implying an $i - z$ color typical of young planetary objects. Additional near-infrared observations from multiple facilities, including spectroscopy obtained using the Gemini Near-Infrared Spectrograph (GNIRS), confirmed this identification, yielding a spectral type T3.5(± 1). Some standard models of planet formation cannot easily produce massive companions so far from their hosts. Naud and collaborators suggest that both objects formed in the gravitational collapse of the common molecular cloud that was their birthplace, similar to the process that forms binary stars. This distant planet is likely unusual, however; it is the only such candidate detected in the GMOS survey of 90 stars.

3.3 Extreme Volcanoes on Io

Gemini's rapid and flexible scheduling capabilities enabled high spatial resolution observations during an extreme volcanic outburst on Saturn's satellite Io. A pair of eruptions was first detected using the W. M. Keck Observatory on August 15, 2013, and rapid follow-up from Gemini showed a third, more powerful eruption, away from the original site. This turned out to be one of the brightest events on the most volcanically active body in the Solar System. On Gemini, the Near InfraRed Imager and Spectrometer (NIRI) with the Altair adaptive optics system, along with other Mauna Kea facilities provided day-to-day monitoring observations over the subsequent weeks, which showed the evolution of this event (Figure 3-4).

This work led by Katherine de Kleer of the University of California Berkeley (2014 *Icarus* 242 352) revealed a peak power output of about 20 terrawatts, and estimated lava flow coverage over tens of square kilometers. The eruption itself was likely in the form of "fire fountains" along fissures on Io's surface. The high eruption temperature (over 1500K) indicates that the magma is magnesium rich, in contrast to basaltic magma, as is common on Earth.

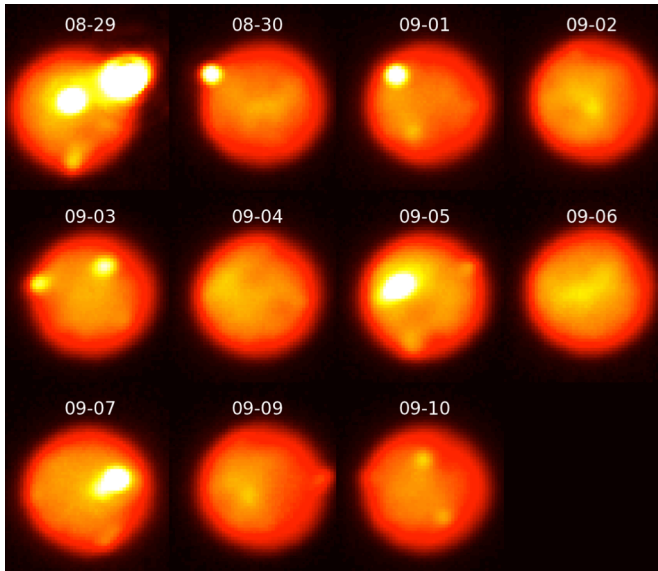


Figure 3-4: NIR images of I0 (at 3.78 μm) obtained using NIRC2 and Altair adaptive optics at the Gemini North telescope track the decreasing intensity of the extreme eruption on I0. Due to I0's rapid rotation, a different area of the surface is viewed on each night. 2013 dates are indicated on the figure.

3.4 The Origin of an Ultracompact Dwarf Galaxy and Its Black Hole

Peering into the center of an ultracompact dwarf galaxy, Anil Seth (University of Utah) and collaborators find a supermassive black hole (Seth *et al.* 2014 *Nature* 513 398). The team obtained high spatial resolution kinematic data using the Near-Infrared Integral Field Spectrometer (NIFS) and the laser guide star adaptive optics system on Gemini North to measure the black hole's mass, of $2.1 \times 10^7 M_{\text{Sun}}$ (Figure 3-5). This accounts for 15% of the total mass of the ultracompact dwarf galaxy (UCD) and makes this object, called M60-UCD1, the lowest mass galaxy known to host a supermassive black hole.

UCDs are extremely dense, showing some similarities to globular clusters, which raises the question of their origin. Are they massive versions of ordinary globular clusters, or did they come from galaxies that have lost their extended components? The extremely large black hole mass fraction and relatively normal stellar mass to light ratio of M60-UCD1 suggest the latter, that it is the remains of a tidally-stripped galaxy. This galaxy would have lost many of its stars in encounters in the dense environment around the massive elliptical galaxy M60.

The research team suggests the UCD black holes are indeed common, doubling the number of known supermassive black holes in clusters of galaxies and therefore greatly increasing the number density of black holes

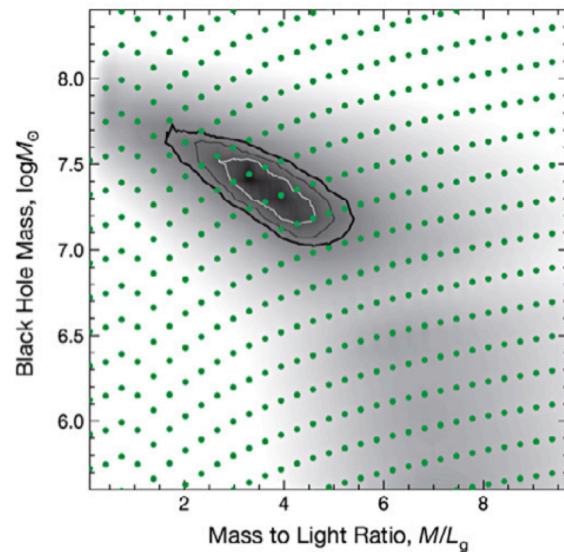


Figure 3-5: The black hole mass is derived from dynamical modeling, where the stellar CO bandhead provides the kinematic information. This figure shows the goodness-of-fit measurement considering variations in black hole mass and stellar mass-to-light ratio, calculated at the discrete green points. Contours mark the 1, 2, and 3 σ confidence levels.

overall in the local universe. They continue to use Gemini facilities to measure additional supermassive black holes in small galaxies.

3.5 Galaxy-Wide Outflows Are Common Among Quasars

New work shows that galaxy-wide outflows are common among galaxies that host luminous quasars. The underlying energetic source of these outflows is unclear, being related either to the accretion onto the central supermassive black hole or star formation. Some process to inject mass and energy into the surroundings does, however, appear to be an essential aspect of cosmic evolution. In addition to depositing chemically enriched material in the halo and larger intergalactic environment, outflows may be a key link that provides feedback between growth of central black holes and star formation, which accounts for the present-day distribution of galaxy properties.

Chris Harrison (Durham University) led the study, based on observations of 16 luminous quasars at redshifts $z < 0.2$ (Harrison *et al.* 2014 *MNRAS* 441 3306). These are all type 2 (*i.e.*, obscured) radio-quiet quasars exhibiting ordinary rates of star formation. Selected from a parent sample of 24,000 galaxies, these observations yield general conclusions about the frequency, properties, and impact of galaxy-wide energetic outflows. The targets are relatively high luminosity, with active galactic nucleus (AGN) contributions $L_{\text{AGN}} \sim 10^{45} \text{ erg s}^{-1}$. They also exhibit spectrally broad [O III] emission, but this is not actually unusual, being characteristic of nearly half the parent sample, even without correcting for the difficulty of measuring weak broad components.

The team obtained data using the GMOS-South Integral Field Unit (IFU), which enables spatially resolved kinematic measurements based on emission of H β and [O III]. Bulk outflow velocities are typically in the range of 500 to 1000 km s $^{-1}$, and the emission line profiles of the two species are generally similar. The researchers find that the ionized oxygen emission extends over sizes of 10–20 kiloparsecs, or beyond the observed field of view (Figure 3-6). Mass and energy are flowing, with mass outflow rates typically ten times the star formation rate, though it is not certain whether this material will permanently escape to the galaxy halo.

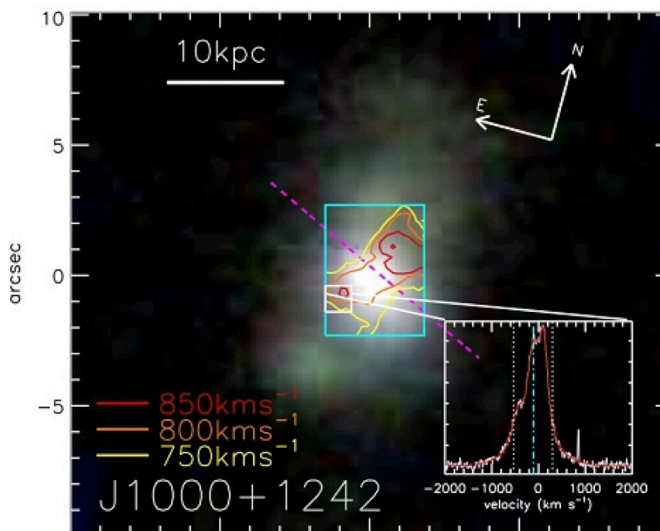


Figure 3-6. An example object from the GMOS observations. The background image is from the Sloan Digital Sky Survey. The cyan rectangle shows the GMOS IFU field of view. The red/yellow contours show the distribution of high-velocity ionized gas. The inset shows an example oxygen emission-line profile ([O III]5007) that was used to trace the gas velocity.

Disentangling the source of the outflow as either star formation or the AGN is difficult. There are no obvious morphological differences between the two, and the underlying power–luminosity from star formation, AGN, and related radio sources—is generally correlated, so energy-scaling arguments alone are insufficient. A mix of all sources may be important.

Nonetheless, these results are broadly consistent with theoretical models of AGN-driven outflows that contribute to galactic feedback.

4 Operations

4.1 Gemini Publications and User Relations

The annual rate of refereed publications based on Gemini data continues to be healthy. As of December 10, 2014, a total of 224 Gemini papers have been published during 2014. The distribution continues to be balanced between Gemini North and Gemini South (131 from GN, and 127 from GS). Note that about 40% of publications are based on more than one program, and some use data from both telescopes. Six of the publications make use of the Gemini Planet Imager (GPI), based on data obtained during commissioning or Early Science observations. Additional GPI papers have been submitted or are in preparation. 2014 shows increased appearance of Near-Infrared Integral Field Spectrometer (NIFS) in publications, with 20 for the year. Fifty-one of the annual publications make use of Gemini adaptive optics capabilities. Current information about refereed publications is available at the Gemini website¹. Over recent years, Gemini staff continue to be primary or co-authors of about 20% of Gemini publications. Appendix B contains a complete list of the 2014 staff publications, and all refereed publications based on Gemini data are listed in Appendix C. Appendix E provides more detail about research staff members' accomplishments.

The Gemini Directorate continues to make an effort to maintain direct contact with the astronomical communities of Gemini Partners and affiliates. The Director, Dr. Markus Kissler-Patig, attended the American Astronomical Society (AAS) and Subaru Users' meetings in January, the Canadian Astronomical Society (CASCAS) meeting in May, and the Korean Astronomical Society meeting in October. The Deputy Director, Dr. Nancy Levenson, attended the annual meetings of the AAS and the Sociedad Chilena de Astronomía (SOCHIAS) in January, the Astronomical Society of Australia in July, and the Sociedade Astronômica Brasileira in September. The Associate Director for Development, Dr. Scot Kleinman, toured 10 US institutions in October and November to help instrument builders become familiar with new options to develop capabilities for use on Gemini. In addition, he attended the AAS and Subaru Users' meetings in January and the SPIE Astronomical Telescopes and Instrumentation conference in June.

Gemini has supported the introduction of Korea as a limited-term Partner, through the Korea Astronomy and Space Science Institute (KASI). We agreed to terms for access to observing time in 2015 and included KASI in the corresponding telescope time allocation process during 2014.

Gemini has introduced a significant internal reorganization with the creation of the Science User Support Department, headed by Dr. Joanna Thomas-Osip. This Department concentrates on the post-observing phase and leads interactions with the National Gemini Offices in the Partnership's distributed support model. Gemini aims to improve user support and scientific productivity overall through the increased visibility

¹ <http://www.gemini.edu/apps/publications-users/>

and attention to this phase of the user-driven scientific cycle. Introduced toward the end of 2014, the Department currently has resources for the development of scientific data processing software. In 2015, the duties will expand to include more dedicated scientist effort, including some matrixed from other areas of the Gemini organization, such as Instrument Scientists.

A key event for 2015 will be the Future and Science of Gemini meeting in Toronto, June 14–18. Gemini and its stakeholders, especially the Users’ Committee for Gemini (UCG) and the Science and Technology Advisory Committee (STAC), were active in 2014 planning the meeting and beginning the program development. The event will focus on scientific results made possible from Gemini’s latest capabilities, including new observing and proposal modes. It will also consolidate plans to assure that our scientific legacy is sustained well into the future. Contributions from participants and Partner communities will serve as a focal point for next-generation instruments, observing modes and synergies with other facilities as the Observatory looks ahead to 2020 and beyond. Besides establishing the basic program and confirming invited speakers, the UCG is planning a dedicated mini-workshop on using Gemini instruments, to feature significant current users from the communities, and both the UCG and STAC are developing a survey of all communities (including their members who are not Gemini users now) to provide a baseline measurement of future needs.

Following a recommendation from the UCG to encourage visiting students and other early-career scientists to participate in observing runs, Gemini has established the “Bring One, Get One” program. Gemini subsidizes the travel expenses of individual early-career researchers visiting Gemini North or South when accompanying a senior visiting observer. We have budgeted this program to accommodate up to ten visits annually and already hosted the first five. The initial reports from the observers and students are very positive. Large and Long Programs (§4.6) especially are using this opportunity effectively.

4.2 Operations Summary

The Operations Division of Gemini is responsible for maintaining the instruments and telescopes to conduct science observations on sky. They 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 2014 are described in the following sections, and Section 4.9 provides a summary of operations metrics.

The 2014 program plan provided a bullet list of “regular operations” activities, and tabulated specific additional major tasks scheduled for 2014. These major items are listed in Table 4-1 and Table 4-2. The main major tasks were completed, with the exception of the stabilization of the Gemini Multi-conjugate Adaptive Optics System (GeMS) and the design of a replacement for the SynchroBus. 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.

4.3 Instrumentation

Gemini North instrumentation has been relatively stable both in complement and functionality. We note that both the Differential Speckle Survey Instrument (DSSI)

camera (Principal Investigators Howell & Horch) and the TEXES mid-IR spectrometer (PI Lacy) had successful visits to Gemini North in 2014, and we anticipate their return in 2015. In the expectation that new visiting instrument teams will make contact with the Observatory over the coming years, the Systems Engineering group has led work with Engineering Operations to produce a reference page² providing background information and linking to the critical interface control documents (ICDs) to which a potential visiting instrument needs to adhere. This documentation is not intended to replace discussion with local engineers and software staff, but to provide a useful first reference to be used ahead of such discussions. Detailed comments on the Gemini South instrument complement follow.

4.3.1 GeMS

Neither Canopus nor the GeMS laser was operationally stable in 2014. Essentially all effort went into remediation of two major performance issues: (i) an image quality problem that surfaced in late 2013; and (ii) failures and low power output from the GeMS laser. These issues, and the management effort required on the project to improve the natural guide star wavefront sensor (NGS2), put Operations sustainability activities

Title	Completion	Section
Establish GeMS into regular science operations with a stable observing/staffing model	10%	4.3.1
Absorb the Phase II of the US community	100%	4.5
Commence the GPI Campaign	100%	4.3.3
Public release of quick-install GPI pipeline for non-campaign users	100%	4.4
Commence Large and Long Programs	100%	4.6
Inclusion of GMOS-S Hamamatsu CCDs in Gemini DR Package	100%	4.4
Community-wide release of the Astrodats/Recipe system	100%	4.4
Complete automation of operations software regression testing	100%	4.4
SynchroBus replacement design	0%	4.7

Table 4-1: Major Operations Goals for 2014

effectively on hold through most of the year. We made a small amount of progress on the prioritization of the various tasks in the sustainability list, and with planning their execution. But the great majority of effort on GeMS sustainability will now fall in 2015, fully one year later than anticipated.

² <http://www.gemini.edu/sciops/instruments/specifications>

4.3.2 FLAMINGOS-2

We completed the review of the optical image quality problem reported in the last annual report in early 2014. The most likely cause—an inverted lens in the camera barrel—was confirmed, and the instrument was removed from the telescope in early 2014A to revert that lens to its correct orientation. FLAMINGOS-2 resumed operations in May. While the image quality was now exceptional across the whole field, spectroscopy performance remained an apparent issue. Subsequent modeling and comparison with the final performance specification has shown that performance in this area is similar to that expected from the optical design, so no further work is planned in this area. At the time of writing, high background in spectroscopy observations, caused by a stuck gate-valve baffle, remains the only issue with FLAMINGOS-2 in operations. This will be remediated in a stand-down planned for March 2015.

4.3.3 GPI

GPI remained a Development project through most of 2014. However with the completion of all but a small number of commissioning tasks the instrument moved into regular science use in November 2014, and the GPI Campaign commenced on November 8, 2014.

4.3.4 GMOS-South

The Hamamatsu CCD focal plane was delivered in 2014Q2 and installed in GMOS-S by a joint team of engineers and astronomers from both sites. Upon commencing commissioning, however, two problems surfaced: (i) a charge bleeding effect; and (ii) an effect on the background level within any channel containing saturated pixels. These are discussed further in the Development section. The bleeding effect has been cured but the saturation effect awaits delivery of new video boards in early 2015. A new version (0.4.2) of the GMMPS mask design software was made available to the community; this is an interim release as the process of adapting the software to the new chips revealed a number of coding issues. Backwards compatibility with the old detectors remains to be achieved.

Project Title	Status
Complete GMOS-N+Altair	Not completed.
Commission FLAMINGOS-2 MOS mode	Planned for 2015. See Section 8.
Final GNIRS lens replacements	Postponed. Minor science impact.
Commence Fast Turnaround Programs	Commences in January 2015.
SynchroBus replacement on both telescopes	Replaced by M2 CEM spares project
SDSU-VME interface obsolescence upgrades	Placed on hold.

Table 4-2: Optional Operations Projects - Analysis for 2014

4.4 Data Reduction and Software

The “gemini_python” data reduction platform (DR) was developed to support the Quality Assessment Pipeline, and will be used for all future facility instrument data reduction. It also has potential wider uses and features of general interest, so we released a preliminary version to the community in November 2014. The main components automate data processing and access Multi-Extension FITS files Gemini uses in a generic way. A temporary “commissioning” release of the data reduction package

compatible with the GMOS-S Hamamatsu CCDs was released to the community on July 22, 2014 and updated in October. The GPI data reduction pipeline³ was developed within the GPI instrument team and supported by Gemini. The initial version was released with the first light data in February. Improved versions have followed, including incorporating enhancements for 2014B programs.

The automated software regression testing infrastructure is complete and robust for user tools, including the Phase I Tool, Observing Tool, and Integration Time Calculators. The last two of these are automatically tested every week on the current test version, and tests are updated with scheduled software changes.

4.5 User Support

In 2014B, all US community phase II support was provided by Observatory staff, a change from the traditional process in which the US NGO would provide initial support and the Observatory would provide a second review. This change has been accomplished smoothly. US NGO staff provided oversight of the Observatory support, finding it appropriate.

For the first time in 2014B, some non-US Phase IIs were checked by staff members in NGOs other than that of the PI's Partner Country. NGO heads identified the instrumental specializations of their staff members. The process of distributing proposals was then to attempt to find an instrument specialist within the home NGO, and if that was not possible, to distribute the proposal to another NGO that had available expertise. We found infrared expertise to be in short supply by comparison to the demand, so Gemini will support additional training for the NGO staff.

With the signing of a Memorandum of Understanding between Gemini and KASI, Operations has begun to integrate Korea into the telescope access system for 2015A. Korea-specific web documentation was set up at KASI and linked to from the Gemini pages. A Phase I back-end was set up at Gemini and a dedicated Phase I Tool release made for Korean PIs to submit their proposals to this back end.

4.6 New Observing Modes

Gemini introduced the new opportunity for Large and Long Programs (LLPs) in 2014. The participating Partners (US, Canada, Australia, and Argentina) made available up to 20% of their time at each telescope for their astronomers. These PI-defined and -driven programs that either require significantly more time than a partner typically approves for a single program or extend over two to six semesters, or both. LLPs programs are expected to promote collaborations across the partnership's communities, to have significant scientific impact, and normally to provide a homogeneous data set, potentially for more general use. The time is available in a common pool, without calculation of allocated or observed Partner time shares. The proposals are evaluated by a distinct Long Program Time Allocation Committee (LPTAC), which includes members from all participating countries. The first announcement of opportunity was released in December 2013, with letters of intent due in February 2014. Complete proposals were required by the end of March 2014, with first observations as part of the 2014B semester.

³ <http://www.gemini.edu/sciops/instruments/gpi/data-reduction-and-calibrations?q=node/12205>

The program was extremely popular among potential community scientists. A total of 32 proposals were submitted to the LPTAC, requesting a total of 5637 hours. In the first semester (2014B), 1357 hours were requested, 60% at Gemini South and with GMOS-S as the single most popular instrument (due to the improved capability of the new red-sensitive CCDs). The LPTAC considered the scientific merit of the programs and the teams' capacity to complete them. Gemini considered operational constraints in approving the final slate of programs from among the ones recommended. Seven proposals were approved, for a total of 1370 hours over six semesters. Considering the ratio of requested to approved time, this corresponds to an oversubscription rate of a factor of approximately 5.2 in the first year.

LLPs will be open again annually, for new programs to begin observations during 2015B. Previously approved programs are required to submit an annual progress report to Gemini. This will be due with the new program deadline at the end of March 2015. The LPTAC will review these reports and advise the Gemini Director on continuation of each of the approved programs.

Large and Long programs are by default using the new "Priority Visitor" (PV) observing mode; only the strict Target of Opportunity program will not be visiting the Gemini telescopes. Astronomer support has been provided each night, and the feedback from PIs has been extremely positive. We are accumulating notes on what worked well and what did not, in preparation for regular use of PV mode announced in the 2015A call for proposals. We anticipate making it available to band 1 PIs preferentially, initially with summit support throughout each run. In future semesters, we will reduce the staffing requirement by increasing the level of documentation and removing the staff observer (apart from the observing-trained SOS group member) from the summit beyond standard first-half-night support for visitor observing runs.

4.7 Telescopes and Enclosures

Two shutter failures at Gemini North in late 2013 and early 2014 cost the community a combined 79 nights of telescope time. Although a detailed analysis of the first failure had shed light upon possible failure modes and changes in maintenance procedures had been put in place, the second failure indicated that the root cause was more fundamental. We are seeking an external contract for independent analysis of the problem, and following conclusive analysis we will implement a full solution, including additional mitigation and detection. This work has the highest Observatory priority.

As discussed in the 2013 annual report, the Gemini North telescope has been permanently equipped with accelerometers. We are now able to generate vibrational spectrum data on demand for a large number of locations on the telescope structure and in the instrument support systems at the bottom end. A visiting consultant (H Bonnet, ESO) assisted with interpretation and with mitigation proposals. At present the anticipated mitigation for the dominant 12-Hz vibrational signature in the north is to detect its signature integrated over many cycles in the wavefront sensor output and feed that directly into the secondary mirror control system. A similar approach has been successfully used to control an AO tip/tilt mirror at ESO.

Obsolescence issues are increasingly a concern for Gemini Operations. We completed a detailed analysis in early 2014 to identify as the highest priority the obsolescence of boards in the secondary mirror control computer (the “M2 CEM”). We have thus generated a complete inventory of spares and tested a number of DSP boards, concluding that M2 control is sustainable for the immediate (few-year) future. Some in-system testing during a shutdown remains for one type of DSP board. We expect to conclude this effort in the next year and then move on to the subsequent obsolescence issues, related to the SynchroBus and SDSU-VME, the interface between the detector controller and its VME crate. Meanwhile, we continue to analyze spares for the SynchroBus system, and some additional boards (required for the Gemini South natural guide star wavefront sensor upgrade, the “NGS2” project, described below) have been procured.

4.8 Storage and Archiving

Statistics for activity and data ingestion in the Gemini Science Archive (GSA) are given in Table 4-3. The contractual uptime requirement for the GSA is 98%, and was exceeded in all three quarters reported so far this year.

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

Period	Helpdesk tickets resolved	Dealt with by GS	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 2013	44		589387	344514	51645	12421	1488	99.86%	21561	422
Jan-Mar 2014	36		71575	36194	44704	8776	1530	98.77%	22420	352
Apr-Jun 2014	29		56663	21521	53272	12263	1563	99.7%	23571	402
Jul-Sep 2014	28		381129 (a)	54558 (a)	58534	5216	1591	100%	24525	1364 (a)

(a) Statistics on site hits are affected by occasional web “robot” activity. Q1 and Q2 2014 represent the normal level of science use.

In response to an apparent cyber-attack, the Canadian Government shut down major parts of the research computing infrastructure in Canada in July 2014. A number of servers at the Canadian Archive and Data Centre (CADC) were included in the shutdown. Users were not significantly impacted, as CADC quickly implemented some backup servers. Figure 4-1 shows the GSA availability statistics for the past three years; the effect of the above shutdown is not detectable in this plot.

Work on the calibration service went very much slower at both sites (Gemini and CADC) than anticipated, largely due to the diversion of effort at CADC to dealing with the shutdown discussed above, and work proceeding at Gemini on the prototype of a low-cost science archive discussed below. However once the CADC servers were restored, work commenced again. One of the two required calibration servers is now in place at Gemini (in the north), with work proceeding on the other.

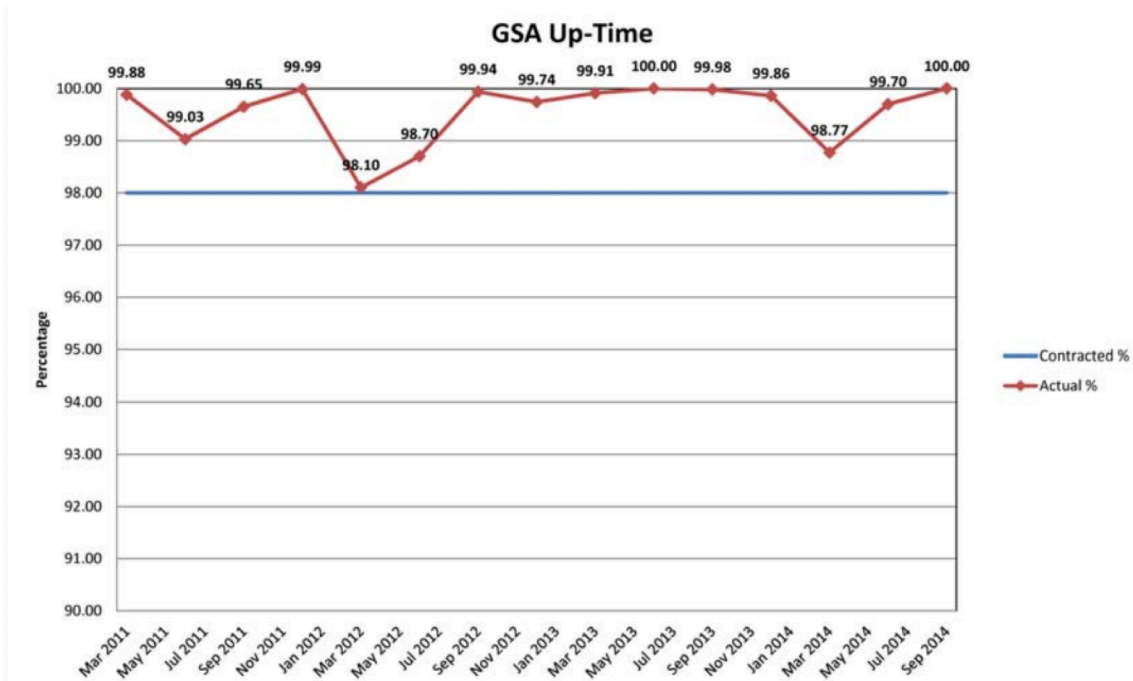


Figure 4-1: GSA uptime statistics for the past three years. The small blip in May 2014 corresponds to ~1 day downtime in the preceding quarter and is not related to the cyber-attack shutdown.

4.9 Operations Metrics

The statistics in this section refer to demand and performance in the last two complete semesters: 2013B and 2014A. Approved science programs, in both queue and classical modes, for these semesters are listed in Appendix D.

Figure 4-2 shows queue completion rates per telescope for all semesters to 2014A. Note that 2014A programs in Band 1 may still be completed due to rollover status. Against the somewhat tighter targets set by the Gemini Board, completion rates in Band 2 remain a concern, and we are exploring causes and some possible mitigations. However, the data for 2014A are affected by particular circumstances, not a part of an ongoing trend. At Gemini South, the main contributing factors were the continuing GeMS performance

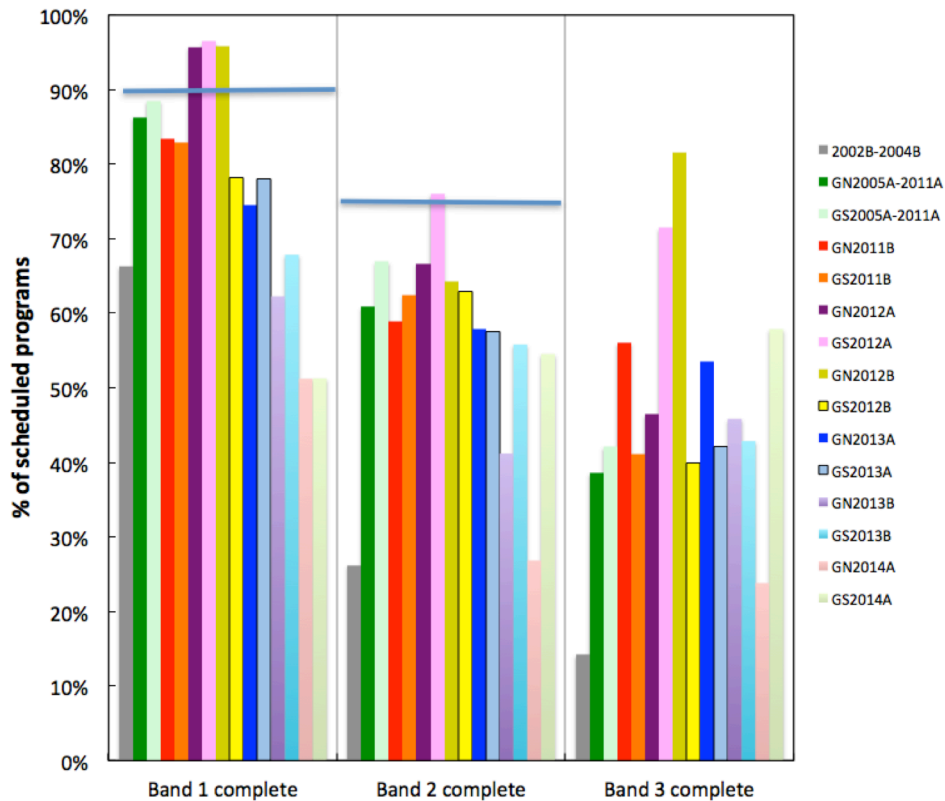


Figure 4-2: Completion statistics for GN and GS. Horizontal bars represent NSF target completion rates. 2013B and 2014A are represented by the bars at the right of each group. Bands 1 and 2 targets are based on program completion.

issues which caused the complete loss of a number of GeMS runs, the FLAMINGOS-2 remedial work which took the workhorse infrared instrument off the telescope, and the extended period between installation of the GMOS-S Hamamatsu CCDs and their availability for science. In the north, the main contributing factor was the loss of essentially an entire month to the shutter failure.

4.9.1 Telescope Time Usage

Table 4-4 and Table 4-5 show top-level time and fault distributions and science usage. Note that in order not to contaminate the underlying fault statistics, we place time spent in remediation of the 13B and 14A Gemini North shutter failures into the “Shutdown” category. Figure 4-3 places the fault loss data in context of the last three years of operations. The most significant change between the 13B and 14A semesters is that the contribution of instruments/AO facilities to the total time lost overtakes losses due to telescope and enclosure faults at Gemini South; this again reflects the issues with GeMS and (somewhat) FLAMINGOS-2 over the first half of 2014.

Semester	Site	Science	Engineering & Commissioning	Fault loss	Weather loss	Shutdown
13B	North	46%	3%	2%	23% ^a	26% ^b
	South	57%	14%	6%	18%	5%
14A	North	41%	2%	2%	35%	20% ^b
	South	62%	12%	5%	26%	0%
^a Note that at present, band 4 observing time in the south is not counted as weather loss; in the north it is. We have not yet rectified this anomaly.						
^b Dominated by shutter repair time						

Table 4-4: Overall operational statistics, semesters 2013B and 2014A. Science time is distributed among Bands 1, 2, and 3 according to weather conditions and program priorities within the semester.

Semester	Category	North	South
13B	Computer/Software	7%	6%
	Instruments & AO Facilities	33%	31%
	Telescope & enclosure	60%	63%
14A	Computer/Software	26%	8%
	Instruments & AO Facilities	44%	65%
	Telescope & enclosure	30%	27%

Table 4-5: Categorized fault distribution, semesters 2013B and 2014A.

4.9.2 Oversubscription and Demand

Oversubscription rates of the two telescopes by partner are shown in Figure 4-4. These rates 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

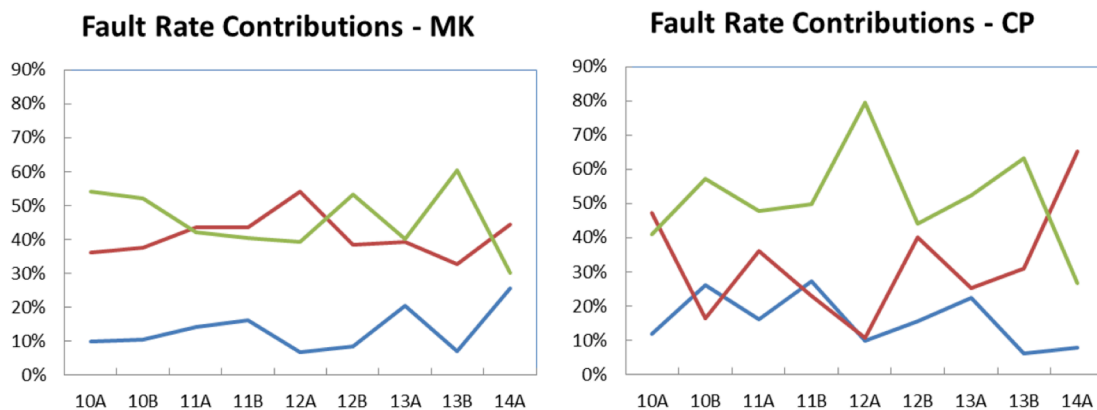


Figure 4-3: Relative contributions to fault rates, at Mauna Kea (MK, left) and Cerro Pachón (CP, right). Categories are: Telescope & Enclosure (green); Instruments & AO Facilities (red); and Software (blue).

calibrations. Such calibrations vary by instrument, resulting in an effective factor of between 5% and 10% that is not part of the oversubscription 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

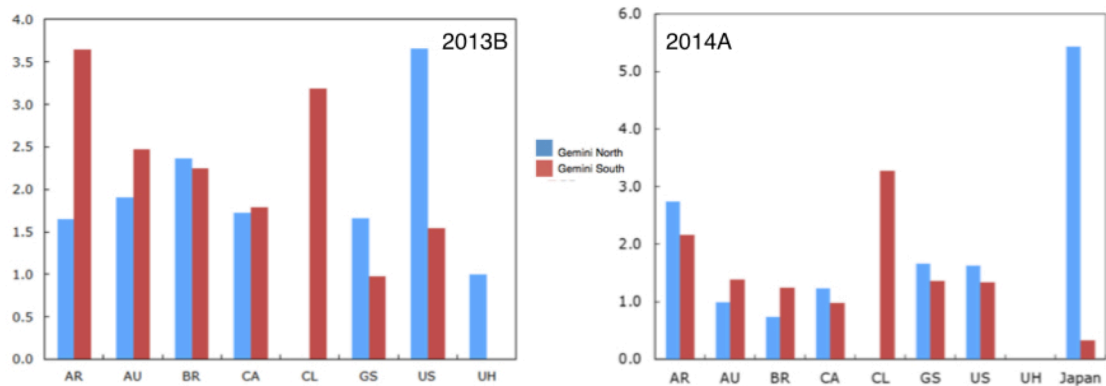


Figure 4-4: Oversubscription of Gemini North (blue) and South (red) for Semesters 2013B and 2014A, by partner. Note that the vertical scale is larger in the 2014A plot.

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 requested by instrument is shown in Figure 4-5.

The Operations Working group changed the process for adjusting shares in light of rollover time in February 2014. Starting in 2015A, only partners with active rollover programs in the next semester have their allocatable time reduced to accommodate it. (Previously, all partners had time reduced to accommodate rollover programs.)

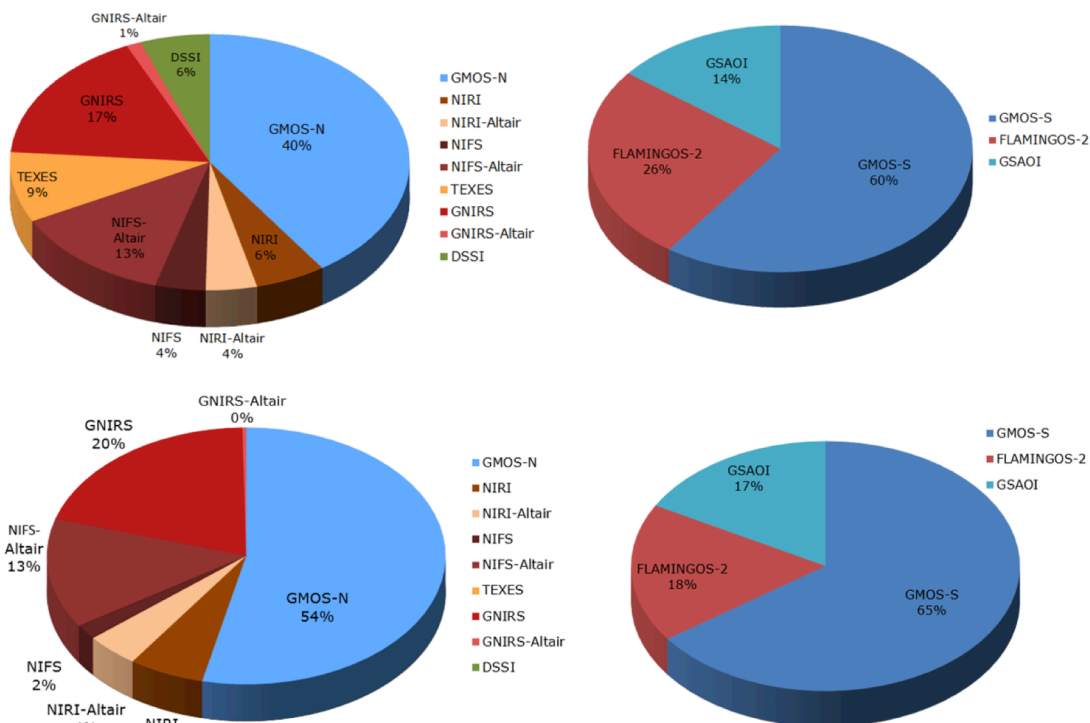


Figure 4-5: Allocations by instrument for Semester 2013B (upper) and 2014A (lower). Note the significant fraction of Gemini North taken by visiting instruments (DSSI and TEXES) in the B Semester.

4.10 Transition Program

The objective of the Transition Program is, by the end of 2015, to operate a sustainable, scientifically competitive observatory on a ~20% reduced operations budget. We have identified spending reductions of \$6.5M compared with the 2012 budget, to produce an operations plan that fits within the intended 2016 contributions of \$27.35M.

To develop the program and select areas of savings, Gemini management examined the Observatory's core mission, identified the principal services that ought to be delivered, and restructured the operations accordingly. The budget savings result from three activities:

1. Create a staffing structure that supports the new operations model. Labor costs, representing ~60% of the O&M budget, are being reduced by ~20% ("Labor" in Fig. 4-6).
2. Scrutinize all budget accounts and reduce non-labor expenses where possible ("General non-labor" in Fig. 4-6).
3. Implement about 30 saving projects and initiatives either to support the reduction in staff or to achieve additional yearly savings ("TP non-labor" in Fig. 4-6).

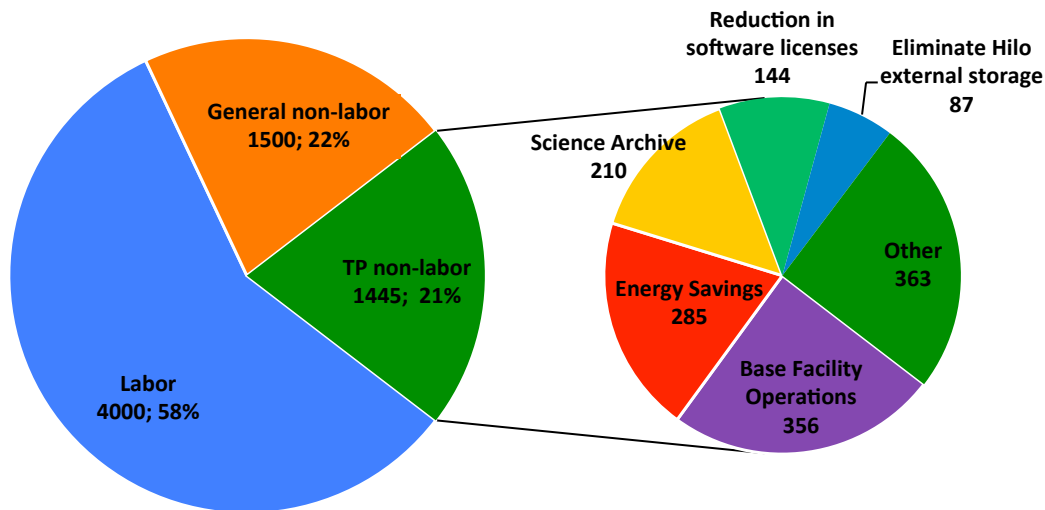


Figure 4-6: Distribution of the O&M budget reductions; amounts are in \$1000. The potential savings from the Transition Program projects are about \$1.5M ("TP non-labor" on left, and detailed on right), while the required savings are \$1M.

The management of the Transition Program remained a top priority for the Observatory in 2014 as we reach the end of the transition period. This year, many of the general non-labor savings have already been implemented, and the high priority projects advanced.

4.10.1 Staffing Reductions

The largest part of the O&M budget reduction comes from the staff reduction. The current staffing plan results in a staff size of 155 FTE post-transition. All affected staff members have been informed. The cost savings is certain to be achieved, and the main issue is our ability to operate effectively and sustainably on the reduced staff. We have recently completed a review of the staffing plan post-transition with the Heads of the

Departments and key managers. Using their input, we are evaluating small revisions to the staffing plan to make the operations sustainable long-term. The staff reduction also potentially affects the morale and productivity of staff who will remain working at the Observatory. Gemini leadership continues to dedicate effort to manage this aspect of the transition.

4.10.2 General Non-Labor Budget Reductions

Reductions in non-labor budgets not related to Transition Program projects are enabled primarily through two channels. First, reduction in staff will lead to reduction of spending on travel, professional developments, computers and supplies and materials directly related to staff numbers. Second, the non-labor budgets have been reviewed, principles for budgeting put in place, and top-level reductions have been imposed. The current non-labor budgets planned for 2016 and 2017 show that we will achieve the required savings. In particular, the reduction in staff is expected to lead to annual savings on computers of the order \$100k. The use of the budget principles has already resulted in reductions of the budget lines for supplies and materials totaling approximately \$200k annually, which is reflected in current budget planning for 2015.

4.10.3 Transition Program Projects

The complete set of projects are estimated to deliver nearly \$1.5M non-labor savings and support operational sustainability with reduced staff. We plan more conservatively, discounting the expected savings based on the confidence factor of each project. As a result, we remain highly confident of achieving at least the minimum required savings of \$1M through these projects.

We have accelerated some of the non-labor savings, where possible. Figure 4-7 shows the status of the savings as of end of 2014Q3, \$273k annually. As of mid-2015 we expect to have reached \$566k of savings, having achieved early savings from reduction in spares and overtime budgets, savings from renegotiated benefits, and savings from reduced power usage.

During 2014, Gemini management reviewed the status and potential savings from the Transition Program projects. We canceled low priority and low return projects in order to free up resources for higher priority work across the Observatory and within the Transition Program. Figure 4-8 shows the current strategic map of projects. Specifically, we put the Real-Time (RT) Systems upgrade on hold for about one year to free up resources needed for the implementation of the Base Facility Operations (BFO), whereby we will fully operate each telescope from its corresponding base facility. This change increases the likelihood of achieving the bulk of the planned savings from BFO, having it in place at Gemini North by the end of 2015. There is no great risk to delaying the RT systems project at this stage, having completed the first three major milestones of the year as planned, and the budget can accommodate the required changes in software contracts.

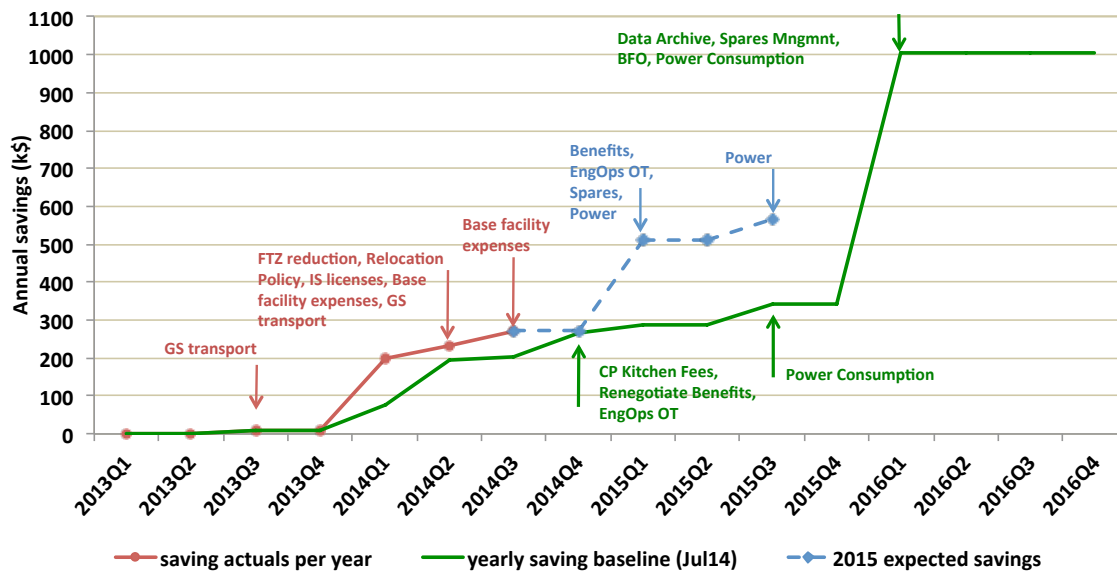


Figure 4-7: Transition Program non-labor savings. Current savings at end of 2014Q3 is \$273k annually (red solid line). The blue dashed line at later times shows the current best estimate of savings in place (budgeted) for 2015. The green solid line shows the baseline savings, including discounts for reduced confidence.

A second example is the cancellation of the Hilo Base Facility (HBF) partial lease project, after we determined that the market for leasing business property in Hilo was less favorable than previously assumed. Instead, we will use some of the vacant HBF offices for storage, ensuring that we can fully vacate the leased off-site Foreign Trade Zone (FTZ) storage by the end of 2015. Similarly, the projected savings from changes to the Cerro Pachón kitchen fees are smaller than previously expected, so we have canceled this project.

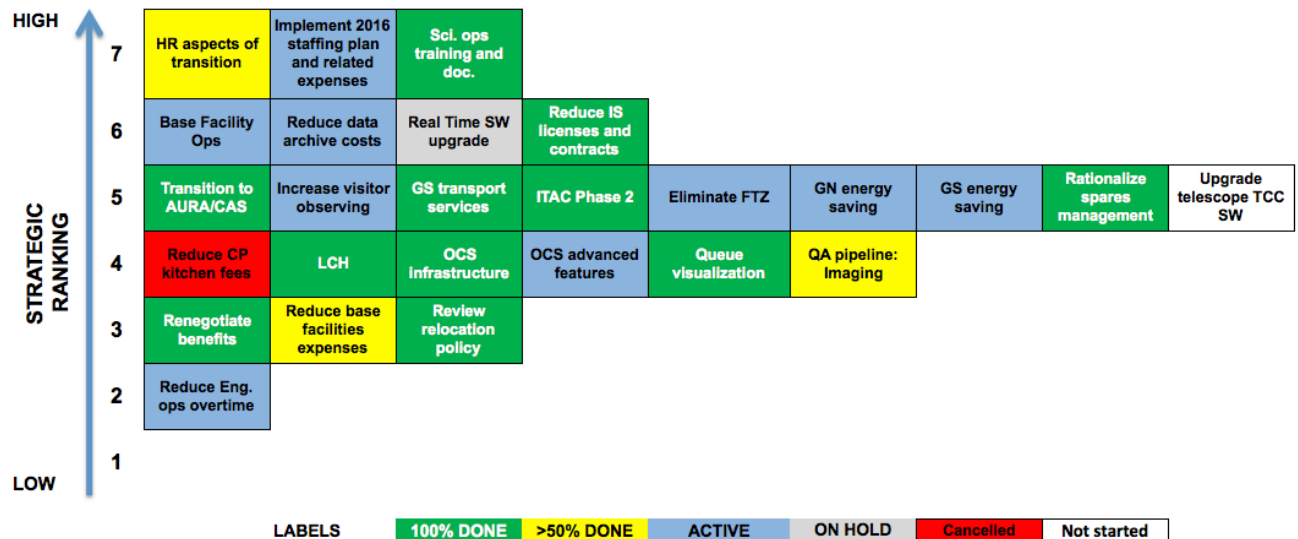


Figure 4-8: Transition Program strategic map.

Third, the scope of the Quality Assessment Pipeline (QAP) that is part of the Transition Program core goals is now limited to completing all imaging modes. Additional work on QAP, such as extension to spectroscopy modes, is not essential to Gemini's successful transition and is therefore not a formal part of the Program.

During 2014 we reached major milestones in the implementation of BFO. The remote enclosure operation was put in place at Gemini South early in the year. This aids operations in the winter months and is also needed for BFO. The transponder based aircraft detection system (TBAD) was installed at both sites and is undergoing testing. This will enable laser operations without spotters at both sites, a requirement for BFO. Design and implementation work is underway on key work packages for the Facility Project system, systems for monitoring of equipment and weather, and the sealing of the Gemini North dome enclosure. In parallel, we changed part of the management team for the BFO project early in the year, in order to have a project manager and systems engineer in place who could focus 100% on this key project. The project team presented the full plan for implementing BFO at both sites to a review committee in September, which included external members who had implemented similar programs at other observatories. The committee supported the scope of the project, but was concerned about the tight schedule and resources. Based in this input, we will implement BFO for Gemini North with completion in late 2015 using 15 FTEs, while Gemini South will follow in 2016.

We achieved other core goals of the Transition Program projects for 2014. Specifically, the design decision was made to implement the prototype for the in-house science archive, which will reduce costs. The prototype passed the acceptance test, which included external and user review, and the STAC and Board agree to proceed to full implementation. We completed the project to reduce information systems license costs, with the resulting savings of \$144k exceeding the \$100k planned. We completed the queue visualization project that provides tools to reduce staff effort in planning queue observations. The four planned stages of software were released, and now the result is integrated into regular Operations. The only project that did not achieve all its core goals was the Quality Assessment Pipeline (QAP), which provides rapid data quality assessment during nighttime observing. The first milestone was met, providing a public user desktop version of the Gemini Python package including the QAP. Resource limitations primarily due to staff turnover delayed the completion of pipeline modes for FLAMINGOS-2 and GSAOI imaging.

Results on the optional elements of the Transition Program, all of which were undertaken on a best-effort basis, are listed below.

Downsize Foreign Trade Zone storage *to reduce costs of renting off-site facility*

- Obtained authorization and disposed of unnecessary stored materials

Reduce Cerro Pachón kitchen expenses *to reduce costs of providing food at CP*

- Service level agreement is in place; remainder of project canceled, noted above

Observatory Control Systems (OCS) advanced features *to improve software that controls observations and is employed by science users, enabling improvements to calibrations, observation summaries, usability, and maintenance*

- Kicked off project and completed baseline plan

- Released initial software and second incremental software version

Adaptive Queue Planning *to reduce staff effort of planning queue observations, to incorporate site monitoring information for real-time use, and to improve scheduling algorithms*

- Cancelled as a Transition project; not essential to the success of the Transition Program and deferred until after 2015

Increase visitor observing *to reduce staff effort of nighttime observing and to provide more direct interaction with users*

- Full definition of visitor observing modes complete, with initial trials of Priority Visitor mode during 2014

Project Management Office *to manage projects and resource allocations*

- Project stopped because original design would require too many long-term resources; smaller improvements will be implemented

Spares management *to complete spares inventory and organization, to analyze obsolescence across systems, and to plan a long-term acquisition strategy*

- Savings have been incorporated in 2015 budget, moving remainder of work to Operations

Energy savings *to reduce energy usage and expenses*

- Approved detailed project plan for Gemini North, summit and base; issued request for bids for Mauna Kea photovoltaic panel
- Approved detailed project plan for Gemini South, summit and base; Southern Base Facility energy management changes completed
- Implemented reduction in all three computer rooms where feasible

Reduce base facilities expenses *to reduce expenses of operating and working in base facilities, including contracted effort and supplies*

- Identified cost savings areas; approved and implemented plan
- All required savings were realized in 2014, and additional savings are expected in 2015.

4.11 Administration and Facilities

The Administration and Facilities Group (AFG) in the North and South provided full support services to employees and telescope users and achieved significant advances in 2014 on Gemini Observatory priority projects. The Facilities team in the North achieved reductions of facilities annual expenses in the amount of \$15k from pooling printers and copy machines at the Hilo base facilities, and from developing a procedure that rationalized the use and maintenance costs of the printing and copying equipment. New water fountains provide drinking water at a reduced cost. The facilities team in the South reduced the vehicle fleet from twelve to nine vehicles, obtaining annual savings on maintenance and fuel of \$35k. We continue to work on the elements of the Transition Program, including elimination of the FTZ warehouse and energy savings.

In 2014 the Gemini Chief Financial Officer and AURA Central Administrative Services (CAS) Senior Manager began to hold weekly meetings. This practice establishes actions at Gemini and CAS to provide administrative services within terms in the CAS charter. Gemini and National Optical Astronomy Observatory-South (NOAO-S) signed Service Level Agreements for shared facilities services for the South operation. A new shared cost allocation model was defined and agreed between NOAO-S and the users and is the basis of charges from October 1, 2014. Gemini participates on the advisory

committee for NOAO-S facilities. This group meets every quarter to review financial results and discuss status of shared facilities services.

4.12 Safety

The Safety team worked closely with employees and supervisors during 2014. The number of significant Safety incidents (medical treatment and first aid) in 2014 decreased from 2013 (Figure 4-9). In 2014 Gemini achieved the best Safety indicators from the past five years, and workers' compensation auditors acknowledged the reduction of safety risk at work areas. As a result of this audit, Gemini's risk decreased, and insurance cost for workers compensation coverage will decrease \$50k annually. The Safety team also launched the new Gemini Observatory Safety manual. It is accessible to staff online, and printed copies are also available at each facility.

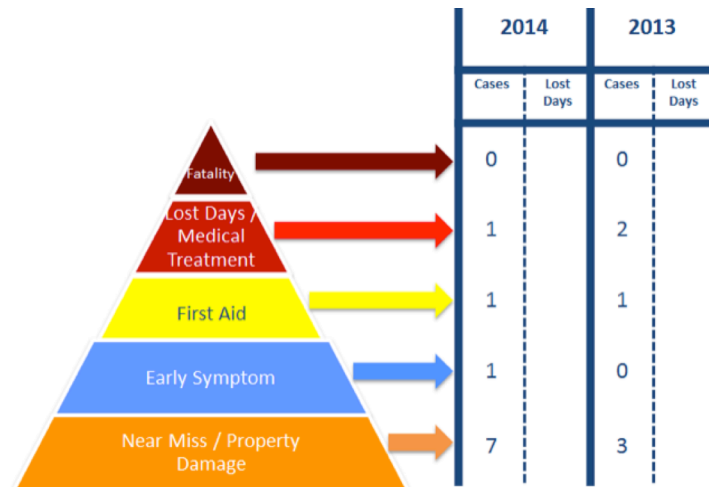


Figure 4-9: Safety incidents 2013–2014. (All lost day values are zero.)

5 Instrumentation and Facility Development

The Development Division delivered major new capabilities to the Observatory in 2014 and made significant progress in projects for the future. Highlights include starting the Gemini Planet Imager (GPI) Campaign and user observations, commissioning Hamamatsu CCDs in GMOS-S, and successfully completing the Gemini Remote Access to ESPaDOnS (GRACES) phase 1 experiment. Additionally, we brought the Gemini High-resolution Optical SpecTrograph (GHOST) through its preliminary design review, initiated the Gemini Instrument Feasibility Studies (GIFS) as the first step for our next new instrument, Generation 4 Number 3 (Gen4#3), and initiated several improvement projects for the Gemini Multi-conjugate Adaptive Optics System (GeMS).

5.1 GPI

The Gemini Planet Imager is now in regular use at Gemini South for both PI programs and the Campaign, the Gemini Planet Imager Exoplanet Survey (Macintosh *et al.*, 2014 AAS #223 229.02). After initial tests on the telescope, the GPI team fixed several small problems (including the slipping mechanisms noted in last year's report) and discovered that the GPI cryocoolers were inducing vibrations into the telescope primary support structure that were in turn affecting image quality as seen by GPI. These vibrations only appear when GPI is mounted on the telescope; they do not affect GPI's capabilities when mounted on the bench. Thus, they are definitely due to an interaction between GPI and the telescope and it is only GPI's impressive sensitivity that allowed us to actually detect and measure the problem. Changing the telescope response to GPI's vibrations has proven difficult, so instead we are using GPI's powerful Adaptive Optics (AO) system

to correct for the vibrations with only a small loss in performance. The team is also exploring better ways to mount the cryocooler and reduce the vibrations at the source as well as deploying tuned mass dampeners and tunable vibration absorbers to dampen the vibrations on GPI before they have a chance to couple into the telescope. This work will continue into 2015.

5.2 GMOS CCD Upgrade

The GMOS team installed the new Hamamatsu CCDs and Astronomical Research Cameras (ARC) detector controller into GMOS-South in June 2014. After commissioning, the team corrected a few small problems in July and August, with full regular use in science observations beginning immediately thereafter. Commissioning also revealed an additional problem involving saturated pixels that was not tested in the lab prior to installation. Gemini's detector engineer traced the problem to the ARC video board and found the manufacturer had since corrected the problem in a new version of the board. We are currently testing the new board and plan to install it in GMOS-S by early 2015.

During the year, we decided to delay installing the GMOS-North CCDs until mid-2015 in order to free up resources for other projects. The GMOS-N instrument already has upgraded deep depletion CCDs from E2V, so the need for the Hamamatsu CCDs is not as great as it was for GMOS-S. We completed a contract with Hamamatsu Photonics for the CCDs for the GMOS-N instrument and expect the first detector to be delivered in January 2015. We plan to have the CCDs ready for installation into GMOS-N during the northern summer, 2015.

5.3 GHOST

In May 2014, we finalized the contract with Australian Astronomical Observatory (AAO) for the new facility high-resolution optical spectrograph, GHOST (formerly known as GHOS). We quickly followed the contract completion with a preliminary design stage kickoff meeting at the AAO including team members from the AAO, National Research Council of Canada, Hertzberg Institute for Astronomy (NRC-H), Australian National University (ANU), and Gemini. The team quickly began a series of trade studies to finalize the basic design of the instrument, analyzing the best spectrograph layout, detector and camera package, and spectrograph location within the Gemini dome. The team completed its preliminary design review in December 2014 and will continue with the critical and final design stages in 2015. We have assembled a Gemini support team consisting of a project manager, project engineer, project scientist, systems engineer, software engineer, optical engineer, and a mechanical engineer to work with the external team and help ensure the delivered instrument will ultimately meet Gemini's needs without significant post-delivery rework.

Having overcome the contract delays of last year, we have modified the approach for future instruments to sign complete contracts (from design through commissioning) at the start of the conceptual design stage for each competing team. We had negotiated these contracts for GHOS(T), but kept them unsigned until after the down-select. The delay between the contract negotiation and signing, however, made us vulnerable to external changes that could prevent final contract signing. By signing a contract for the duration of the project at the start of the conceptual design stage, we eliminate the lag between the contract negotiation and signing. We will include an offramp for Gemini at the end of the conceptual design stage so we'll simply terminate the contracts of the

non-selected team(s) while letting the selected team move immediately to the preliminary design stage. This new approach, to be employed for Gen4#3, should shave several months off the project's ultimate duration.

5.4 Gen4#3

In 2014, Gemini developed and released a call for feasibility studies for science cases and instrument ideas for the next new facility-class instrument, Gen4#3. The teams selected for feasibility studies will present them at the June 2015 Future and Science of Gemini meeting to gather additional community feedback. Gemini will take the results of these feasibility studies and work with the STAC and our user community to develop the instrument requirements we will use for competitive conceptual design studies that will decide the nature of Gen4#3. The new procurement model, which allows in-kind contributions from instrument teams as well as cash and telescope time compensation, will support Gen4#3.

5.5 GRACES

GRACES aims to provide high-resolution optical spectroscopy for the Gemini community, feeding the ESPaDOnS spectrograph at the Canada-France-Hawaii Telescope (CFHT), via a 270m fiber attached to the Gemini North telescope through GMOS-N. GRACES is a combined effort of CFHT, NRC-H, and Gemini. In 2014, the team completed the planned phase 1 experiment, verifying that this system can indeed provide a competitive spectroscopic capability. Figure 5-1 shows a comparison of GRACES observations of the standard star Feige 66 with similar observations taken from Keck's HIRES data archive. The results show GRACES offers competitive optical spectroscopy at Gemini at wavelengths above ~550nm. Our goal for 2015 is to make a few minor modifications to the instrument to make it both more efficient and easier to operate and offer it to the community as a visitor instrument for up to 20 nights per semester.

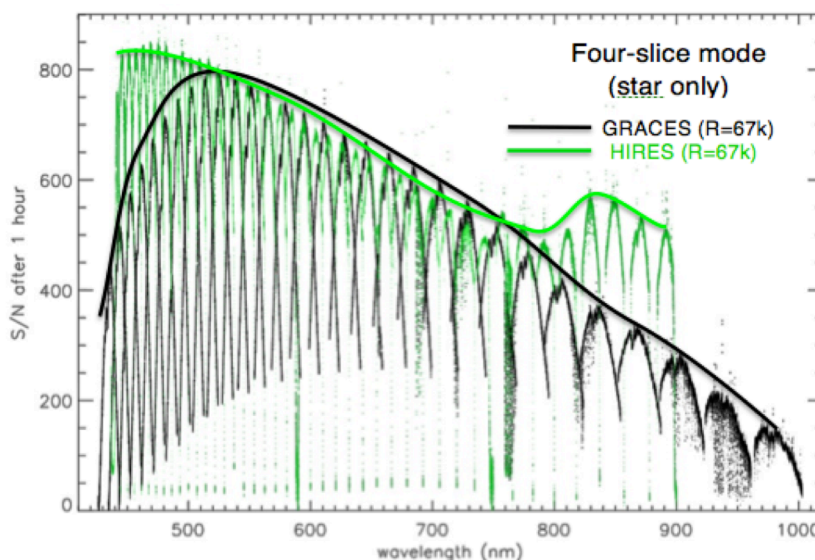


Figure 5-1: A comparison of an observed GRACES spectrum of Feige 66 with a corresponding HIRES spectrum from the Keck telescope adjusted to match GRACES observation's weather conditions and resolution. GRACES and HIRES are comparable above ~550nm.

5.6 AO and Other Facility Upgrades

The remaining Development projects for 2014, including all of those related to adaptive optics and telescope facility upgrades, were assigned low priority, and therefore received

resources only on a best-effort basis. Nonetheless, we made progress on several of these, listed below.

GMOS+Altair

to offer GMOS-N with adaptive optics

- Software changes completed; on-sky testing still required

Altair upgrades

- Defined work for a study to replace the real-time computer

GeMS upgrades

- Natural guide star wavefront sensor upgrade project (NGS2) at ANU underway
- Contracts to procure spare deformable mirror and electronics in progress

LGSF upgrades

to provide stable, high-power laser at Gemini South with reduced maintenance effort; the project will consider procurement of the newest laser technology, for laser replacement in 2016 or later

- Launched feasibility study
- Contracted modeling study to validate new laser performance

A&G Upgrades

- Researched options for motion control (PMAC) integrator; developed plans for complete trade study
- Defined parameters for trade study to upgrade peripheral wavefront sensor

IR detector controller

- Verified ARC controller suitability

Interface control document updates

to complete and update the documents that builders of new facility and visiting instruments require

- Updated interface control documents for GHOST
- Outlined work required for remaining documents

6 Public Outreach and Broadening Participation

Gemini's Public Information and Outreach (PIO) efforts successfully met the primary goals of the program plan for 2014, maintained a high-level of ongoing quality programming, and responded to many new opportunities and challenges. The results significantly impacted a diverse set of audiences — spanning from students and teachers in our local host communities to the astronomical users who produce the science that drives the Observatory's mission.

Like all of Gemini's 2014 initiatives, these results unfolded against the backdrop of the Transition Program. We had integrated the significant changes for PIO early in the process, reducing expenses in areas like publications (*e.g.*, Gemini*Focus* transition to an electronic publication) and eliminating planned hiring of a press officer, in order to fit within the smaller budget envelope. The greatest impact among staff was to build depth in numerous newly-distributed responsibilities (through cross training) and secondly, to assume new duties (along with some reprioritization of existing ones) in order to help absorb other, observatory-wide, reductions. A major example of this is the continuing growth of the PIO office's involvement in proactive user communications and support.

6.1 Expanding on a Legacy of Local Community Outreach Programming

Among the highest-level goals are to maintain and build on the remarkable success we have established in our local host-community outreach programming. Of these, Gemini's flagship outreach programs Journey through the Universe ("Journey" in Hawai'i), and Viaje al Universo ("Viaje" in Chile) are more relevant than ever, as demonstrated by the success of Journey and the celebration its 10th anniversary in 2014. (Viaje celebrated its 5th this year.) Both of these programs have strong philosophical foundations that require meaningful and broad participation by observatory scientific, technical, and engineering staff in classroom presentations as well as public and family programs. Table 6-1 lists the raw participation by students, teachers and the public. Key metrics of the programs' success are staff participation (which grew by about 10% for both programs in 2014), and community partnerships, which also grew by over 10% for both programs. In addition, both Journey and Viaje strongly support our expanding efforts to promote observatory career awareness and the related goal to expand distribution of our new "Out of this World" career brochure—key goals set in the 2014 Program Plan. (See Figure 6-2 and Table 6-1.)



Figure 6-1: Gemini staff astronomer Andre-Nicolas Chene shares his passion with local Hilo, HI students as part of the Journey through the Universe classroom programming. GeminiFocus is the Gemini Newsletter used to convey key news to users and other key Gemini stakeholders.

Gemini's other significant local outreach programs are listed below, with relevant data for each included in Table 6-1.



Figure 6-2: Covers of career tri-fold brochures (English and Spanish) featuring Gemini staff career highlights augmented by online resources that include brief video interviews of selected staff. Collectively, over 7,000 copies were distributed in 2014.

- **StarLab portable planetaria** provide classroom programming (Chile) or equipment training and loaning (Hawai'i) to local schools and educators;
- **FamilyAstro** programs (Chile and Hawai'i) are presented as part of the Astronomical Society of the Pacific's program that we have adapted for local host community families;
- **Live from Gemini** is live video fieldtrip in which students make a virtual trip to the Gemini control rooms and interact with STEM staff and PIO host.
- **AstroDay Chile** is based on the international AstroDay program, adapted to the local Chile community and with participation of other local Chilean observatories. (Gemini North also participates in an Annual AstroDay, but it is organized by all of the Mauna Kea observatories.)

6.2 Beyond Local Outreach

Balanced with our core local outreach programming is a strong and sustained commitment to broader education, outreach, and overall external Observatory communications.

During the past 12 months the Gemini PIO office produced nine press or image releases, which are distributed worldwide to traditional and new media communities (including journalists and bloggers)⁴. We also significantly increased our database of new media contacts by over 15% and established a protocol for regularly identifying new contacts based on electronic coverage of Gemini's findings.

The Gemini PIO office provides significant support on diverse communications products for our user community, including the quarterly and annual review issues of the *GeminiFocus* newsletter. We also develop conference displays and support other community events, including this year advance work for the 2015 Future and Science of Gemini meeting.

Activity/Event	Participants
Out of This World career brochure distribution	7,200
Journey Through the Universe, Hawai'i	9,982
Viaje al Universo, Chile	9,175
StarLab (Hawai'i and Chile)	4,687
Family Astro, AstroDay Chile, and others	7,457
Live from Gemini (Hawai'i)	102
Summit Tours (Hawai'i and Chile)	330
Total	38,933

Table 6-1: Participation in outreach events

A continually evolving area of development is in social and new media. Gemini has continued to grow and develop new methodologies and approaches to this area of communications. In 2014 we incorporated a social media blog to allow better integration

of longer content as well as better archiving and improved tracking of readership. We

⁴ Gemini's media coverage blog is available at <http://staff.gemini.edu/piomha/>.

now use new tools for scheduling and collaborative production of social media content. In 2014 our Facebook community grew by 15%, and we met our aggressive minimum target of an average of 5 Facebook or Twitter posts per week.

Finally, ongoing PIO functions include supporting the myriad needs of the Observatory such as photographic documentation, graphic arts, library services, facility tours for VIPs, students, teacher, and the media, and web content development.

6.3 Broadening Participation and Workforce Development

Our goal remains to have a competitive and financially sustainable Observatory with a highly skilled and motivated staff. Several workforce development initiatives continue and new initiatives have been developed during 2014. The remote and teleworking policy introduced in 2013 is now being utilized by 9 employees, allowing us to retain valuable staff who are highly motivated and committed.

Succession planning has been part of regular staff planning in 2014, enabling Gemini to plan strategically for future structures and people. We developed staff retention plans and risk analysis and mitigations for key positions and skills within the Observatory. We have incorporated these elements in to a sustainability plan.

AURA activities support workforce development. Gemini continues to contribute significantly to AURA's Workforce and Diversity Committee⁵, and we introduced a Diversity Advocate for Chile. The AURA 2012 survey of workplace climate identified areas for improvement of the workplace environment. The Directorate initiated a review of results by Department, and each developed specific action plans in response. At the Observatory level, we acted on two areas: transparency about how decisions are made and communication of policies. First, we have enhanced communications with managers and staff both upwards and downwards, and opened opportunities for staff to participate in governance meetings. Second, we consolidated policies and created an online policy directory, and we introduce new policies more comprehensively, with opportunities for questions and discussion.

Department / Specialty	Funding By	Educational Skill Level	Intern Program	2014 Interns
Engineering / Technical / Science	Akamai	Undergraduate	Akamai	4
Engineering / Technical	Gemini	Undergraduate / Graduate	Univ. of Victoria	2
Science	AGUSS	Undergraduate	AGUSS	2
Science / Other	Gemini/Unpaid	Undergraduate	Univ. of Hawai'i	1
Science/Engineering	Gemini	Various	Internal	4
Engineering	AURA/Gemini	Undergraduate / Graduate	Chilean Universities	5

Table 6-2: Gemini interns 2014.

We maintain a strong internship program with Partner countries and local sites, hosting 18 interns in 2014 (Table 6-2).

⁵ <http://www.aura-astronomy.org/diversity.asp>

7 Administration and Finance

7.1 Finance

We have enabled more effective management of the annual budget through a set of improved financial planning systems, processes, and reporting tools. Gemini adopted *encumbrance accounting* principles to present quarterly and annual expense reports, including the reports presented in this document. In addition to cash expenditures, 2014 expenses include the outstanding commitments balance as of December 31, 2014. Because of the timing of completing the accounting or payment cycle, a few goods or services cannot be billed or delivered by year end, and thus cannot be categorized as cash expenses. Instead, they add to the year-end outstanding commitments balance. Throughout utilizing encumbrance accounting, annual expenses include cash and outstanding commitments as of year-end.

Figure 7-1 presents the *spending process* of the Gemini Observatory. When an account manager approves a purchase requisition, the accounting system generates an outstanding commitment entry. When Gemini receives the invoice from the vendor, Accounts Payable closes the outstanding commitment, creates an expense entry, and records an accounts payable entry due to the vendor. When the account manager approves the invoice and acknowledges the receipt of the good or service, Accounts Payable processes the payment and closes the account payable entry.

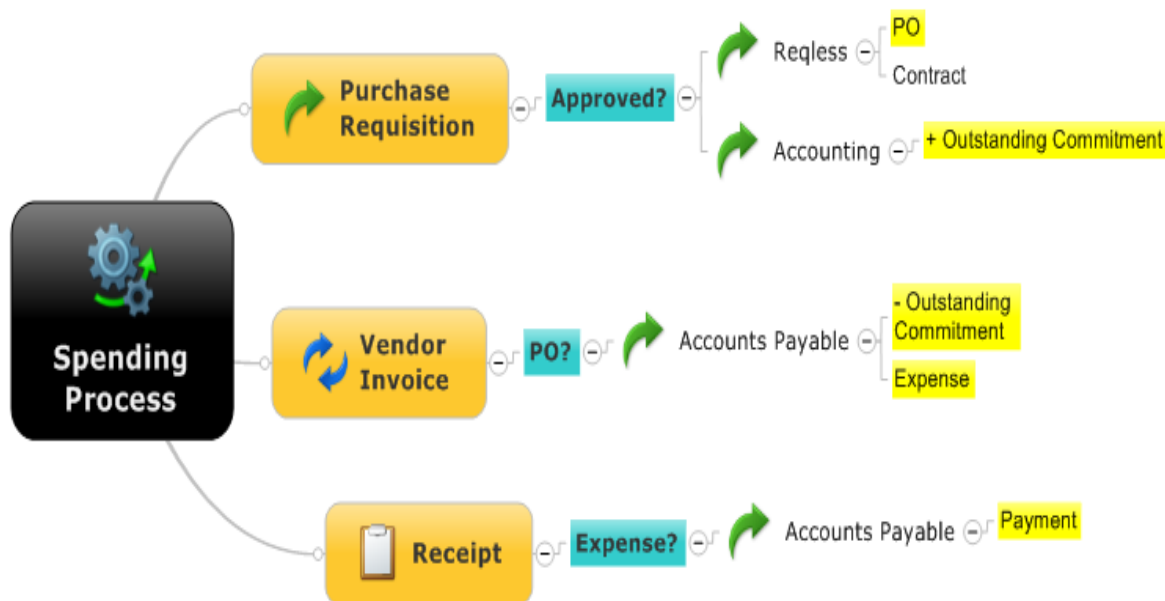


Figure 7-1: Gemini's spending process.

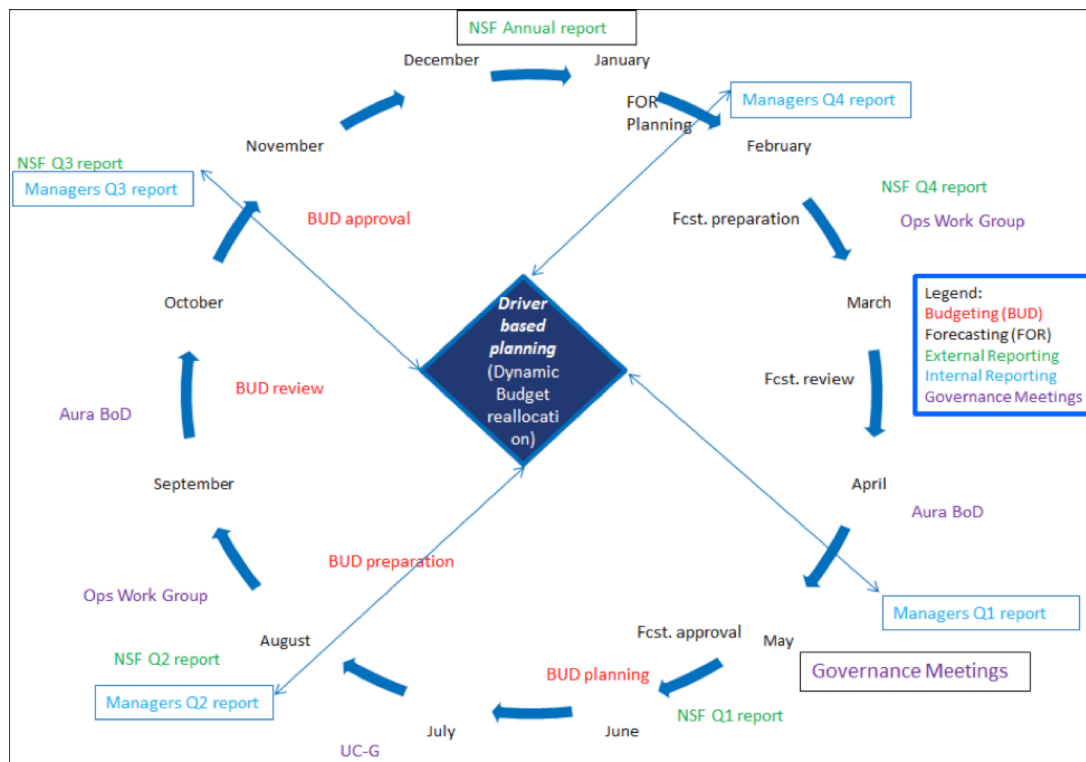


Figure 7-2: Gemini annual budget and reporting cycle.

Gemini's Directorate established a new process for *dynamic budget reallocation*. This system enables unexpected important work to be done and eliminates potential unspent budget where projects cannot be completed because resources are required elsewhere. The dynamic process that starts with collecting information on estimated budget under- or over-spending. During the quarterly review of Gemini's expenses, estimated unspent budget values are made available for other uses. The Gemini Directorate reviews and agrees the requested allocations of incremental budget, which are transferred to the corresponding O&M accounts where they will be used. The completion of this financial planning, forecasting and reporting cycle enables maintaining a balanced budget and executing expenses within +/- 3% of Gemini's spending authority. A formal policy guides the use of this process. Figure 7-2 shows a graphical view of the annual budget and reporting cycle, including the use of the dynamic reallocation.

7.2 Organization and Staffing

There are currently 181.4 employees on a Full Time Equivalent (FTE) basis; 48% of the staff members are based in Hilo and 52% are based

	2014
ADMINISTRATION+	18.2
Accounting	1.0
Facilities & Administration	14.8
Safety	2.4
DEVELOPMENT	17.9
Adaptive Optics	8.1
Systems Engineering	4.7
Instrumentation	5.1
OPERATIONS	127.2
Engineering-S	15.0
Engineering-N	8.5
ISG	13.1
SCI Intern	1.0
SCI SOS-S	11.8
SCI SOS-N	13.7
SCI-Astronomers-S	13.9
SCI-Astronomers-N	11.7
Software	14.4
Summit Crew-S	12.8
Summit Crew-N	11.5
DEPUTY DIR	11.9
Library	0.5
PIO	6.0
SCI User Support	5.4
DIRECTORATE	6.1
GRAND TOTAL	181.4

Table 7-1: 2014 staffing, by Division.

in La Serena. Table 7-1 shows the distribution by Division and function. Staff turnover is currently about 6% on an annualized basis. This compares favorably to the previous values of 10% in 2013 and 12% in 2012.

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 the NSF. These agreements clarify the members' partnership shares and the timing for the payment of contributions.

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

Table 7-2: Partners' cost shares.

The current apportionment of the Gemini cost shares under the original Partnership is shown in Table 7-2. Table 7-3 sets forth 2014 actual and 2015 estimated contributions by partner for Operations, Instrumentation, and the combination of the O&M and IDF funds.

Contributions	O&M 2014	O&M 2015	IDF 2014	IDF 2015	Total 2014	Total 2015
US	17,583	18,022	2,000	2,590	19,583	20,612
UK	-	-	-	-	-	-
Canada	5,009	5,009	615	615	5,624	5,624
Australia	1,667	1,667	-	-	1,667	1,667
Argentina	835	856	263	263	1,099	1,119
Brazil	1,754	1,798	-	-	1,754	1,798
Total	26,847	27,352	2,880	3,471	29,726	30,820

Table 7-3: Partner contributions 2014 and 2015; values in US \$1000.

7.3.2 Financial Results for the Year of 2014

The summary of year to date expenditures in terms of the funding sources as of the end of the third quarter of 2014 (Q3) is given in Table 7-4. In addition to the main budget funds introduced above (O&M, IDF, and FDF) we list the Special (SPEC) budget account, which contains grants and awards outside of the Partnership.

	Dec- 2013 Commits	2014 Approved Budget	-2014 Spending Authority Budget	2014 Q1 (Act.)	2014 Q2 (Act.)	2014 Q3 (Act.)	Q4 (Fcst.)	2014 Est.	2014 Commits	2014 Expenses and Commits	\$ 2014 Remainder Budget	% 2014 Remainder Budget
O&M	1,463	30,130	31,593	6,468	6,786	6,676	8,123	28,053	1,526	29,579	2,014	6.7%
IDF	1,446	5,274	6,720	761	970	837	1,557	4,124	1,057	5,181	1,538	29.2%
FDF	193	1,556	1,750	13	88	262	181	544	203	747	1,002	64.4%
SPEC	2	-	2	82	79	38	-	199	6	205	(203)	
TOTAL	3,104	36,961	40,064	7,323	7,923	7,813	9,861	32,920	2,792	35,712	4,352	11.8%

Table 7-4: 2014-Q3 Budget and Actual Expenditures – O&M, IDF, FDF, and Special; values in US \$1000.

The expense reports in this document use encumbrance accounting principles. Expense reports present the 2014 spending authority budget that results from the sum of the

approved 2014 budget and outstanding commitments as of year-end 2013. Therefore, in addition to presenting the 2014 approved budget, the reports show also encumbrance balances as of December 31, 2013.

7.3.3 2014 Budget vs Actual Variance Analysis

Table 7-5 shows a net budget left to spend risk of \$4.35M, and this balance includes an O&M budget underspending risk of \$2.0M or 7% of the 2014 approved budget. The three key drivers of the 2014 budget underspend are exchange rate fluctuations, hiring lag, and carryover of project costs (especially in the IDF). We detail these effects and note below lessons learned and future actions to prevent the recurrence of budget over- or under-spending.

Based on currency forecasts of the Chilean peso that the International Monetary Fund (IMF) distributed in 2013Q4, Gemini's estimate for the Chilean foreign exchange rate was CLP\$498 per USD. Given the current 2014 average CLP exchange rate, and consistent with the foreign currency forecasts from private bank sources (Scotiabank) and multilateral banks (IMF), we adjusted the 2014 CLP exchange rate to CLP\$560 per USD. The 12.4% unplanned CLP devaluation drives cost reductions of \$748k in labor and \$386k in non-labor areas.

Lag in hiring to fill planned positions and cancellation of other open postings produced a staffing reduction of 7-13 FTEs with respect to the original staffing plan for 2014, reducing labor cost by \$734k. The carryover of project budgets is another important source of 2014 non-labor budget variances. The re-baselining of the O&M Base Facility Operations (BFO) project, as well as delayed IDF and FDF projects required the reallocation of 2014 projects budget into 2015 and later years. (Note that IDF and FDF project costs are principally payments to external vendors, and their delays put off milestone payments.) Table 7-5 shows the combined 2014 budget vs actuals variance analysis (labor and non-labor). The 2014 remainder budget presented in the second to

	O&M	IDF	FDF	Total
2014 Budget	30,130,483	5,273,657	1,556,477	36,960,618
Dec-2013 Commits	1,462,597	1,445,854	193,139	3,103,559
2014 Spending Authority Budget	31,593,080	6,719,511	1,749,616	40,064,176
2014 Labor Budget	17,202,689	1,177,325	391,977	18,771,992
2014 Non-Labor Budget	12,927,794	5,273,657	1,556,477	19,757,928
2014 Subcontracts Budget	1,139,835	3,681,832	650,000	5,471,667
2014 Modified Non-Labor Budget	11,787,959	1,591,825	906,477	14,286,261
Factors driving 2014 budget underspending				
Labor cost Change - Devaluation	(643,915)	(99,672)	(4,079)	(747,667)
Labor cost Change - Staffing Changes	(632,152)	(97,851)	(4,005)	(734,008)
Labor cost Change - Wages changes	335,421	51,920	2,125	389,466
Total Labor cost Changes	(940,646)	(145,603)	(5,959)	(1,092,209)
N. Labor Cost Changes - Devaluation	(318,818)	(43,053)	(24,517)	(386,387)
Carryover of Projects Budget	(445,010)	(1,531,231)	(460,455)	(2,436,696)
2014 Remainder budget	(309,517)	181,471	(511,489)	(639,535)
Net Change - 2014 Labor Budget Vs Forecast	(2,013,991)	(1,538,416)	(1,002,420)	(4,351,836)
2014 Estimated Costs	29,579,089	5,181,096	747,196	35,712,340

Table 7-5: 2014 budget vs actuals variance analysis (labor and non-labor).

last line of the table shows the 2014 over or underspending (+/-) risk of each fund. O&M under-spending of \$309K represents 1.07% of O&M 2014 approved budget.

The set of improved financial planning systems, processes and reporting tools implemented in 2014 have enabled a more effective management of Gemini's annual budget. However, the elasticity of Gemini's spending to staffing changes, to the Chilean currency volatility, and to changes of schedule or cash-flow projection in large project budgets are key lessons to learn from 2014 budget variances.

8 2015 Program Plan

8.1 Overview of 2015

The highest priority remains to operate the Observatory to enable the users' scientific advancement. We continue with regular operations against the backdrop of the final full year of Gemini's Transition to a lower budget, which requires both implementing significant savings and completing several important projects that will enable long-term Observatory sustainability with fewer staff members.

	2014 Actual	2015 Budget	2016 Budget	2017 Budget
Operations and Maintenance (O&M)	29,579,356	29,990,012	27,617,422	27,856,123
Instrument Development Fund (IDF)	5,181,096	4,467,398	6,643,019	6,574,490
Facilities Development Fund (FDF)	747,168	656,735	1,448,031	1,286,577
Total	35,507,619	35,114,146	35,708,472	35,717,191

Table 8-1: Budgets for 2014, 2015 (as approved), and anticipated for 2016 and 2017.

	2014 Actual	2015 Plan	2016 Plan	2017 Plan
ADMINISTRATION+	18.2	19.8	19.0	19.0
Accounting	1.0	2.0	2.0	2.0
Facilities & Admin.	14.8	15.3	14.5	14.5
Safety	2.4	2.5	2.5	2.5
DEVELOPMENT	17.9	18.5	14.8	12.8
Adaptive Optics	8.1	9.5	6.8	5.8
Systems Engineering	4.7	5.0	5.0	5.0
Instrumentation	5.1	4.0	3.0	2.0
OPERATIONS	127.2	131.4	118.8	112.2
Engineering-S	15.0	14.3	13.0	12.0
Engineering-N	8.5	9.0	9.0	9.0
ISG	13.1	13.8	12.0	12.0
SCI Intern	1.0	1.0	1.0	1.0
SCI SOS-S	11.8	12.0	10.0	10.0
SCI SOS-N	13.7	14.5	11.0	11.0
SCI-Astronomers-S	13.9	13.6	13.4	11.9
SCI-Astronomers-N	11.7	13.5	13.4	11.0
Software	14.4	15.7	13.6	12.3
Summit Crew-S	12.8	13.0	11.4	11.0
Summit Crew-N	11.5	11.0	11.0	11.0
DEPUTY DIR	11.9	12.3	11.5	11.5
Library	0.5	0.5	0.5	0.5
PIO	6.0	6.0	6.0	6.0
SCI User Support	5.4	5.8	5.0	5.0
DIRECTORATE	6.1	6.0	6.0	6.0
GRAND TOTAL	181.4	187.9	170.0	161.5

Table 8-2: Staffing plan through 2017. FTEs are integrated per calendar year.

budget, and plans for 2016 and 2017 in the three categories. The IDF and FDF budgets in a given year are not exactly aligned with the income in these categories given the multi-year nature of the financed projects.

Observatory Budget 2014 – 2016 Overview

The Observatory budget is managed in three categories: 1. Operations and Maintenance (O&M – spent on an annual basis); 2. Instrument Development Fund (IDF - used for long-term, multi-year instrumentation and adaptive optics projects); and 3. Facilities Development Fund (FDF - no new income, used for two multi-year telescope sub-system improvement projects).

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 2014 budget, the approved 2015

Staffing Plan

Table 8-2 shows the actual 2014 staffing and the plans for 2015–2017, as FTEs integrated over each calendar year. Most of the planned effort remains within defined Divisions, Operations staff supporting operations activities and Development staff supporting 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 15 FTE in 2015, primarily from Engineering with smaller contributions from Science Operations. Some contracts associated with the Transition expire during 2016, so only 2017 reflects post-transition steady-state values.

Economic Assumptions through 2017

Year	2015	2016	2017
US inflation	2%	2%	2%
US inflation - energy	2.9%	2.9%	2.9%
Chile inflation	4%	4%	4%
Chile inflation - energy	4.4%	4.4%	4.4%
FX rate CLP/USD	560	560	560

Table 8-3: Economic assumptions.

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

Operations & Maintenance (O&M) Budget 2014 to 2017

The Operations and Maintenance (O&M) budget supports 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. Table 8-4 shows the O&M budget by cost categories for the period 2015 – 2017.

Cost Category	2015	2016	2017
Total Labor	17,935,327	17,297,135	16,691,667
Supplies & Equipment	1,089,120	1,197,066	1,234,039
Travel	1,266,229	895,333	922,193
Recruiting & Relocation	61,004	290,504	300,683
Professional Fees	1,686,640	1,630,311	1,441,125
Meeting, Conferences, Prof.Dev.	347,418	210,475	216,789
Computer Software & Equip.	664,547	641,899	664,156
Facilities	700,682	629,572	651,871
Maintenance	102,552	127,552	131,379
Utilities	1,727,441	1,907,682	1,972,415
Meals and Lodging	590,565	333,571	350,785
Total Site Costs	3,121,240	2,998,377	3,106,449
Spares	535,065	680,700	701,121
Other	49,081	36,357	937,448
Indirect Costs	933,092	939,732	813,922
Subcontracts	1,353,296	549,025	568,508
Total Non-Capital Expenditures	29,042,060	27,366,914	27,598,100
Computer	361,430	50,000	51,500

General	586,522	200,508	206,523
Vehicles	-	-	-
Total Capital Expenditures	947,952	250,508	258,023
TOTAL EXPENDITURES	29,990,012	27,617,422	27,856,123

Table 8-4: O&M budget by cost categories for the period 2015–2017, values in USD.

Instrument Development Fund (IDF) Budget 2014-2017

The IDF is used for instrumentation and adaptive optics systems. Table 8-5 presents the IDF 2015 – 2017 spending plan by instrument project, defined in §5 (Instrumentation and Facility Development). The additional account line for program support contains these significant activities in 2015: labor and non-labor expenses for Gemini staff performing instrument development work for IDF-funded projects; personnel support such as training; subcontracts for the design that will follow from the Gen4#4 feasibility studies; and contracted work to support future instrument upgrades.

IDF Project	2015	2016	2017
AO-UPGRADES (Altair, Canopus)	367,817	366,000	-
GEN 4#3	380,000	530,000	450,000
GHOST	1,611,100	2,748,200	1,346,000
GMOS (CCD upgrades)	476,000	-	-
GEN 4#4	100,000	860,396	4,218,917
INSTRUMENTS UPGRADE	171,000	741,000	-
PROGRAM SUPPORT	1,361,481	1,397,423	559,574
TOTAL GEMINI	4,467,398	6,643,019	6,574,490

Table 8-5: IDF spending for the years 2015 – 2017 by instrumentation project.

Facilities Development Fund (FDF) Budget 2014-2017

The FDF was established to support enhancements to the telescopes and adaptive optics infrastructure. It receives no new contributions and will be depleted by 2017. It will be used in 2015 to support a) the Acquisition and Guiding (A&G) system development; b) upgrade of the Laser Guide Star Facility (LGSF) at Gemini South; and c) the Gemini South AO facility. Table 8-6 lists these expenses.

FDF Project	2015	2016	2017
A & G SYSTEMS DEVELOPMENT	227,735	754,031	225,445
LGSF upgrades	58,000	666,000	550,000
MCAO - GS AOM CANOPUS	371,000	28,000	-
Facility Instrument Upgrades			511,132
Grand Total	656,735	1,448,031	1,286,577

Table 8-6: FDF 2015 – 2017 budget by project.

8.2 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.

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 90% of the observing.
- Support visiting classical observers in their execution of their programs on the telescope.
- Ensure integrity of data (headers & quality control information) entering the Gemini Science Archive.
- Support visiting instruments as needed and possible.
- Support, maintain and upgrade a data reduction package for the user community.
- 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; data flow software to move data into the science 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.
- Maintain communications between the Observatory and the National Gemini Offices and ensure that NGO staff members receive appropriate training.
- Staff the third and final level of a helpdesk to respond to queries from the user community. (The first two levels are (i) national office and (ii) instrument specialists at the national offices.)

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 held by the Heads of Engineering Operations, 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 2015 we will undertake a number of projects to improve longer-term sustainability impact or to improve service to users. These goals are limited, as 2015 is the final year of the Transition Program, and Base Facility Operations will be a major effort. Unless otherwise noted, the completion of each goal is planned for the end of the year.

Mirror Recoating

We will recoat the Gemini South primary mirror toward the end of the year (Q3), on the regular schedule (five years since the last recoat). The Gemini North secondary was last coated in early 2012 but is not aging well, possibly due to its more exposed location high in the dome. We will recoat it during the mid-year shutdown in Hawai'i (Q3).

Review of operational model

We will examine all processes of both Science and Engineering Operations in detail (Q1). These reviews will identify a new night-time operations model compatible with working from the base, and will seek efficiencies in all aspects of both the science and engineering support of astronomy with the two telescopes, for implementation later.

Fast Turnaround Programs

We will implement Fast Turnaround programs at Gemini North in 2015A. If successful, we will extend the system will be deployed to Gemini South later in the year.

Stabilize GeMS Operations

This effort aims to make operation of GeMS sustainable and limit required effort for the system's use. Core goals are to define the plan for execution in 2015, limited to only the highest priority tasks. (Unreliability of GeMS and corresponding unavailability of the system contributed to relatively poor science program completion at Gemini South during 2014, and this stabilization program should lead to improved observing completion rates in the future.)

Conclude dome shutter failure work

We will receive independent analysis of the two Gemini North shutter failures and implement procedures to reduce the risk of additional failures. (These failures severely affected science program completion at Gemini North during 2014, and correcting the fundamental problem should promote improved science completion over the long term.)

8.3 Transition Program in 2015

2015 is the last full year to complete the Gemini Transition. To create a feasible plan, we have evaluated all Transition Program projects. This resulted in cancellation of some lower priority projects as well giving higher priority to the energy savings projects.

8.3.1 2015 Goals for the Transition Program

The main goals for the Transition Program during 2015 focus on ensuring a smooth transition of the personnel to the reduced number of staff, as well as completing the high priority Transition Program projects. Specifically:

- *Staffing Plan changes*: Ensure that Gemini is on track for the implementation of the large changes in staffing at the end of 2015 and in early 2016. This includes review of all short-term contracts for consistency with budget as well as project plans (Q2).
- *Base Facility Operations*: Complete implementation by the end of 2015 such that Gemini North is operated from the base by the end of 2015 and Gemini South is on track to be operated from the base during the first quarter of 2016. Key milestones during 2015 are to provide remote access to summit plant room (Q2), provide remote access to observing floor (Q3), and eliminate outside activities (Q4).
- *Reduce Data Archive Costs*: Deploy in-house Science Archive (Q3); close CADC archive (Q4).
- *GN/GS Energy Savings*: Implement the subprojects with the highest potential for electricity savings: Mauna Kea photovoltaic panels (Q3), chillers at Gemini North and South summits (Q3/4), and replacement of HBF air conditioning system (Q2).
- *Eliminate FTZ*: Complete the elimination of the FTZ, while using vacated offices at the Hilo Base Facility for some storage (Q4). Also requires implementation of additional storage at the Mauna Kea summit facility (Q2).
- *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).

As described in the report on 2014 activities above, several projects have been removed from the Transition Program. By the end of 2015, we plan to have completed all Transition Program projects with the following exceptions:

- *Base Facility Operations*: Implementation for Gemini South expected in 2016 Q2.
- *Real-time systems upgrade*: Due to the need to put the project on hold to free up resources for BFO, the end date has changed from mid-2016 to mid-2017.
- *Telescope Control Console rewrite*: Start date expected to be early 2016, with completion in late 2016. Permanent staff members will implement this software.

8.3.2 Contingency plan

In the event that the Transition Program projects fail to deliver the required savings of \$1M, we in 2013 developed a contingency plan, which involved further staff reductions that could realize \$0.5M in savings. However, at this point we do not foresee that these staff reductions will be needed. We will closely track the progress on the Transition Program during 2015, especially the high priority projects with large savings potential: BFO, energy savings, and the archive.

8.4 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.

8.4.1 Development Core Goals

GPI

- Complete handover to Operations (Q2)

GMOS CCDs

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

GHOST

- Complete critical design review (Q4)

GRACES

- 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)

GIFS and Gen4#3

- 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)

GMOS+Altair

- Purchase dichroic (Q2)

Altair

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

GeMS

- Finalize NGS2 contract (Q1) and support external work (through Q4)
- Finalize procurement for spare deformable mirror and associated electronics (Q4)

GeMS Laser

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

Interface Control Documents

- Update documents needed for Gen4#3 (Q3)

Instrument Upgrades

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

8.4.2 Development Optional Projects

These additional development projects will receive resources on a best-effort basis, not to conflict with the primary goals listed above.

Acquisition and Guiding Units

- Progress trade studies for motion controller and wavefront sensors

IR detector controller

- Develop ARC controller in-house
- Develop requirements for software needed to support new controller

8.5 Administration and Facilities and Safety in 2015

We will continue to provide regular support in administration and facilities. Additional goals are listed here.

Finance and Administration

- **Finish the 2015 budget within -2% and +3% of the allocated O&M budget**
Continue to promote the accountability among the budget account managers.
- **Reporting expenses and commitments with respect to Budget**
Work with the AOC-G and Gemini Finance Committee to arrive at an agreed reporting of expenses and commitments and comparison to annual budget, taking properly into account last year's commitments.
- **Support the provision of highest standard of Administrative services to the Gemini Observatory**
Partner with Administration and Facilities services providers (CAS, NOAO-S and MKSS) to ensure the provision of timely and high quality administrative services to all Gemini's users.

Safety

- **Routine Safety Measures**
Continue to promote safety of the staff, our visitors and the Observatory as a top goal.
- **New safety structure**
Implement a new safety management structure around the new safety manager, define long-term structure for safety at Gemini, exploring actively joint resources at Gemini South.
- **Complete Safety Training**
Complete all trainings at the level set for each individuals.

8.6 Public Information and Outreach in 2015

2015 is anticipated to be an exceptional year for Gemini, with several special projects in addition to maintaining our various successful ongoing programs. We will lead the flagship local outreach programs Journey Through the Universe in Hawai'i and Viaje al Universo in Chile. When combined with our AstroDay Chile, Starlab portable planetaria, Family Astro, and other long-running programming, a strong commitment to our local communities emerges as a significant Gemini theme, and we expect to reach over 10,000 members of the public.

We will maintain communications with the public and users. Annually, we expect to produce a minimum of 8–10 press or image releases, which are distributed to the media worldwide. User communications include the quarterly and Annual Review issues of the GeminiFocus newsletter. Additional ongoing PIO functions include providing

photographic documentation, graphic arts, and library services for the Observatory. Projects listed below will be complete by the end of 2015, unless otherwise noted.

Conference and event support

2015 presents multiple events and conferences where Gemini participation is crucial to support our mission. Each of these events requires considerable advance work and logistical support, including tours and press duties for some. Thus, many worthy projects have been deferred until 2016 as a result. The key conferences are: the Future and Science of Gemini meeting (Toronto, Canada; June); the International Astronomical Union General Assembly (Honolulu; August); and the NSF-funded Astronomy in Chile Educator Ambassadors Program (Chile; June).

Press Officer Internship

A six-month student internship will be initiated in 2015 to establish an ongoing opportunity for science journalist students. This also offsets a key reduction realized by the Transition Program, specifically the elimination a dedicated Press Officer position.

International Year of Light (IYoL)

While not a specific program for Gemini, plans are in place to highlight the IYoL in many of our existing programs (Journey, Viaje, StarLab) and several new demos and workshops are planned in our local communities.

Expansion of Live from Gemini

This initiative will add significant, and relevant, activities for students to enhance the Live from Gemini video “fieldtrip” experience (Figure 8-1). In 2015, we will test student use of Gemini data to produce aesthetically striking, and even scientifically useful astronomical images. We have already established a partnership with the Hawai’i State Department of Education to complete this pilot with selected local students and teachers. The new resources developed will then be offered broadly to other classes and realize a long-standing goal to allow secondary (grades 8-12) students from around the Gemini partnership to use our data in a meaningful way.



Figure 8-1. A recent Live from Gemini event with students in North Carolina engages the students as well as Gemini science staff members Andreea Petric, Adam Smith (right), and PIO host Peter Michaud (left).

Career Brochure V.2

We will produce an updated version of the extremely popular Careers Brochure and video website in late 2015, for printing in early 2016. This will incorporate at least 6 new staff, and possibly add new partners to offset costs and expand distribution.

Electronics Data/Metrics Tracking

We have already established the systems to track data on electronic access to materials such as career resources, user publications, and social media. In 2015 we will systematically analyze the data, utilizing the information to strategically target and deliver content to audiences most effectively.

Virtual Tour During 2015, a tablet/web browser-based virtual tour will allow users to interactively walk around the Gemini facilities. Plans also include a prototype display in Gemini's two lobbies to assess feasibility of distribution to museums, planetaria and other public spaces in order to share an "insiders" view of our remarkable facilities.

8.7 Gemini External Relations in 2015

Gemini Observatory continues to support external relationships, especially with Partners and other potential stakeholders in the international astronomical community. Specific goals for 2015 are to:

- Integrate Korea as a limited-term partner through the Korea Astronomy and Space Science Institute (KASI);
- Continue to seek additional limited-term or full partners;
- Establish and fully staff the Science User Support Department;
- Hold a successful Future and Science of Gemini meeting in June.

Appendix A. Acronyms and Abbreviations

A&G	Acquisition and Guiding units
AAO	Australian Astronomical Observatory
AFG	Administration and Facilities Group
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
CAS	(AURA) Central Administrative Services
CCD	Charge-Coupled Device
CP	Cerro Pachón
DR	Data Reduction
DSSI	Differential Speckle Survey Instrument
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
IMF	International Monetary Fund

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, Hertzberg 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
PNAS	Publications of the National Academy of Sciences
Q1	Quarter 1
QAP	Quality Assessment Pipeline
SOS	Science Operations Specialist
SPEC	Special grants and awards fund
STAC	Science and Technology Advisory Committee
STEM	Science, Technology, Engineering, and Mathematics
TAC	Time Allocation Committee
UCG	Users' Committee for Gemini
US	United States
z	Redshift

Appendix B. Publications by Staff

B.1 Staff Refereed Publications

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Appendix C. Publications by Users

See notes for methodology.⁶⁷

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⁷ 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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Appendix D. Science Programs 2013B and 2014A

2013B Scientific Ranking – Gemini North

Band	Gemini ID	PI Name	Partners	Instrument	Title	Time
C	GN-2013B-C-1	McGreer	US	GMOS-N	The Faint End of the Quasar Luminosity Function at $z=5$	20.0
C	GN-2013B-C-2	Ikeda	JP	GMOS-N	New constraints on the faint end of the quasar luminosity function at $z \sim 5$	20.0
C	GN-2013B-C-3	Inoue	JP	GMOS-N	Spatial segregation of galaxy populations in the SSA22 $z=3.1$ proto-cluster	10.0
1	GN-2013B-Q-1	Aller	UH	GNIRS	Finding the Elusive Substellar Members of Nearby Young Moving Groups	24.0
1	GN-2013B-Q-2	Almeida	BR	GNIRS	Fundamental parameters for three unique young eclipsing binaries	10.5
1	GN-2013B-Q-3	Babul	CA	NIFS	The Impact of QSO B0910+410 On Its Surroundings	18.9
1	GN-2013B-Q-4	Bastien	CA	GMOS-N	Variability of the active RY Tauri bipolar jet	1.7
1	GN-2013B-Q-5	Bentz	AU/US	NIFS	A Stellar Dynamical Black Hole Mass for the Reverberation-Mapped Active Galaxy NGC6814	21.5
1	GN-2013B-Q-6	Berger	US/AU	GMOS-N	Exploring the Cosmic Dawn, Galaxy Evolution, and Exotic Stellar Deaths with Rapid GRB Follow-Up Observations (North)	14.4
1	GN-2013B-Q-7	Best	UH	GNIRS	L/T Transition Dwarfs in the Solar Neighborhood from Pan-STARRS1 and WISE	2.0
1	GN-2013B-Q-8	Brodwin	US	GMOS-N	The Massive Distant Clusters of Wise Survey (MaDCoWS)	32.0
1	GN-2013B-Q-9	Cenko	CA	GMOS-N	Probing the Central Black Holes of Distant, Quiescent Galaxies via Tidal Disruption Flares (North)	2.0
1	GN-2013B-Q-10	Cidale	AR	GNIRS	Disentangling the population of evolved massive stars in the galaxy M31	8.6
1	GN-2013B-Q-11	Cidale	AR	GNIRS	Tracing mass-loss events of evolved massive stars	3.1
1	GN-2013B-Q-12	Cuneo	AR	GMOS-N	Spectroscopic metallicities of polluted visible component atmospheres in black hole binary systems (North)	0.9
1	GN-2013B-Q-13	Daemgen	CA	NIRI	Proper motion follow-up of young planetary-mass companion candidates in Taurus	6.0
1	GN-2013B-Q-14	Desert	US	GMOS-N	Comparative Exoplanetology of Hot-Jupiter Prototypes (North)	15.0
1	GN-2013B-Q-15	Elvis	US	GNIRS	Quasar SEDs - 'Reaching the Peak'	5.1
1	GN-2013B-Q-16	Galicher	CA	NIRI	Completing the follow-ups of the 300 stars of the International Deep Planet Survey	10.7
1	GN-2013B-Q-17	Geach	CA	NIFS	Tracing the formation and evolution of star-forming galaxies across cosmic time: Completing the HiZELS/NIFS survey	23.0
1	GN-2013B-Q-18	Geballe	GS	GNIRS	H β absorption in the nucleus of NGC1068	3.5
1	GN-2013B-Q-19	Grundy	US	NIRI	Mutual Orbits and Masses of Kuiper Belt Binaries and Multiple Systems	12.5
1	GN-2013B-Q-20	Howard	UH	GMOS-N	Characterization of the Uranus-size planet GJ 3470b	10.0
1	GN-2013B-Q-21	Ikeda	JP	GMOS-N	New constraints on the faint end of the quasar luminosity function at $z \sim 5$	2.0
1	GN-2013B-Q-22	Inoue	JP	GMOS-N	Spatial segregation of galaxy populations in the SSA22 $z=3.1$ proto-cluster	2.0
1	GN-2013B-Q-23	Kasliwal	US	GMOS-N	Rapid Spectroscopy of Elusive Transients and Young Supernovae (North)	4.8
1	GN-2013B-Q-24	Kavelaars	CA	GMOS-N	Tracking in the Kuiper Belt, astrometric followup of CFEPs discoveries.	11.0
1	GN-2013B-Q-25	Keel	US	GMOS-N	Fading AGN with giant ionized clouds: mode switching and outflows	10.0
1	GN-2013B-Q-26	Lagattuta	AU	GNIRS	A SHARPer Look at Substructure: Identifying the Redshifts of Gravitational Lens Systems	4.0
1	GN-2013B-Q-27	Leggett	GS/US	NIRI	A Study of the 450K Transition from T to Y Dwarf, and of the 350K Y Dwarfs. (North)	3.7
1	GN-2013B-Q-28	Lorenzo de Oliveira	BR	GMOS-N	Chromospheric Activity in Old Open Clusters: NGC 188	9.2
1	GN-2013B-Q-29	McConnell	UH	GMOS-N	The Black Hole Safari Forges Ahead	22.5
1	GN-2013B-Q-30	McDermid	US/AU/GS	NIFS	Driving the molecular outflow in NGC1266	9.0

2013B Scientific Ranking – Gemini North (continued)

Band	Gemini ID	PI Name	Partners	Instrument	Title	Hours
1	GN-2013B-Q-31	Meech	UH	GMOS-N	The UH ISON Team?: Development of Activity	2.2
1	GN-2013B-Q-32	Metchev	US	GMOS-N	Weather on Other Worlds: Magnetic Fields or Clouds? (North)	8.8
1	GN-2013B-Q-33	Moskovitz	US	GMOS-N	Mission Accessible Near-Earth Objects Survey (MANOS) (North)	22.5
1	GN-2013B-Q-34	Najita	US	TEXES	The HCN/Water Ratio in Inner Disks: A Chemical \newline Signature of Planetesimal Formation?	25.0
1	GN-2013B-Q-35	Ohsawa	JP	NIRI	Investigation of the PAH size distribution in a compact HII region	3.8
1	GN-2013B-Q-36	Ohta	JP	NIFS	A Forming Elliptical Galaxy at z=1.4 under multi-merging?	7.5
1	GN-2013B-Q-37	Parker	US	GMOS-N	Targeted Recovery of Candidate Kuiper Belt Objects for New Horizons Flyby (North)	4.0
1	GN-2013B-Q-38	Pontoppidan	US	TEXES	Are Herbig Ae disks really depleted of water vapor?	8.0
1	GN-2013B-Q-39	Rogerson	CA	GMOS-N	Spectroscopy of Photometrically Varying BAL Quasars (North)	4.5
1	GN-2013B-Q-40	Sosa	AR	GMOS-N	Photometric study of the blazar MAGIC J2001+435 and its host galaxy.	3.2
1	GN-2013B-Q-41	Stephens	GS/US/BR	GNIRS	CNO Abundances in Resolved M31 Globular Cluster Stars	25.0
1	GN-2013B-C-42	Tsang	US	TEXES	Io's Atmosphere: Density above Volcanoes	10.0
1	GN-2013B-Q-43	van Altena	US	DSSI	A Snapshot Improvement in the Metal-Poor Mass-Luminosity Relation	2.2
1	GN-2013B-Q-44	Walsh	US	NIFS	Measuring Black Hole Masses in Compact, High-Dispersion Galaxies	1.0
1	GN-2013B-Q-45	Webster	AU	GMOS-N	The structure of the central engine in quasars	8.5
1	GN-2013B-Q-46	Young	US	DSSI	Pluto's volatile distribution from speckle imaging	18.0
2	GN-2013B-Q-47	Adamson	GS	NIFS	Eruptive protostars from UKIDSS	4.7
2	GN-2013B-Q-48	Alexandersen	CA	GMOS-N	Plutino colours: a matter of size?	24.0
2	GN-2013B-Q-49	Bresolin	UH	GMOS-N	Studying rejuvenation mechanisms in early-type galaxies	8.5
2	GN-2013B-Q-50	Chambers	UH	GNIRS	Quasars in the epoch of reionisation	14.0
2	GN-2013B-Q-51	Cibirka	BR	GMOS-N	Follow-up of Gravitational Arcs discovered with SOAR	6.1
2	GN-2013B-Q-52	de Mooij	CA	GMOS-N	Hotter than an M-dwarf: Optical day-side emission from KOI-13b & WASP-33b	12.0
2	GN-2013B-Q-53	Desert	US	GMOS-N	Comparative Exoplanetology of Hot-Jupiter Prototypes (North)	15.0
2	GN-2013B-Q-54	Diniz	BR	NIFS	Two-Dimensional Stellar Populations in Active Galaxies using NIFS	11.9
2	GN-2013B-Q-55	Foley	US	GMOS-N	RAISIN: Tracers of Cosmic Expansion with SN Ia in the IR (North)	9.0
2	GN-2013B-Q-56	Fox	AU/US	GMOS-N	Exploring Exotic Stellar Deaths with Standard TOO GRB Follow-Up Observations (North)	4.0
2	GN-2013B-Q-57	Grundy	US	NIRI	Mutual Orbits and Masses of Kuiper Belt Binaries and Multiple Systems	12.5
2	GN-2013B-Q-58	Hagele	AR	GMOS-N	Understanding the complex gas kinematics of compact, rapidly growing galaxies in the local Universe	3.6
2	GN-2013B-Q-59	Hall	CA	GMOS-N	Monitoring Emergent Absorption Troughs in Quasars (North)	11.5
2	GN-2013B-Q-60	Hirst	GS	GMOS-N	A search for the optical and NIR counterparts of the hotspots in Cygnus A.	1.0
2	GN-2013B-Q-61	Ingraham	CA	GNIRS	Near-Infrared (XJHK) Spectroscopy of Substellar and Planetary Mass Objects in Orion	16.0
2	GN-2013B-Q-62	Jorgensen	GS/US	GMOS-N	Stellar populations in the Lynx Super Cluster at redshift 1.26	52.5
2	GN-2013B-Q-63	Lacy	US	TEXES	A Study of the NGC 7538 IRS 1 high-mass star formation region	7.5
2	GN-2013B-Q-64	Lamb	CA	GNIRS	Searching for Metal-Poor Stars in the Galactic Bulge	3.4
2	GN-2013B-Q-65	Leggett	GS/US	GNIRS,NIRI	A new Y dwarf search probing the limits of WISE (North)	21.8
2	GN-2013B-Q-66	Mackey	AU	GMOS-N	Dynamics of the accreted remote globular cluster system of M31	12.0
2	GN-2013B-Q-67	Mason	GS	GNIRS	Direct detection of the dust and accretion disk in low-luminosity AGN	1.0
2	GN-2013B-Q-68	McConnell	UH	GMOS-N	The Black Hole Safari Forges Ahead	9.6
2	GN-2013B-Q-69	Mechtley	US	NIRI	PSF Star Selection for HST Program 12974: UV-Faint Quasars at z=6: Part II: Semester B Targets	2.6
2	GN-2013B-Q-70	Melin	US	GNIRS	Quantifying energy flows between Jupiter's magnetosphere, ionosphere, and thermosphere	25.0
2	GN-2013B-Q-71	Merline	US	DSSI	High-Resolution Imaging of Asteroids/Satellites	10.0
2	GN-2013B-Q-72	Moskovitz	US	GMOS-N	Mission Accessible Near-Earth Objects Survey (MANOS) (North)	22.5
2	GN-2013B-Q-73	Muzerolle	US	NIFS,NIRI	Accretion and Outflow in a Periodically-Varying Protostar	9.5
2	GN-2013B-Q-74	Nielsen	US	GMOS-N	Exploring the intragroup medium with bent double lobe radio sources	12.6

2013B Scientific Ranking – Gemini North (continued)

Band	Gemini ID	PI Name	Partners	Instrument	Title	Hours
2	GN-2013B-Q-75	Peeters	CA	NIRI	Photo-chemical evolution of PAHs	9.0
2	GN-2013B-Q-76	Phillips	US	GNIRS	Near-Infrared Spectroscopy of Type Ia Supernovae	10.0
2	GN-2013B-Q-77	Reipurth	UH	GNIRS,NIRI	Infrared Spectroscopy of the HH 24 Multiple Protostellar System - NIRI and GNIRS	13.0
2	GN-2013B-Q-78	Seth	US	NIFS	Resolving the Most Massive Globular Clusters in the Local Group	8.5
2	GN-2013B-Q-79	Torres	AR	GNIRS	Probing the magnetospheres of massive stars with infrared diagnostics	7.7
2	GN-2013B-Q-80	Zhou	AU	NIRI	Measuring the temperature of a highly irradiated brown dwarf	18.0
3	GN-2013B-Q-81	Beers	US	GMOS-N	Missing metal-poor stars from the HK and Hamburg/ESO Surveys (North)	50.0
3	GN-2013B-Q-82	Carr	US	TEXES	Molecular Shielding and Photodissociation of H ₂ in the Disks of T Tauri Stars	17.0
3	GN-2013B-Q-83	Daemgen	CA	NIFS,NIRI	Protoplanetary disk lifetimes revisited - The frequency of disks around single stars and binary components as a function of age.	12.6
3	GN-2013B-Q-84	Ferrero	AR	GNIRS	A High Resolution Near Infrared Spectral Atlas of O stars with Gemini	5.5
3	GN-2013B-Q-85	Gagne	CA	GMOS-N	Spectroscopic confirmation of very low-mass stars and brown dwarf candidates in nearby, young moving groups (North)	6.4
3	GN-2013B-Q-86	Hebb	US	GNIRS	Mass measurements of a young eclipsing binaries in h and chi Per	43.0
3	GN-2013B-Q-87	Howell	US	DSSI	High-resolution Speckle Imaging of Kepler Exoplanet Host Stars - Validation of Earth-size, Habitable Zone Exoplanets	20.0
3	GN-2013B-Q-88	Koss	UH	GMOS-N	Studying Merger Driven Growth Using Dual AGN and a Black Hole Recoil Candidate	15.0
3	GN-2013B-Q-89	Lange	AU	GMOS-N	Bridging the gap: A pilot study for a combined GAMA - HST study of galaxy morphology at 0.1<z<1.0	13.0
3	GN-2013B-Q-90	Mackey	CA	GMOS-N	Dynamics of the accreted remote globular cluster system of M31	6.0
3	GN-2013B-Q-91	Marsset	CA	GNIRS	NIR spectroscopy of two ~T7-Y0 brown dwarf candidates (North)	1.2
3	GN-2013B-Q-92	McDermid	GS	GMOS-N	Probing for H α emission in the diffuse ionized-gas around the center of M31	8.0
3	GN-2013B-Q-93	Melin	US	GNIRS	Characterizing the energy drivers of the upper atmosphere of Uranus	24.0
3	GN-2013B-Q-94	Mendes de Oliveira	BR	GMOS-N	Kinematics and stellar populations of two first-ranked fossil group galaxies	5.0
3	GN-2013B-Q-95	Mould	US/CA	NIFS	The circumstellar disks of nearby active galaxies	2.0
3	GN-2013B-Q-96	Pontoppidan	US	TEXES	Using TEXES to find evidence for large scale migration of icy bodies in protoplanetary disks	10.0
3	GN-2013B-Q-97	Sales	BR	GMOS-N	Mapping the Inner Structure of OH Megamaser Merger Galaxies	3.8
3	GN-2013B-Q-98	Salyk	US	TEXES	Locating the water vapor in protoplanetary disks	14.0
3	GN-2013B-Q-99	Shih	UH	GMOS-N	Massive Outflows in FR II Quasars and Radio Galaxies	20.0
3	GN-2013B-Q-100	Stock	CA	NIRI	The nature of extinction in HII regions	2.7
3	GN-2013B-Q-101	Sung	US	NIFS	Mass Accretion Rate of Very Low Luminosity Objects	0.5
3	GN-2013B-Q-102	Van Belle	US	DSSI	Stellar Diameters & Surface Imaging with DSSI	10.0
3	GN-2013B-Q-103	Villforth	US	GMOS-N	Starburst Quasars: A transitional stage in the quasar lifecycle?	6.5
3	GN-2013B-Q-104	White	AU	NIFS	Accretion and Outflow from Young Stellar Disks	10.0
4	GN-2013B-Q-105	Beers	BR	GMOS-N	Missing metal-poor stars from the HK and Hamburg/ESO Surveys (North)	25.0

2013B Scientific Ranking – Gemini South

Band	Gemini ID	PI Name	Partners	Instrument	Title	Time
C	GS-2013B-C-1	Sharp	AU	GSAOI	GSAOI GT program December 2013	30.0
C	GS-2013B-C-2	Ridgway	US	Flamingos 2	Flamingos 2 Spectroscopy of Obscured and Unobscured Quasars	10.0
C	GS-2013B-C-3	Eisenhardt	US	GMOS-S	Hot DOGs: The Most Luminous Galaxies Found by WISE	10.0
C	GS-2013B-C-4	Cantalupo	US	GMOS-S	Deep Lyman-alpha Imaging of Luminous z~2 Quasars: Testing the Cold Accretion Paradigm	40.0

2013B Scientific Ranking – Gemini South (continued)

Band	Gemini ID	PI Name	Partners	Instrument	Title	Time
1	GS-2013B-Q-1	Abraham	CA/AU/US	GSAOI	Red Nuggets in the Adaptive Optics Deep Field	42.9
1	GS-2013B-Q-2	Anguita	CL	Flamingos 2	Unveiling the nature of lensed "normal" galaxies in the redshift desert	9.0
1	GS-2013B-Q-3	Berger	US/AU	GMOS-S	Exploring the Cosmic Dawn, Galaxy Evolution, and Exotic Stellar Deaths with Rapid GRB Follow-Up Observations (South)	9.6
1	GS-2013B-Q-4	Cenko	CA	GMOS-S	Probing the Central Black Holes of Distant, Quiescent Galaxies via Tidal Disruption Flares (South)	1.0
1	GS-2013B-Q-5	Chapman	CA	GMOS-S	Optical followup of the new Cycle1 ALMA-SPT sample of lensed submillimeter galaxies	20.0
1	GS-2013B-Q-6	Cidale	AR	Flamingos 2	Hot water in the disks of B[e] stars	2.4
1	GS-2013B-Q-7	Clayton	CA	GSAOI	What is the evolutionary origin of cool RCB stars?	1.7
1	GS-2013B-Q-8	Desert	US	GMOS-S	Comparative Exoplanetology of Hot-Jupiter Prototypes (South)	10.0
1	GS-2013B-Q-9	Drinkwater	AU	GMOS-S	The cause of high mass-to-light ratios in ultracompact dwarf galaxies	9.0
1	GS-2013B-Q-10	Dupuy	US	GSAOI	Uncovering a New Population of Brown Dwarf Binaries with GeMS Astrometry	5.7
1	GS-2013B-Q-11	Fraser	CA	GMOS-S	Characterizing the Atmospheres of KBOs Quaoar and 2007 OR10	6.0
1	GS-2013B-Q-12	Gonçalves	BR	GMOS-S	Chemical tagging with emission line populations in NGC 55	6.0
1	GS-2013B-Q-13	Kasliwal	US	GMOS-S	Rapid Spectroscopy of Elusive Transients and Young Supernovae (South)	3.6
1	GS-2013B-Q-14	Lacy	US	GSAOI	The highest resolution view of massive distant galaxies	11.7
1	GS-2013B-Q-16	Leggett	CL/US/GS	Flamingos 2	A new Y dwarf search probing the limits of WISE (South)	31.2
1	GS-2013B-Q-15	Leggett	US	Flamingos 2, GSAOI	A Study of the 450K Transition from T to Y Dwarf, and of the 350K Y Dwarfs. (South)	25.7
1	GS-2013B-Q-17	Moskovitz	US	GMOS-S	Mission Accessible Near-Earth Objects Survey (MANOS) (South)	6.5
1	GS-2013B-Q-18	Parker	US	GMOS-S	Targeted Recovery of Candidate Kuiper Belt Objects for New Horizons Flyby (South)	4.0
1	GS-2013B-Q-19	Rest	US	GMOS-S	Spectrophotometric Time Series of η Carinae's Great Eruption	13.5
1	GS-2013B-Q-20	Ricci	BR	GMOS-S	Nuclear and circumnuclear low ionization emission in massive galaxies	12.3
1	GS-2013B-Q-21	Rogerson	CA	GMOS-S	Spectroscopy of Photometrically Varying BAL Quasars (South)	10.2
1	GS-2013B-Q-22	Saha	US	GMOS-S	Establishing a Network of DA White Dwarf SED Standards	21.5
1	GS-2013B-Q-23	Schreiber	CL	GMOS-S	Accurate orbital periods and component masses of three doubled-line double white dwarfs.	16.7
1	GS-2013B-Q-24	Sesto	AR	GMOS-S	Dating the most intense star formation events in the past of NGC 1316	9.7
1	GS-2013B-Q-25	Stubbs	US	GMOS-S	Spectroscopy of Galaxies in Massive Clusters: \\\ Galaxy Properties and Dynamical \\\ Cluster Mass Calibration	32.0
1	GS-2013B-Q-26	Tinney	US/AU	GSAOI	MCAO Astrometry of WISE Y dwarfs	13.5
1	GS-2013B-Q-27	Torres-Flores	CL	GMOS-S	Metallicity gradients and star formation in interacting galaxies	6.6
1	GS-2013B-Q-28	Treu	US	GMOS-S	Spectroscopic study of the environment of time-delay lenses for accurate cosmology	8.8
1	GS-2013B-Q-29	Trujillo	GS	GMOS-S	Distant Solar System Objects	3.5
2	GS-2013B-Q-30	Ammons	US/CA	GSAOI	A Test of GEMS Astrometric Precision for Exoplanet Detection and Mass Measurement	3.0
2	GS-2013B-Q-31	Angeloni	CL	GSAOI	Unveiling the giant jet of Sanduleak's star in the NIR with GSAOI	9.0
2	GS-2013B-Q-32	Artigau	CA	GMOS-S	Identifying Planetary-Mass Companions to Nearby Young Stars	17.4
2	GS-2013B-Q-34	Balogh	CA	Flamingos 2	Star formation and AGN activity in the central galaxies of Xray groups at $z=1$	4.0
2	GS-2013B-Q-35	Bannister	AU	GMOS-S	Ruling out a Galactic progenitor for dispersed radio bursts	3.5
2	GS-2013B-Q-36	Blum	US	GSAOI	The Double Cluster R136/R141-142 in 30 Doradus: A Definitive Study of the Low Mass Stellar Component	3.9
2	GS-2013B-Q-37	Caso	AR	GMOS-S	The globular cluster system of the massive elliptical galaxy NGC 6876	4.6
2	GS-2013B-Q-38	Chornock	GS/US	GMOS-S	Unveiling the Explosion Physics of Nature's Most Luminous Supernovae (South)	10.0

2013B Scientific Ranking – Gemini South (continued)

Band	Gemini ID	PI Name	Partners	Instrument	Title	Time
2	GS-2013B-Q-39	Clayton	US	Flamingos 2	Using 160/180 to Determine the Evolutionary History of the R Coronae Borealis Stars	14.3
2	GS-2013B-Q-40	Cote	CA	GMOS-S	Measuring Mass-to-Light in Nearby Dwarf Spheroidal Galaxies	13.3
2	GS-2013B-Q-41	de S. Angelo	BR	GMOS-S	Spectroscopy of the dissolving star cluster candidates NGC7193 and NGC7772	5.2
2	GS-2013B-Q-42	Demarco	CL	GSAOI	Size evolution of early-type galaxies in the strongest $z > 1.5$ overdensity in COSMOS	12.0
2	GS-2013B-Q-43	Denney	US	GMOS-S	Reverberation Mapping of a Gravitationally-lensed Quasar (South)	24.1
2	GS-2013B-Q-44	Desert	US	GMOS-S	Comparative Exoplanetology of Hot-Jupiter Prototypes (South)	10.0
2	GS-2013B-Q-45	Foley	US	GMOS-S	RAISIN: Tracers of Cosmic Expansion with SN Ia in the IR (South)	9.0
2	GS-2013B-Q-46	Fox	AU/US	GMOS-S	Exploring Exotic Stellar Deaths with Standard TOO GRB Follow-Up Observations (South)	4.0
2	GS-2013B-Q-47	Gamen	AR	GMOS-S	Galactic O-Star Spectroscopic Survey: Disentangling the spectra of close companions.	1.8
2	GS-2013B-Q-48	Graham	US	GMOS-S	Understanding the Power Source in Type Ia Supernovae with Nebular Phase Spectroscopy (South)	11.0
2	GS-2013B-Q-49	Hagele	AR	GMOS-S	The CNSF rings of Seyfert galaxies and their connection with the active nuclei: abundances and kinematics	3.6
2	GS-2013B-Q-50	Hall	CA/US	GMOS-S	Monitoring Emergent Absorption Troughs in Quasars (South)	4.5
2	GS-2013B-Q-51	Kannappan	US	GMOS-S	Resolved Spectroscopy Of a Local Volume: The RESOLVE Survey in Stripe 82	10.0
2	GS-2013B-Q-52	Kepler	AR/BR/GS	GMOS-S	Extremely Low Mass White Dwarf Pulsators	5.0
2	GS-2013B-Q-53	Kilic	US	GMOS-S	A Search for Pulsating White Dwarf Companions to Millisecond Pulsars (South)	4.0
2	GS-2013B-Q-54	Marsset	CA	Flamingos 2	NIR spectroscopy of two $\sim T7$ -Y0 brown dwarf candidates (South)	2.4
2	GS-2013B-Q-55	McConnachie	CA	GSAOI	The space motion and stellar content of Galactic satellites seen with GeMS/GSAOI: Part II	11.6
2	GS-2013B-Q-33	Menezes	BR	GMOS-S	AGN and nuclear cluster properties in Sc galaxies: a mini-survey	3.9
2	GS-2013B-Q-56	Metchev	US	GMOS-S	Weather on Other Worlds: Magnetic Fields or Clouds? (South)	14.8
2	GS-2013B-Q-57	Moskovitz	US	GMOS-S	Mission Accessible Near-Earth Objects Survey (MANOS) (South)	6.5
2	GS-2013B-Q-58	Neichel	GS	GSAOI	Dissecting a galaxy group at $z \sim 0.7$	2.3
2	GS-2013B-Q-59	Oesch	US	Flamingos 2	Emission Line Strengths and Gas-Phase Metallicities for the Massive Galaxy Population at $z \sim 3-4$	6.5
2	GS-2013B-Q-60	Piatti	AR	GMOS-S	Catching a hidden old SMC star cluster	1.0
2	GS-2013B-Q-61	Puzia	GS/US	GSAOI	The GeMS/GSAOI Galactic Globular Cluster Survey (G4CS)	13.5
2	GS-2013B-Q-62	Repetto	BR	GMOS-S	2D kinematic study of the nuclear component of NGC 1808 and the induced inflow.	3.0
2	GS-2013B-Q-63	Richtler	CL	GMOS-S	Isolated ellipticals - key objects for the dark matter problem?	10.0
2	GS-2013B-Q-64	Romita	US	GSAOI	Revealing the Properties of Embedded Clusters Beyond the Milky Way	10.0
2	GS-2013B-Q-65	Ryder	CL	GSAOI	GeMS Study of Supernovae in Luminous Infrared Galaxies	5.0
2	GS-2013B-Q-66	Sand	US	Flamingos 2	Constraining Type Ia Supernova Physics with Near-Infrared Spectroscopy (South)	12.7
2	GS-2013B-Q-67	Scarano Jr	BR	GMOS-S	Interactions vs. Spiral Arms Effects in the Oxygen Abundances of ESO194-G013 Galaxy	2.9
2	GS-2013B-Q-68	Schirmer	GS	GMOS-S	Green beans, quasar ionization echoes, and the evolution of AGN (South)	12.0
2	GS-2013B-Q-69	Schulze	CL	GMOS-S	A systematic search of supernova components in gamma-ray bursts	8.0
2	GS-2013B-Q-70	Sharp	AU/ CA	GMOS-S	Resolving cluster evolution	11.5
2	GS-2013B-Q-71	Stevenson	US	Flamingos 2	Validation of FLAMINGOS-2 for Exoplanet Research: The WASP-18b Case Study	10.0
2	GS-2013B-Q-72	Stubbs	US	GMOS-S	Spectroscopy of Galaxies in Massive Clusters: Galaxy Properties and Dynamical Cluster Mass Calibration	20.0

2013B Scientific Ranking – Gemini South (continued)

Band	Gemini ID	PI Name	Partners	Instrument	Title	Time
2	GS-2013B-Q-73	Webster	AU	Flamingos 2	Understanding the Physics of the Broad Line Region	13.4
3	GS-2013B-Q-74	B. Menezes	BR	GMOS-S	AGN and nuclear cluster properties in Sc galaxies: a mini-survey	11.0
3	GS-2013B-Q-75	Beers	US	GMOS-S	Missing metal-poor stars from the HK and Hamburg/ESO Surveys (South)	50.0
3	GS-2013B-Q-76	Bizyaev	US	GMOS-S	NEW DWARF GALAXIES IN THE LOCAL VOLUME/LOCAL GROUP	5.0
3	GS-2013B-Q-77	Bussmann	US	GMOS-S	Gemini-South Imaging and Spectroscopy of ALMA Lensed SMGs Discovered by Herschel	25.8
3	GS-2013B-Q-78	Cales	CL	Flamingos 2	PIT_HighzQuasars_GeminiS2013B	6.3
3	GS-2013B-Q-79	Gagné	CA	Flamingos 2	'Spectroscopic confirmation of very low-mass stars, brown dwarfs and planemo candidates in nearby, young moving groups	54.3
3	GS-2013B-Q-80	Kedziora-Chudczer	AU	Flamingos 2	Eclipse spectra of 'hot' Jupiters with inflated atmospheres.	8.1
3	GS-2013B-Q-81	Leggett	GS	Flamingos 2	A Study of the 450K Transition from T to Y Dwarf, and of the 350K Y Dwarfs. (South)	5.2
3	GS-2013B-Q-82	Minniti	CL	GMOS-S	Peering at the high-redshift nature of 10 unidentified hard X-ray sources	10.0
3	GS-2013B-Q-83	Rodriguez	CL	GMOS-S	Characterizing Young, Low-Mass Stars Near Earth	15.0
3	GS-2013B-Q-84	Rupke	US	GMOS-S	Verifying the Spatial Extent of QSO Outflows Discovered in Absorption	9.5
3	GS-2013B-Q-85	Ryder	AU	GMOS-S	The Type II In Supernova 1978K Revisited	2.9
3	GS-2013B-Q-86	Sales	US	GMOS-S	Mapping the Inner Structure of OH Megamaser Merger Galaxies	4.7
3	GS-2013B-Q-87	Sharp	US	GMOS-S	Resolving cluster evolution	4.8
4	GS-2013B-Q-88	Ahumada	AR	GMOS-S	A new template spectral library of Large Magellanic Cloud's star clusters	20.0
4	GS-2013B-Q-89	Beers	BR	GMOS-S	Missing metal-poor stars from the HK and Hamburg/ESO Surveys (South)	25.0

2014A Scientific Ranking – Gemini North

Band	Gemini ID	PI Name	Partners	Instrument	Title	Time
C	GN-2014A-C-2	Melin	US	GNIRS	Energy flows in the auroral region of Saturn	40.00
C	GN-2014A-C-3	Rigby	US	GNIRS	The $z \sim 2$ mass-metallicity relation from lensed galaxies	30.00
C	GN-2014A-C-1	Tilvi	US	GMOS-N	Completing the Galaxy Census from $z=0$ to $z \sim 7$ in the CANDELS/COSMOS Field	40.00
1	GN-2014A-Q-41	Aller	UH	GNIRS	Finding the Elusive Substellar Members of Nearby Young Moving Groups	20.00
1	GN-2014A-Q-40	Balogh	CA	GMOS-N	Dead and dying satellite galaxies at $z=1$	30.00
1	GN-2014A-Q-39	Bassett	AU	GMOS-N	Local Counterparts to High-Redshift Turbulent Galaxies: What are the Stellar Kinematics?	14.00
1	GN-2014A-Q-38	Berger	US/GS	GMOS-N, GNIRS, NIRI	Exploring the Cosmic Dawn, Galaxy Evolution, and Exotic Stellar Deaths with Rapid GRB Follow-Up Observations (North)	13.50
1	GN-2014A-Q-37	Cenko	CA	GMOS-N	Probing the Central Black Holes of Distant, Quiescent Galaxies via Tidal Disruption Flares (North)	2.70
1	GN-2014A-Q-36	Cidale	AR	GNIRS	Revealing the mass-loss history of evolved massive stars	6.20
1	GN-2014A-Q-35	Cortesi	BR	GMOS-N	Tracing the star formation history of the S0 NGC4382 with GMOS spectroscopy of globular clusters and field stars	5.30
1	GN-2014A-Q-34	de Kleer	US	NIRI	Linking Io's Volcanic Activity to Plasma Torus Variability	20.00
1	GN-2014A-Q-33	De Rosa	US	GNIRS, NIFS	Spectroscopic characterization of a newly-identified substellar companion to an early-type star	2.90
1	GN-2014A-Q-32	Desert	US	GMOS-N	Comparative Exoplanetology of Hot-Jupiter Prototypes (North)	17.56
1	GN-2014A-Q-31	Fox	GS	GMOS-N	Exploring Exotic Stellar Deaths with Standard TOO GRB Follow-Up Observations (North)	1.00
1	GN-2014A-Q-30	Gibson	AU	GMOS-N	Probing the atmospheres of a hot Neptune and a hot Saturn using GMOS differential spectro-photometry	4.50
1	GN-2014A-Q-29	Guenther	US	NIFS	Proto-stellar jets in the making	3.00
1	GN-2014A-Q-28	Hennig	BR	NIFS	AGN-Starburst connection in Mrk42 probed with NIFS	7.50

2014A Scientific Ranking – Gemini North (continued)

Band	Gemini ID	PI Name	Partners	Instrument	Title	Time
1	GN-2014A-Q-27	Jorgensen	GS	GMOS-N	Galaxy Evolution in the Densest Environments: Abell 2029 and Abell 2142	10.00
1	GN-2014A-Q-26	Kasliwal	US	GMOS-N	Rapid Spectroscopy of Elusive Transients and Young Supernovae (North)	4.80
1	GN-2014A-Q-25	Keel	US	GMOS-N	Fading AGN with giant ionized clouds: mode switching and outflows	12.50
1	GN-2014A-Q-24	Kerzendorf	CA	GMOS-N, NIRS	SN2011fe at late times	14.10
1	GN-2014A-Q-23	Kilic	US	GMOS-N	A Search for Pulsating White Dwarf Companions to Millisecond Pulsars	4.00
1	GN-2014A-Q-22	Konstantopoulos	AU	GMOS-N	20:20 Vision: Observing Galaxy Assembly Through Compact Lenses	12.00
1	GN-2014A-Q-21	Koyamatsu	Subaru	NIFS	Search for Gas "Streamer" in the Cavity of Transitional Disks	7.50
1	GN-2014A-Q-20	Leggett	GS	GNIRS, NIRS	Discovering and Characterizing new Y Dwarfs at the Faint Limits of WISE (North)	4.40
1	GN-2014A-Q-19	Liu	US	GMOS-N	Feedback in Luminous Red Quasars at $z \sim 0.5$	14.20
1	GN-2014A-Q-18	Marois	CA	NIRS	Completing the follow-ups of the 300 stars of the International Deep Planet Survey	9.10
1	GN-2014A-Q-17	McConnell	UH	NIFS	Black Hole Safari: Precision Measurements with Adaptive Optics	8.00
1	GN-2014A-Q-16	McGurk	US	GMOS-N	Exploring the Origin of Double-Peaked Emission Lines in AGN	18.40
1	GN-2014A-Q-15	Meech	UH	GMOS-N, GNIRS	The "Manx" Comets	6.30
1	GN-2014A-Q-14	Moon	CA	GNIRS	Towards the first-ever dynamical mass measurement in an ultra-luminous X-ray source	7.50
1	GN-2014A-Q-13	Moskovitz	US	GMOS-N, GNIRS	Mission Accessible Near-Earth Objects Survey (MANOS) (North)	22.50
1	GN-2014A-Q-12	Muratore	AR	GNIRS	Circumstellar disks around massive stars in the Arches cluster ? primordial remnants or signs for binary interaction?	2.70
1	GN-2014A-Q-11	Nishiyama	Subaru	NIFS	Gas Cloud Accretion onto the SMBH SgrA* and Formation of Jet 2	7.50
1	GN-2014A-Q-10	Pforr	US	GMOS-N	A GMOS spectroscopy survey of Herschel sources in the CANDELS COSMOS field	35.00
1	GN-2014A-Q-9	Repetto	BR	GMOS-N	Exponential pseudobulge kinematic properties in NGC 3367.	5.70
1	GN-2014A-Q-8	Sand	US	GNIRS	Constraining Type Ia Supernova Physics with Near-Infrared Spectroscopy (North)	8.98
1	GN-2014A-Q-6	Scholz	CA	NIRS	Rapid Target of Opportunity Gemini Infrared Observations of Magnetars in Outburst	4.50
1	GN-2014A-Q-7	Scholz	CA	NIRS	Target of Opportunity Gemini Infrared Observations of Magnetars in Outburst	9.80
1	GN-2014A-Q-5	Schramm	Subaru	GNIRS	NIR spectroscopy of a lensed quasar host galaxy at $z=2.2$	15.00
1	GN-2014A-Q-4	Seth	US/AU	NIFS	Resolving the Nature of Ultracompact Dwarfs	19.50
1	GN-2014A-Q-3	Steiner	BR	GMOS-N	LLP - The Gemini Survey of Galactic Nuclei - GSGN	2.44
1	GN-2014A-Q-2	Tilvi	US	GMOS-N	Completing the Galaxy Census from $z=0$ to $z \sim 7$ in the CANDELS/COSMOS Field	1.00
1	GN-2014A-Q-1	Tumlinson	US	GMOS-N	The CGM in HD: New Maps of Galactic Accretion, Quenching, and Chemical Feedback in the Circumgalactic Medium (North)	20.00
2	GN-2014A-Q-82	Aldering	US	GMOS-N	Dwarf Galaxy Hosts of Type Ia Supernovae (North)	5.80
2	GN-2014A-Q-81	Aller	UH	GNIRS	Finding the Elusive Substellar Members of Nearby Young Moving Groups	5.00
2	GN-2014A-Q-79	Best	UH	GNIRS	L/T Transition Dwarfs in the Solar Neighborhood from Pan-STARRS1 and WISE	2.00
2	GN-2014A-Q-78	Bian	AU	NIFS	Gas Kinematics in the Most Luminous Lyman Break Galaxies at $z \sim 3$	10.00
2	GN-2014A-Q-77	Brodwin	US	GMOS-N	Massive Distant Clusters of WISE Survey (MaDCoWS)	33.30
2	GN-2014A-Q-76	Chornock	US/GS	GMOS-N	Unveiling the Explosion Physics of Nature's Most Luminous Supernovae (North)	7.10
2	GN-2014A-Q-75	Cidale	AR	GNIRS	Developing a near infrared diagnostic for magnetism in hot, massive stars	2.20

2014A Scientific Ranking – Gemini North (continued)

Band	Gemini ID	PI Name	Partners	Instrument	Title	Time
2	GN-2014A-Q-74	de Mooij	CA	GMOS-N	Comparative Exoplanetology: Transmission Spectroscopy of Three Hot Saturns	18.00
2	GN-2014A-Q-73	Denney	US	NIFS	Reverberation Mapping of a Gravitationally-lensed Quasar (North)	14.38
2	GN-2014A-Q-72	Desert	US	GMOS-N	Comparative Exoplanetology of Hot-Jupiter Prototypes (North)	17.56
2	GN-2014A-Q-71	Do	CA/US/UH	NIFS	Determining the origin and structure of the young stellar disk at the Galactic center with NIFS	12.00
2	GN-2014A-Q-70	Faifer	AR	GMOS-N	Exploring the faint galaxy content and the globular cluster systems of the Pegasus I Group.	2.40
2	GN-2014A-Q-69	Hagele	AR	GMOS-N	The CNSF rings of Seyfert galaxies and their connection with the active nuclei: abundances and kinematics (North)	6.60
2	GN-2014A-Q-68	Hainline	US	GMOS-N	Exploring the Narrow Line Region Sizes of IR-luminous Type II QSOs with GMOS-IFU Data	8.10
2	GN-2014A-Q-67	Hall	CA/US/	GMOS-N	Monitoring Emergent Absorption Troughs in Quasars (North)	19.27
2	GN-2014A-Q-66	Hibon	GS	GMOS-N	Dissecting the halo of a $z=2.3$ LEGO (Ly-alpha emitting galaxy-building objects).	6.00
2	GN-2014A-Q-65	Lamb	CA	GNIRS	Searching for Metal-Poor Stars in the Galactic Bulge Part II	2.60
2	GN-2014A-Q-64	Leggett	US/GS	GNIRS,NIRI	Y Dwarf Characterization (North)	12.00
2	GN-2014A-Q-63	Liu	US	GMOS-N	Quasar feedback at the peak of the galaxy formation epoch	10.00
2	GN-2014A-Q-62	Magnier	UH	GNIRS	Rare Brown Dwarfs in the Solar Neighborhood from Pan-STARRS 1	9.50
2	GN-2014A-Q-61	Mann	US	GNIRS	Prospecting in Ultracool Dwarfs: Measuring the metallicity of L dwarfs	8.80
2	GN-2014A-Q-60	McConnell	UH	NIFS	Black Hole Safari: Precision Measurements with Adaptive Optics	14.40
2	GN-2014A-Q-59	McDermid	AU/CA	GMOS-N	The Nuclear to Global Connection: a Detailed View of Stellar Nuclei in a Sample of Virgo Ellipticals	13.50
2	GN-2014A-Q-80	Menezes	BR	GMOS-N	AGN and nuclear cluster properties in Sc galaxies: a mini-survey	5.40
2	GN-2014A-Q-58	Metchev	CA/US	GMOS-N	Weather on Other Worlds: Magnetic Fields or Clouds? (North)	12.00
2	GN-2014A-Q-57	Moskovitz	US	GMOS-N, GNIRS	Mission Accessible Near-Earth Objects Survey (MANOS) (North)	22.50
2	GN-2014A-Q-56	Najarro	GS	GNIRS	Massive Stars in Clusters and in Isolation in the Galactic Center: Origins, IMFs, and Chemical Enrichment Histories	6.50
2	GN-2014A-Q-55	O'Dea	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	5.70
2	GN-2014A-Q-54	Oka	US/GS	GNIRS	Study of the gas in the Central Molecular Zone of the Galactic center by H3+ spectroscopy (continuation)	16.50
2	GN-2014A-Q-53	Okoshi	Subaru	NIFS	First Survey for Galaxies associated with strong MgII gas at $z>3$	10.00
2	GN-2014A-Q-52	Phillips	US	GNIRS	Near-Infrared Spectroscopy of Type Ia Supernovae	10.00
2	GN-2014A-Q-51	Sales	BR	GMOS-N	Mapping the Inner Structure of OH Megamaser Merger Galaxies	12.60
2	GN-2014A-Q-50	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?	15.50
2	GN-2014A-Q-49	Sellgren	US	GNIRS	Characterization of Methanol Ice around Massive YSOs in the Galactic Center	5.00
2	GN-2014A-Q-48	Sharon	US	GMOS-N	?Resolving the Star Formation in Distant Galaxies? ? supporting ground-based spectroscopy for a large HST program	16.50
2	GN-2014A-Q-47	Shemmer	US	GNIRS	Weak Line Quasars at High Redshift: Unusual Ionization Conditions or Anemic Broad-Line Regions?	7.50
2	GN-2014A-Q-46	Shinn	US	NIRI	Study on the accretion of massive young stellar objects using the outflow features around ultracompact H II regions	18.00
2	GN-2014A-Q-45	Stanghellini	US	GMOS-N	The M81 radial metallicity gradient and its discontinuity through HII region weak-line abundances	0.50
2	GN-2014A-Q-44	Tadaki	Subaru	NIFS	Constraints on bulge and disk formation scenarios in clumpy disks	5.00
2	GN-2014A-Q-43	Ye	CA	GMOS-N, GNIRS	Visible and Near-Infrared Portrait of 209P/LINEAR	7.00
2	GN-2014A-Q-42	Zakamska	US	NIFS	Quasar feedback at the peak of galaxy formation epoch	4.60

2014A Scientific Ranking – Gemini North (continued)

Band	Gemini ID	PI Name	Partners	Instrument	Title	Time
3	GN-2014A-Q-103	Arias	AR	GNIRS	The interplay between pulsations and mass loss in blue supergiants	1.90
3	GN-2014A-Q-102	Artigau	CA	GMOS-N	Identifying Planetary-Mass Companions to Nearby Young Stars (North)	1.88
3	GN-2014A-Q-101	Beers	BR	GMOS-N	Missing metal-poor stars from the HK and Hamburg/ESO Surveys (North)	16.67
3	GN-2014A-Q-100	Bresolin	UH	GMOS-N	Studying rejuvenation mechanisms in early-type galaxies	8.50
3	GN-2014A-Q-99	Caballero	US	NIFS	Young Companions to Massive Stars in Cygnus OB2	2.70
3	GN-2014A-Q-98	Chambers	UH	GNIRS	Near IR spectroscopy of new $z \sim 6$ quasars discovered by Pan-STARRS	16.00
3	GN-2014A-Q-97	Clement	US	NIRI	Photometric downselection of $z \sim 7$ quasars from the CFHQSIR survey	5.70
3	GN-2014A-Q-96	Conn	GS	GMOS-N	A Gemini Planetary Nebulae Survey "GemPlaNS": Spatially-Resolved Optical Slit-Scan Spectroscopy (North)	7.57
3	GN-2014A-Q-95	Ferrero	AR	GNIRS	A High Resolution Near Infrared Spectral Atlas of O stars with Gemini	4.60
3	GN-2014A-Q-94	Gagné	CA	GMOS-N	Spectroscopic confirmation of very low-mass stars, brown dwarfs and planetary-mass candidates in nearby, young moving groups (North)	20.50
3	GN-2014A-Q-93	Keeney	US	GMOS-N	Confirming the Discovery of Massive 10^6 K Gas Reservoirs in Spiral-Rich Galaxy Groups	22.00
3	GN-2014A-Q-92	Kellogg	CA	GNIRS	Determining Dust Content in New Peculiar L and T Dwarfs	11.70
3	GN-2014A-Q-91	Leggett	US	GNIRS,NIRI	Discovering and Characterizing new Y Dwarfs at the Faint Limits of WISE (North)	24.20
3	GN-2014A-Q-90	Lena	US	GMOS-N	Mapping sub-kpc gas flows in a sample of nearby, hard X-ray selected AGNs	7.60
3	GN-2014A-Q-89	Najarro	US	GNIRS	Massive Stars in Clusters and in Isolation in the Galactic Center: Origins, IMFs, and Chemical Enrichment Histories	10.00
3	GN-2014A-Q-88	Ouellette	US/CA	GMOS-N	Populating the Virgo Velocity Function with Early-Type Galaxies at Gemini (North)	40.00
3	GN-2014A-Q-87	Pracy	AU	GMOS-N, GNIRS	Obtaining the Cosmic Gas Mass Density from 21-cm in MgII Absorption Systems	13.90
3	GN-2014A-Q-86	St-Louis	CA/GS	GMOS-N	In Search of Large-Scale Variable Wolf-Rayet Stars. III (North)	2.39
3	GN-2014A-Q-85	Trafton	US	NIFS	Hemispherical Constraint of Titan's Methane Cycle	16.00
3	GN-2014A-Q-84	Winkler	US	GMOS-N	Supernova Remnants in the Most Fertile Galaxy: NGC\,6946	20.70
3	GN-2014A-Q-83	Woo	US	GMOS-N	Investigating the M-sigma relation using rotation-corrected velocity dispersions (North)	5.21
4	GN-2014A-Q-105	Beers	US	GMOS-N	Missing metal-poor stars from the HK and Hamburg/ESO Surveys (North)	33.33
4	GN-2014A-Q-104	Jorgensen	GS	GMOS-N	Galaxy Evolution in the Densest Environments: Abell 2029 and Abell 2142	40.00

2013B Scientific Ranking – Gemini South

Band	Gemini ID	PI Name	Partners	Instrument	Title	Time
C	GS-2013B-C-1	Sharp	AU	GSAOI	GSAOI GT program December 2013	30.0
C	GS-2013B-C-2	Ridgway	US	Flamingos 2	Flamingos 2 Spectroscopy of Obscured and Unobscured Quasars	10.0
C	GS-2013B-C-3	Eisenhardt	US	GMOS-S	Hot DOGs: The Most Luminous Galaxies Found by WISE	10.0
C	GS-2013B-C-4	Cantalupo	US	GMOS-S	Deep Lyman-alpha Imaging of Luminous $z \sim 2$ Quasars: Testing the Cold Accretion Paradigm	40.0

2013B Scientific Ranking – Gemini South (continued)

Band	Gemini ID	PI Name	Partners	Instrument	Title	Time
1	GS-2013B-Q-1	Abraham	CA/AU/US	GSAOI	Red Nuggets in the Adaptive Optics Deep Field	42.9
1	GS-2013B-Q-2	Anguita	CL	Flamingos 2	Unveiling the nature of lensed "normal" galaxies in the redshift desert	9.0
1	GS-2013B-Q-3	Berger	US/AU	GMOS-S	Exploring the Cosmic Dawn, Galaxy Evolution, and Exotic Stellar Deaths with Rapid GRB Follow-Up Observations (South)	9.6
1	GS-2013B-Q-4	Cenko	CA	GMOS-S	Probing the Central Black Holes of Distant, Quiescent Galaxies via Tidal Disruption Flares (South)	1.0
1	GS-2013B-Q-5	Chapman	CA	GMOS-S	Optical followup of the new Cycle1 ALMA-SPT sample of lensed submillimeter galaxies	20.0
1	GS-2013B-Q-6	Cidale	AR	Flamingos 2	Hot water in the disks of B[e] stars	2.4
1	GS-2013B-Q-7	Clayton	CA	GSAOI	What is the evolutionary origin of cool RCB stars?	1.7
1	GS-2013B-Q-8	Desert	US	GMOS-S	Comparative Exoplanetology of Hot-Jupiter Prototypes (South)	10.0
1	GS-2013B-Q-9	Drinkwater	AU	GMOS-S	The cause of high mass-to-light ratios in ultracompact dwarf galaxies	9.0
1	GS-2013B-Q-10	Dupuy	US	GSAOI	Uncovering a New Population of Brown Dwarf Binaries with GeMS Astrometry	5.7
1	GS-2013B-Q-11	Fraser	CA	GMOS-S	Characterizing the Atmospheres of KBOs Quaoar and 2007 OR10	6.0
1	GS-2013B-Q-12	Gonçalves	BR	GMOS-S	Chemical tagging with emission line populations in NGC 55	6.0
1	GS-2013B-Q-13	Kasliwal	US	GMOS-S	Rapid Spectroscopy of Elusive Transients and Young Supernovae (South)	3.6
1	GS-2013B-Q-14	Lacy	US	GSAOI	The highest resolution view of massive distant galaxies	11.7
1	GS-2013B-Q-16	Leggett	CL/US/GS	Flamingos 2	A new Y dwarf search probing the limits of WISE (South)	31.2
1	GS-2013B-Q-15	Leggett	US	Flamingos 2, GSAOI	A Study of the 450K Transition from T to Y Dwarf, and of the 350K Y Dwarfs. (South)	25.7
1	GS-2013B-Q-17	Moskovitz	US	GMOS-S	Mission Accessible Near-Earth Objects Survey (MANOS) (South)	6.5
1	GS-2013B-Q-18	Parker	US	GMOS-S	Targeted Recovery of Candidate Kuiper Belt Objects for New Horizons Flyby (South)	4.0
1	GS-2013B-Q-19	Rest	US	GMOS-S	Spectrophotometric Time Series of η Carinae's Great Eruption	13.5
1	GS-2013B-Q-20	Ricci	BR	GMOS-S	Nuclear and circumnuclear low ionization emission in massive galaxies	12.3
1	GS-2013B-Q-21	Rogerson	CA	GMOS-S	Spectroscopy of Photometrically Varying BAL Quasars (South)	10.2
1	GS-2013B-Q-22	Saha	US	GMOS-S	Establishing a Network of DA White Dwarf SED Standards	21.5
1	GS-2013B-Q-23	Schreiber	CL	GMOS-S	Accurate orbital periods and component masses of three doubled-line double white dwarfs.	16.7
1	GS-2013B-Q-24	Sesto	AR	GMOS-S	Dating the most intense star formation events in the past of NGC 1316	9.7
1	GS-2013B-Q-25	Stubbs	US	GMOS-S	Spectroscopy of Galaxies in Massive Clusters: \\\ Galaxy Properties and Dynamical \\\ Cluster Mass Calibration	32.0
1	GS-2013B-Q-26	Tinney	US/AU	GSAOI	MCAO Astrometry of WISE Y dwarfs	13.5
1	GS-2013B-Q-27	Torres-Flores	CL	GMOS-S	Metallicity gradients and star formation in interacting galaxies	6.6
1	GS-2013B-Q-28	Treu	US	GMOS-S	Spectroscopic study of the environment of time-delay lenses for accurate cosmology	8.8
1	GS-2013B-Q-29	Trujillo	GS	GMOS-S	Distant Solar System Objects	3.5
2	GS-2013B-Q-30	Ammons	US/CA	GSAOI	A Test of GEMS Astrometric Precision for Exoplanet Detection and Mass Measurement	3.0
2	GS-2013B-Q-31	Angeloni	CL	GSAOI	Unveiling the giant jet of Sanduleak's star in the NIR with GSAOI	9.0
2	GS-2013B-Q-32	Artigau	CA	GMOS-S	Identifying Planetary-Mass Companions to Nearby Young Stars	17.4
2	GS-2013B-Q-34	Balogh	CA	Flamingos 2	Star formation and AGN activity in the central galaxies of Xray groups at $z=1$	4.0
2	GS-2013B-Q-35	Bannister	AU	GMOS-S	Ruling out a Galactic progenitor for dispersed radio bursts	3.5
2	GS-2013B-Q-36	Blum	US	GSAOI	The Double Cluster R136/R141-142 in 30 Doradus: A Definitive Study of the Low Mass Stellar Component	3.9
2	GS-2013B-Q-37	Caso	AR	GMOS-S	The globular cluster system of the massive elliptical galaxy NGC 6876	4.6
2	GS-2013B-Q-38	Chornock	GS/US	GMOS-S	Unveiling the Explosion Physics of Nature's Most Luminous Supernovae (South)	10.0

2013B Scientific Ranking – Gemini South (continued)

Band	Gemini ID	PI Name	Partners	Instrument	Title	Time
2	GS-2013B-Q-39	Clayton	US	Flamingos 2	Using 160/180 to Determine the Evolutionary History of the R Coronae Borealis Stars	14.3
2	GS-2013B-Q-40	Cote	CA	GMOS-S	Measuring Mass-to-Light in Nearby Dwarf Spheroidal Galaxies	13.3
2	GS-2013B-Q-41	de S. Angelo	BR	GMOS-S	Spectroscopy of the dissolving star cluster candidates NGC7193 and NGC7772	5.2
2	GS-2013B-Q-42	Demarco	CL	GSAOI	Size evolution of early-type galaxies in the strongest $z > 1.5$ overdensity in COSMOS	12.0
2	GS-2013B-Q-43	Denney	US	GMOS-S	Reverberation Mapping of a Gravitationally-lensed Quasar (South)	24.1
2	GS-2013B-Q-44	Desert	US	GMOS-S	Comparative Exoplanetology of Hot-Jupiter Prototypes (South)	10.0
2	GS-2013B-Q-45	Foley	US	GMOS-S	RAISIN: Tracers of Cosmic Expansion with SN Ia in the IR (South)	9.0
2	GS-2013B-Q-46	Fox	AU/US	GMOS-S	Exploring Exotic Stellar Deaths with Standard TOO GRB Follow-Up Observations (South)	4.0
2	GS-2013B-Q-47	Gamen	AR	GMOS-S	Galactic O-Star Spectroscopic Survey: Disentangling the spectra of close companions.	1.8
2	GS-2013B-Q-48	Graham	US	GMOS-S	Understanding the Power Source in Type Ia Supernovae with Nebular Phase Spectroscopy (South)	11.0
2	GS-2013B-Q-49	Hagele	AR	GMOS-S	The CNSF rings of Seyfert galaxies and their connection with the active nuclei: abundances and kinematics	3.6
2	GS-2013B-Q-50	Hall	CA/US	GMOS-S	Monitoring Emergent Absorption Troughs in Quasars (South)	4.5
2	GS-2013B-Q-51	Kannappan	US	GMOS-S	Resolved Spectroscopy Of a Local Volume: The RESOLVE Survey in Stripe 82	10.0
2	GS-2013B-Q-52	Kepler	AR/BR/GS	GMOS-S	Extremely Low Mass White Dwarf Pulsators	5.0
2	GS-2013B-Q-53	Kilic	US	GMOS-S	A Search for Pulsating White Dwarf Companions to Millisecond Pulsars (South)	4.0
2	GS-2013B-Q-54	Marsset	CA	Flamingos 2	NIR spectroscopy of two $\sim T7$ -Y0 brown dwarf candidates (South)	2.4
2	GS-2013B-Q-55	McConnachie	CA	GSAOI	The space motion and stellar content of Galactic satellites seen with GeMS/GSAOI: Part II	11.6
2	GS-2013B-Q-33	Menezes	BR	GMOS-S	AGN and nuclear cluster properties in Sc galaxies: a mini-survey	3.9
2	GS-2013B-Q-56	Metchev	US	GMOS-S	Weather on Other Worlds: Magnetic Fields or Clouds? (South)	14.8
2	GS-2013B-Q-57	Moskovitz	US	GMOS-S	Mission Accessible Near-Earth Objects Survey (MANOS) (South)	6.5
2	GS-2013B-Q-58	Neichel	GS	GSAOI	Dissecting a galaxy group at $z \sim 0.7$	2.3
2	GS-2013B-Q-59	Oesch	US	Flamingos 2	Emission Line Strengths and Gas-Phase Metallicities for the Massive Galaxy Population at $z \sim 3-4$	6.5
2	GS-2013B-Q-60	Piatti	AR	GMOS-S	Catching a hidden old SMC star cluster	1.0
2	GS-2013B-Q-61	Puzia	GS/US	GSAOI	The GeMS/GSAOI Galactic Globular Cluster Survey (G4CS)	13.5
2	GS-2013B-Q-62	Repetto	BR	GMOS-S	2D kinematic study of the nuclear component of NGC 1808 and the induced inflow.	3.0
2	GS-2013B-Q-63	Richtler	CL	GMOS-S	Isolated ellipticals - key objects for the dark matter problem?	10.0
2	GS-2013B-Q-64	Romita	US	GSAOI	Revealing the Properties of Embedded Clusters Beyond the Milky Way	10.0
2	GS-2013B-Q-65	Ryder	CL	GSAOI	GeMS Study of Supernovae in Luminous Infrared Galaxies	5.0
2	GS-2013B-Q-66	Sand	US	Flamingos 2	Constraining Type Ia Supernova Physics with Near-Infrared Spectroscopy (South)	12.7
2	GS-2013B-Q-67	Scarano Jr	BR	GMOS-S	Interactions vs. Spiral Arms Effects in the Oxygen Abundances of ESO194-G013 Galaxy	2.9
2	GS-2013B-Q-68	Schirmer	GS	GMOS-S	Green beans, quasar ionization echoes, and the evolution of AGN (South)	12.0
2	GS-2013B-Q-69	Schulze	CL	GMOS-S	A systematic search of supernova components in gamma-ray bursts	8.0
2	GS-2013B-Q-70	Sharp	AU/ CA	GMOS-S	Resolving cluster evolution	11.5
2	GS-2013B-Q-71	Stevenson	US	Flamingos 2	Validation of FLAMINGOS-2 for Exoplanet Research: The WASP-18b Case Study	10.0
2	GS-2013B-Q-72	Stubbs	US	GMOS-S	Spectroscopy of Galaxies in Massive Clusters: Galaxy Properties and Dynamical Cluster Mass Calibration	20.0

2013B Scientific Ranking – Gemini South (continued)

Band	Gemini ID	PI Name	Partners	Instrument	Title	Time
2	GS-2013B-Q-73	Webster	AU	Flamingos 2	Understanding the Physics of the Broad Line Region	13.4
3	GS-2013B-Q-74	B. Menezes	BR	GMOS-S	AGN and nuclear cluster properties in Sc galaxies: a mini-survey	11.0
3	GS-2013B-Q-75	Beers	US	GMOS-S	Missing metal-poor stars from the HK and Hamburg/ESO Surveys (South)	50.0
3	GS-2013B-Q-76	Bizyaev	US	GMOS-S	NEW DWARF GALAXIES IN THE LOCAL VOLUME/LOCAL GROUP	5.0
3	GS-2013B-Q-77	Bussmann	US	GMOS-S	Gemini-South Imaging and Spectroscopy of ALMA Lensed SMGs Discovered by Herschel	25.8
3	GS-2013B-Q-78	Cales	CL	Flamingos 2	PIT_HighzQuasars_GeminiS2013B	6.3
3	GS-2013B-Q-79	Gagné	CA	Flamingos 2	'Spectroscopic confirmation of very low-mass stars, brown dwarfs and planemo candidates in nearby, young moving groups	54.3
3	GS-2013B-Q-80	Kedziora-Chudczer	AU	Flamingos 2	Eclipse spectra of 'hot' Jupiters with inflated atmospheres.	8.1
3	GS-2013B-Q-81	Leggett	GS	Flamingos 2	A Study of the 450K Transition from T to Y Dwarf, and of the 350K Y Dwarfs. (South)	5.2
3	GS-2013B-Q-82	Minniti	CL	GMOS-S	Peering at the high-redshift nature of 10 unidentified hard X-ray sources	10.0
3	GS-2013B-Q-83	Rodriguez	CL	GMOS-S	Characterizing Young, Low-Mass Stars Near Earth	15.0
3	GS-2013B-Q-84	Rupke	US	GMOS-S	Verifying the Spatial Extent of QSO Outflows Discovered in Absorption	9.5
3	GS-2013B-Q-85	Ryder	AU	GMOS-S	The Type II In Supernova 1978K Revisited	2.9
3	GS-2013B-Q-86	Sales	US	GMOS-S	Mapping the Inner Structure of OH Megamaser Merger Galaxies	4.7
3	GS-2013B-Q-87	Sharp	US	GMOS-S	Resolving cluster evolution	4.8
4	GS-2013B-Q-88	Ahumada	AR	GMOS-S	A new template spectral library of Large Magellanic Cloud's star clusters	20.0
4	GS-2013B-Q-89	Beers	BR	GMOS-S	Missing metal-poor stars from the HK and Hamburg/ESO Surveys (South)	25.0

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.

- nighttime support of regular science operations
- daytime operations
including queue coordination, routine Head of Science Operations duties, Gemini Science Archive operations, and unscheduled daytime work
- instrument support
including instrument maintenance, troubleshooting faults and responding to instrument quality issues, defining calibrations and checkouts, performing nonroutine instrument tests, and instrument documentation
- user support
including direct program support, visiting observer support, response to Helpdesk, and regular semester activities to allocate programs
- improvement work and small operations projects
- research
- major development projects
including instrument commissioning
- transition projects
- management
- other operations
including scheduled non-project staff meetings, career development and training, and outreach activities

NORTH

Staff member	night	day	inst	user	opsimp	res	dev	trans	mgmt	Other ops	total
Adamson, Andy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.94	0.00	1.00
Chene, Andre-Nicolas	0.17	0.08	0.17	0.06	0.00	0.28	0.21	0.00	0.01	0.02	1.00
Chiboucas, Kristin	0.09	0.27	0.05	0.09	0.03	0.19	0.13	0.12	0.01	0.01	1.00
Geballe, Thomas	0.19	0.05	0.04	0.09	0.01	0.53	0.01	0.00	0.01	0.07	1.00
Guyon, Katherine	0.18	0.09	0.13	0.15	0.05	0.05	0.34	0.00	0.02	0.01	1.00
Hirst, Paul	0.00	0.14	0.00	0.00	0.00	0.02	0.00	0.77	0.00	0.06	1.00
Jorgensen, Inger	0.00	0.00	0.00	0.00	0.00	0.44	0.00	0.17	0.38	0.00	1.00
Kissler-Patig, Markus	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.96	0.00	1.00
Kleinman, Atsuko N.	0.00	0.30	0.00	0.02	0.00	0.19	0.00	0.45	0.00	0.04	1.00
Labrie, Kathleen	0.00	0.00	0.00	0.17	0.00	0.12	0.08	0.30	0.18	0.16	1.00
Lai, Olivier*	0.00	0.00	0.38	0.00	0.00	0.51	0.11	0.00	0.00	0.00	1.00
Kleinman, Scot	0.00	0.00	0.00	0.00	0.26	0.04	0.52	0.00	0.18	0.00	1.00
Leggett, Sandra	0.00	0.36	0.00	0.00	0.00	0.39	0.01	0.00	0.07	0.17	1.00
Lemoine-Busserolle, Marie	0.00	0.23	0.35	0.12	0.00	0.26	0.00	0.02	0.02	0.00	1.00
Mason, Rachel	0.01	0.09	0.01	0.00	0.03	0.70	0.14	0.00	0.01	0.00	1.00
Petric, Andreea	0.06	0.15	0.11	0.07	0.01	0.58	0.00	0.00	0.00	0.03	1.00
Placco, Vinicius*	0.13	0.00	0.14	0.05	0.00	0.49	0.15	0.00	0.01	0.03	1.00
Shih, Hsin-Yi*	0.19	0.00	0.05	0.00	0.00	0.76	0.00	0.00	0.00	0.00	1.00
Stephens, Andrew	0.05	0.05	0.08	0.16	0.10	0.06	0.36	0.12	0.01	0.00	1.00
Trujillo, Chadwick	0.00	0.03	0.07	0.00	0.00	0.32	0.02	0.00	0.06	0.49	1.00
AVERAGE	0.06	0.10	0.08	0.05	0.03	0.30	0.11	0.11	0.14	0.06	1.00

SOUTH

Staff member	night	day	inst	user	opsimp	res	dev	trans	mgmt	Other ops	total
Carrasco, E. Rodrigo	0.11	0.05	0.30	0.12	0.00	0.39	0.01	0.00	0.01	0.02	1.00
Conn, Blair	0.05	0.53	0.05	0.08	0.00	0.15	0.02	0.05	0.02	0.05	1.00
Diaz, Ruben	0.21	0.05	0.33	0.15	0.00	0.18	0.04	0.00	0.01	0.03	1.00
Garrel, Vincent	0.00	0.01	0.93	0.00	0.00	0.02	0.01	0.00	0.00	0.03	1.00
Gimeno, German	0.14	0.11	0.14	0.07	0.00	0.07	0.42	0.00	0.00	0.04	1.00
Gomez, Percy	0.05	0.00	0.51	0.07	0.01	0.29	0.01	0.00	0.04	0.02	1.00
Hartung, Markus	0.00	0.00	0.13	0.00	0.00	0.11	0.48	0.00	0.04	0.24	1.00
Hayward, Thomas	0.06	0.20	0.45	0.02	0.07	0.16	0.02	0.01	0.00	0.00	1.00
Hibon, Pascale	0.20	0.08	0.09	0.07	0.00	0.17	0.37	0.01	0.00	0.00	1.00
Hogan, Emma*	0.00	0.00	0.00	0.85	0.00	0.00	0.00	0.15	0.00	0.00	1.00
Levenson, Nancy	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.95	0.00	1.00
Madrid, Juan	0.00	0.06	0.00	0.75	0.00	0.18	0.00	0.00	0.00	0.01	1.00
Margheim, Steven	0.08	0.08	0.00	0.10	0.00	0.09	0.10	0.02	0.03	0.49	1.00
Miller, Bryan	0.00	0.01	0.00	0.01	0.01	0.73	0.16	0.03	0.01	0.04	1.00
Peshev, Peter*	0.20	0.09	0.12	0.05	0.00	0.52	0.01	0.00	0.00	0.02	1.00
Rantakyro, Fredrik	0.22	0.10	0.00	0.03	0.00	0.04	0.59	0.00	0.01	0.02	1.00
Schirmer, Michael	0.15	0.14	0.05	0.04	0.10	0.38	0.14	0.00	0.00	0.00	1.00
Sivo, Gaetano*	0.00	0.85	0.05	0.00	0.05	0.02	0.01	0.00	0.00	0.01	1.00
Turner, James	0.00	0.01	0.00	0.71	0.00	0.19	0.00	0.07	0.01	0.00	1.00
Winge, Claudia*	0.00	0.20	0.07	0.09	0.00	0.18	0.00	0.23	0.00	0.24	1.00
AVERAGE	0.08	0.13	0.17	0.17	0.01	0.20	0.13	0.03	0.06	0.07	1.00

* Less than full-time employment during 2014.

Table E-1: Research staff distribution of effort, by fraction.

**GEMINI
OBSERVATORY**
Exploring the Universe. Sharing its Wonders.

Appendix F. Organizational Chart



Gemini Observatory
Effective as of 11/18/2014

Appendix G. Report Requirements

Terms and Conditions

Requirement	Description	Fulfillment
a.i	Summary of achievements, including a comparison of actual accomplishments versus goals	4,5; Appendix I
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	Appendix B
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, 4.1
g.	Status report and plan for the new program year on the state of the Observatory	8
g.i	Scientific plans	8.2, 8.4
g.ii	Detailed technical plans and the potential impact on the observatory of these plans	8.2, 8.3, 8.4
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 2013B	GN 2014A	GS 2013B	GS 2014A
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)	4.9, Fig. 4-4		See Fig. 4-6			
3	Queue program completion fraction, by band (per telescope, per semester)	4.9, Fig. 4-2	Band 1 Complete: 75%	62%	51%	68%	51%
			Band 2 Complete: 60%	41%	27%	56%	55%
			Band 3 at PI Minimum: 80%	75%	57%	54%	72%
4	List of staff research and technical achievements, including prizes, awards, and invited talks	No special individual achievements to report.					
5	Number of peer-reviewed publications based on Gemini data	4.1, Appendix C	190/year	224 (131 based on GN, 127 based on GS)			
6	Number of peer-reviewed publications with Gemini Observatory staff as (co-)authors	Appendix B.1	20/year	82			

Appendix H. 2014Q3 Financial Report

See attached.

Appendix I. Completion of 2014 Program Plan

The original 2014 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 2014. The main report body provides more explanation of these activities.

Science and Engineering Operations in 2014

Regular operations to deliver science for users ... occupies the vast majority of effort at the Observatory.

[Regular operations tasks were completed as planned. The Gemini North shutter failure affected science program completion. \(See §4.7.\)](#)

Science and Engineering Operations Core Projects

Establish GeMS into regular science operations with a stable observing/staffing model (§4.3.1)

[GeMS was offered for regular science use, but the sustainability project was only 10% completed, as effort was directed to improve performance.](#)

Absorb the Phase II of the US community (§4.5) - completed

Commence the GPI Campaign (§4.3.3) - completed

Public release of quick-install GPI pipeline for non-campaign users (§4.4) - completed

Commence Large and Long Programs (§4.6) - completed

Inclusion of GMOS-S Hamamatsu CCDs in Gemini DR Package (§4.4) - completed

Community-wide release of the Astrodata/Recipe system (§4.4) - completed

Complete automation of operations software regression testing (§4.4) - completed

SynchroBus replacement design (§4.7)

[Deferred to address higher-priority obsolescence issues.](#)

Transition Program

Transition Program Core Goals

In addition to regular management of the Transition Program ([completed](#)), specific project goals for 2014 are listed here.

Base facility operations (§4.10.3)

- Subsystem detailed design reviews - [partial completion](#)
- Commission remote enclosure mode at Gemini South - [completed](#)
- Implement new environmental sensors at both sites - [partial completion](#)

Reduce science archive costs (§4.10.3)

- Design decision: negotiate contract with external provider or assess feasibility of in-house provision - [completed](#)

Information Systems license savings (§4.10.3) - completed

Hilo Base Facility (HBF) partial lease (§4.10.3) - cancelled

Real-time systems upgrades

- Design review of development environment - [completed](#)
- Design review of common support code base - [completed](#)
- Acceptance review of development environment - [completed](#)
- Acceptance review of common support code base - [deferred to 2016](#)

Queue Visualization (§4.10.3) - completed

QA Pipeline (§4.10.3)

- Release public desktop user version of Gemini Python package (including the QAP) - [completed](#)
- Pipeline mode for FLAMINGOS-2 imaging - [delayed](#)
- Pipeline mode for GSAOI imaging - [delayed](#)

Instrumentation and Facility Development in 2014

Development Core Goals

GPI (§5.1)

- Remediation servicing - [completed](#)
- Resume commissioning and verification - [completed](#)
- Complete commissioning and verification - [completed](#)
- Begin regular operations and Campaign - [completed](#)

GMOS CCDs (§5.2)

- Implement first set of Hamamatsu CCDs in GMOS-S - [completed](#)
- Procure and characterize the Hamamatsu CCDs for GMOS-N – [deferred to 2015](#)

GHOST (§5.3)

- Preliminary design phase kickoff - [completed](#)
- Preliminary design review - [completed](#)

Gen4#3 (§5.4)

- Review procurement alternatives - [completed](#)
- Issue call for proposals - [completed](#)

GSAOI Data Reduction Software (§4.10.3)

- Field distortion correction – [delayed](#)

Administration and Facilities in 2014

In addition to carrying out regular administration and facilities supporting activities ([completed](#); §4.11), completing the following projects is planned for 2014:

Financial Effectiveness and Efficiency

- Implement Transition Plan administration projects - [noted above with Transition Program and reported in §4.10.3](#)
- Cooperate with CAS to actively review and monitor conformance to requirements of CAS shared services provided to Gemini [§4.11 - completed](#)
- Cooperate with NOAO-S to actively review and monitor conformance of NOAO-S shared services provided to Gemini South as described in the Service Level Agreements [§4.11 – completed](#)
- **Administrative Policies and Procedures** [§6.3 – completed](#)
- Implement a system that enables all staff to access all policies and procedures through a single point

Financial Planning and Reporting [§4.11 - completed](#)

Public Information and Outreach in 2014

We will lead the flagship local outreach programs Journey Through the Universe in Hawai'i and Viaje al Universo in Chile ... combined with our AstroDay Chile, Starlab portable planetaria, Family Astro, and other long-running programming. [§6.1 and §6.2 – completed](#)

Annually, we expect to produce a minimum of 8–10 press or image releases ... We will and support multiple communications products for our user community. [§6.2 – completed](#)

- Integration of new “key strategic local community partnerships” metric to better evaluate local community outreach programming impact; [§6.1 – completed](#)
- Expanded effort to promote STEM and observatory career awareness in local host communities (Hawai'i and Chile); [§6.1 – completed](#)
- More effective and an expanded role of social and new media in Gemini communications efforts, and a goal to integrate the broader Gemini staff into social media effort. [§6.2 – completed](#)