GEMINI OBSERVATORY

Exploring the Universe, Sharing its Wonders

2009

ANNUAL PROGRESS REPORT AND PROGRAM PLAN OF THE GEMINI OBSERVATORY

ASSOCIATION OF UNIVERSITIES FOR RESEARCH IN ASTRONOMY, INC.

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SECTION A

DIRECTOR'S SUMMARY & OVERVIEW

A. Director's Summary and Overview

With the dawn of a new century, we are also at the dawn of a new era in the lifetime of one of the forefront astronomy research facilities existing today – the Gemini Observatory. The energy and anticipation of the construction period, which launched these marvelous machines nearly a decade ago, is morphing into a steady march of operations and discovery. Like other burgeoning research facilities, transitioning from construction to operations presents many challenges and is akin to switching from a regimen of running sprints to running marathons. We now strive to achieve long-term sustainability, while also maintaining our competitive advantage. In the future we are now shaping, we will capitalize on the unique strengths built into the Gemini telescopes, leverage off synergies with other facilities, and skillfully allocate our finite resources with an objective of maximizing the quality and quantity of our scientific product.

A central element of this future includes developing advanced new instrumentation to meet the needs of Gemini's diverse and demanding community. Technology is the backbone of many of the advancements made in astronomy. Technology both enables and limits our discovery horizon, and national facilities like Gemini must strive to achieve a balance in the technology that it offers and develops to ensure that a baseline of competitive instruments is always available, while also pushing some frontiers to catapult research in bold new directions. This balance is never easy to achieve, but essential for the long-term vitality and sustainability of Gemini, and it is reflected in the blend of instruments now offered and planned for development at Gemini. While the exact details of the next generation of instruments remain undefined, what is clear is that we will provide our community with a combination of advanced laser based adaptive optics systems and "work horse" instruments, capable of effectively supporting a wide range of optical, near-, and mid-infrared programs.

The investments made in developing our sophisticated queue-based science operations will be further leveraged, with the core objectives being to reduce the burden on astronomers to develop their observing programs, while also increasing the amount of data delivered to scheduled programs. Data management will be further enhanced through the Gemini Science Archive (GSA) and data reduction will be better supported through new releases of reduction software and recipes. Essential to all of this activity will be the maturing of Gemini's internal planning system that links and coordinates activity observatory-wide, promotes a working culture of open communication and accountability, and enables the wise allocation of resources to achieve our objectives. These signs of growth and evolution are all manifestations of a maturing observatory, rightfully taking its place alongside contemporary facilities that collectively serve as our primary portals on the Universe.

As has been articulated in previous Annual Reports, Gemini has been one of the most powerful tools for astronomical research over the past decade. Our plans for the coming decade will ensure that Gemini stays in the forefront of research for the astronomical community. But equally important is the immense value of Gemini's ability to educate and inspire the public at large, young and old, most of whom have never had the opportunity to look through a telescope of any size. Gemini is literally a nexus of past, present, and future generations, fused by their common quest to discover themselves in the context of something much grander than our limited senses allow us to perceive.

In the pages that follow, a myriad of performance metrics and publication statistics are described, quantifying the current and proposed future capabilities of the Gemini Observatory. While important to gauge the technical progress and scientific promise of Gemini, these metrics should never be confused

with *why* Gemini is important. That is a completely different matter, which grounds our mission and guides our purpose – *Exploring the Universe, Sharing its Wonders*.

A.1 Observatory Vitals and Key Strengths

Many entities encompass the Gemini Observatory – from the international Partner agencies that created and sustain it, to the people that operate it, to the technology that enables it, to the creativity of the research community that harnesses it. Here we describe the basic "ingredients" of Gemini and what distinguishes this observatory from so many others.

A.1.1 The Gemini Partnership

When confronted by the persistent great unknowns of the Universe, a key facet of the human spirit is our ability to look beyond the barriers of today and dream. It was such a dream that led to the Gemini Partnership and the Observatory. More than 15 years ago AURA, with the NSF, was instrumental in assembling an international group of astronomers and technologists who believed that they could build a unique, powerful, ground-based observatory with two telescopes, one in the Northern Hemisphere and the other located in the Southern Hemisphere. Each telescope's clarity of vision would rival that of the Hubble Space Telescope (HST), with a vast single-piece mirror with at least four times the collecting area of then-existing telescopes.

As a result of these efforts, in 1993 the United States, United Kingdom, Canada, Chile, Argentina, and Brazil came together to form the government-to-government international Gemini Partnership. The current Partners are the United States, the United Kingdom, Canada, Australia, Brazil, and Argentina. Table A-1 shows the national astronomy research funding agencies that compose the international Partnership under the International Gemini Agreement. They are listed in the order of their respective partnership shares.

Country	National Agency
United States	National Science Foundation (NSF)
United Kingdom	Science and Technology Facilities Council (STFC)
Canada	National Research Council (NRC-CRNC)
Australia	Australian Research Council (ARC)
Brazil	Ministério da Ciência e Tecnologia (MCT)
Argentina	Ministerio de Ciencia, Technología e Innovación Productivia (MCTIP)

Table A-1 – The current Gemini partner agencies are listed, in order or partner shares (largest to smallest).

A.1.2 Twin 8-m Telescopes

Each of Gemini's two telescopes has a high-quality, 8-meter monolithic primary mirror. These highly automated telescopes incorporate active and adaptive optics to produce very high-resolution systems. Moreover, they take advantage of two of the highest-quality developed observing sites on the planet and collectively provide full coverage of both the Northern and Southern skies. Gemini's most widely known distinction among other 8-10-m class observatories is its highly optimized infrared (IR) design.

The telescopes employ sputtered multi-layered silver coatings on their primary, secondary, and tertiary mirrors that, together with other facets of their design, achieve extremely low emissivity, diffraction-limited performance at near-infrared (NIR) and mid-infrared (MIR) wavelengths, and smooth stable point-spread functions (PSF). This performance combination leaves Gemini as the world's most sensitive ground based telescopes at thermal infrared wavelengths.

The Gemini-North telescope is one of the four largest Optical/Infrared (OIR) telescopes that stand in the summit region of Mauna Kea some 4,175 m (13,700 ft) above sea level on the Big Island of Hawai'i. Mauna Kea's summit is renowned as the world's premier Northern Hemisphere observing site, being surrounded by a thermally-stable tropical sea, bathed in dry trade winds above the inversion layer, atop a massive mountain with very gradual slopes, and in the absence of major sources of light pollution. In the south, sharing much of the common infrastructure with the other AURA-managed facilities on Cerro Pachón and nearby Cerro Tololo, the Gemini-South telescope stands on a ridge in the Andes at 2,743 m (9,000 ft) elevation on Cerro Pachón. Located some 300 m from the 4-m SOAR (Southern Observatory for Astrophysical Research) telescope, Gemini South's location has proven to be one of the best-developed observing sites in the Southern Hemisphere.

Each telescope feeds a modern suite of imagers and spectrometers, which collectively provide the Gemini community with access to most of the optical, near-infrared, and mid-infrared ground-accessible spectral windows. Each telescope nominally mounts three instruments concurrently, plus an adaptive optics (AO) system that can feed any instrument, and a calibration system, all on a Cassegrain turret. Redirecting the beam with a movable mirror allows almost instantaneous instrument changes and on-the-fly responses to changing sky or instrument conditions, or time-critical observations. The instruments are normally mounted for periods of many months, which avoids lost observing time due to frequent remounting. The instruments are highly integrated into Gemini's control systems and facilitate queue as well as classical observing.

Gemini's Hilo Base Facility (HBF) is located on the University of Hawai'i-Hilo campus. It is the headquarters for the Gemini directorate and the administrative core for Gemini North. The facility provides office and lab space for science, engineering, and administrative staff, and supports data processing and other operations needs. Like its counterpart in Hilo the Gemini-South Base Facility (SBF) overlooks the Pacific Ocean but from La Serena, Chile. The SBF provides office, lab, and meeting space for science, engineering, and administrative staff, network and data-processing equipment, and a remote operations room. It is located within the same gated compound as the operations bases for the AURA operated CTIO (Cerro Tololo Interamerican Observatory) and SOAR observatories.

A.1.3 Queue-Based Science Operations

Gemini's rapidly reconfigurable multi-instrument system has proven both very efficient and effective as the operational backbone behind Gemini's queue mode. The scientific ranking of a program determines its priority for execution and each is completed under the sky conditions it requires. In summary, queue based operations rely upon the Observatory staff conducting researchers' observations by executing preprogrammed scripts that are designed by the researcher to define, in detail, how a program should be carried out. This is in contrast to the classical approach of awarding fixed blocks of observing time, locked to fixed dates in the traditional style that has dominated past practices. When appropriate to the study in question, a queue-based model makes more efficient use of highly oversubscribed observing time (e.g., best seeing conditions or relatively rare low-water-vapor conditions). In this way, observations and calibrations can be more optimally utilized across multiple programs, enhancing the science productivity of the Observatory on behalf of the entire partnership.

Notwithstanding the advantages of queue-type approaches, there remain a number of scenarios where hands-on observing by a Principal Investigator (PI) team may well be the better choice. These include programs that involve new, experimental observing procedures, the training of young scientists,

technology explorations, and the commissioning of instruments. Gemini is fully equipped to support these modes as well, and the Observatory, on the advice of the Time Allocation Committees, routinely allocates a fraction (currently ~10%) of available science time to classical observers. Moreover, these programs are extremely useful for maintaining direct contact with the community and for the community to remain familiar with the Observatory and its staff.

A.1.4 A World Class Staff

The key to Gemini's success to date is in large part attributable to the remarkable staff of the Observatory. Our people are diverse, competent, and fiercely passionate about ensuring that we provide the highest quality scientific product possible. A colorful electronic mosaic of staff photos greets Gemini visitors entering the lobby of either of our offices in Chile or Hawai'i (Figure A-1). It emphasizes both our pride in their individual contributions and their unity as a team, though distributed across 10,500 km and seven time zones.

Figure A.1 - Visitors to Gemini are first greeted in our lobbies with a colorful scrolling photo gallery of everyone on the staff, reinforcing that despite their geographic distribution and diverse heritage, we function as a single team.

The diversity of Gemini's staff, which includes men and women from over 20 countries, is a reflection of the innate diversity of the international community we serve. Gemini not only recognizes, it relies on, the diversity of ideas that flow from the staff and community to ensure that we remain world class in our approach to operating these marvelous machines. It is through our staff and the strong support of Gemini's international partnership that Gemini has achieved many distinctions from the backdrop of other 8-10-m class facilities. In summary these include:

- Gemini is the only major ground-based observatory capable of targeting any object in the sky.
- Gemini's science operations queue is world class in its efficiency, achieving open shutter and acquisition times that are second to none.
- Gemini's ability to react to targets of opportunity is exceptional as demonstrated by our observations of supernovae, Gamma Ray Bursts (GRBs), and planetary phenomena.
- Data are distributed in a matter of minutes from each telescope to the Gemini Science Archive (GSA) nightly, making it possible for Gemini PIs to access their data with speed and ease.
- Gemini's thermal-infrared performance is unmatched, due in large part to the advanced four-layer silver coatings and highly optimized telescope design that together yield an exquisite infrared platform.
- Gemini's investment in adaptive optics technologies will provide both telescopes with advanced laser adaptive optics systems, the hallmark of which will be the multi-conjugate AO (MCAO) system at Gemini South.
- The scientific output and impact of research conducted at Gemini position the Observatory and its highly talented user community at the forefront of contemporary astrophysics.

Collectively, between the unique skills of those that steward Gemini 24/7 and the creativity and ingenuity of the research community that taps the power of Gemini nightly, the future of Gemini is surely bright.

SECTION B

Gemini Science Achievements, Users & Staff Research Programs

B. Science Achievements

Operating from both hemispheres, the Gemini Observatory provides facilities with excellent performance through a broad range of capabilities in the optical and infrared spectrum. Gemini is truly unique in several areas. Its two telescopes are the most sensitive mid-infrared ground-based facilities in the world, offering both imagers and spectrographs. Gemini provides its users with unique high-spatial-resolution spectroscopy capabilities with three integral-field units (optical and infrared), which may be employed with adaptive optics in the infrared or natural seeing at all accessible wavelengths. Gemini also offers a powerful and efficient cross-dispersed spectrograph that allows one-shot coverage from 1-2.5 µm at moderate resolution. Starting in 2010 infrared imagers will be available at both sites that either support high-resolution AO observations or wider fields with plate scales tuned to natural seeing.

Gemini's observing model includes a well-tuned multi-instrument queue-observing system that efficiently fulfills users' observing requests, while ensuring that both the sky conditions and the observatory's systems simultaneously satisfy the users' defined observing requirements. In addition, this system has made Gemini one of the most effective Target of Opportunity (ToO) observing systems available, both for fast response targets (e.g., transients like GRBs) and slow-response follow-up targets (e.g., distant supernovae or newly discovered asteroids). This is further enabled by the average 15-minute data-delivery time from the GSA to the PIs. Gemini also welcomes classical observers. Although they are relatively few, classical observers ensure that programs requiring special acquisition procedures or immediate PI data assessment are executed correctly and efficiently. Classical observing also provides unique opportunities for face-to face interaction between the users and the observatory.

An innovative time exchange program between Gemini, Keck, and Subaru also exists which expands the range of facilities available to each of these communities. Up to five nights per semester have been exchanged between observatories through this program for the past several years. A number of recent and significant Gemini science results are highlighted below. (Figures shown are extracted from the paper, unless credit is indicated otherwise.)

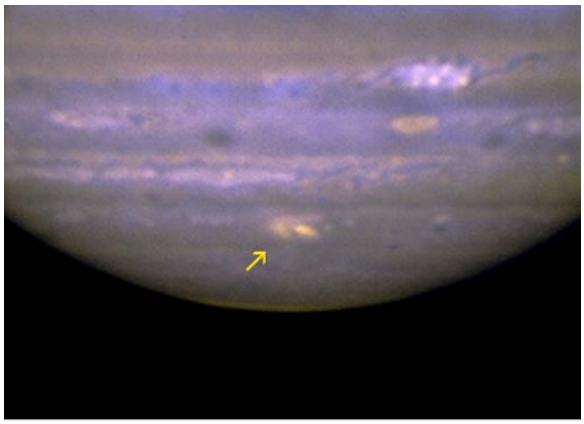
Figures B-1 and B-2 illustrate several research areas that take advantage of Gemini as a high-resolution infrared-optimized platform that is capable of being reconfigured and pointed toward targets of opportunity with exceptional speed and efficiency. For example, it is not unusual for a ToO trigger to be received at Gemini North, where our near-infrared imager (NIRI) may be in the middle of an integration, and within 10-15 minutes of receiving the trigger by a PI anywhere in the world, the GRB is centered in a Gemini multi-object spectrometer (GMOS) slit and optical spectroscopy is underway. Thanks to investments in Internet2 fiber links and the Gemini Science Archive, those data are transmitted to the GSA within

Figure B-1: Trends in future research conducted at Gemini can be extrapolated from recent results that leverage Gemini as a nimble high-resolution platform for conducting infrared observations of faint/distant objects.

5-10 minutes of completing the observation, from which an anxious PI can download them for analysis.

This type of rapid response capability is substantially rooted in Gemini being originally designed to switch *on the fly* to optimally match programs in the queue with changing weather conditions. In practice, these design features also have left Gemini with a unique capability, and obvious synergies with future synoptic survey facilities like Pan-STARRS, VISTA, and LSST. Using this capability Gemini North recorded truly ancient photons emitted from GRB 090423, as shown in the top pane of Figure B-1.

NIRI played an important role in demonstrating through photo-z measurements that this GRB was the most distant source ever detected, except the Cosmic Microwave Background. As powerful probes of the conditions of the early Universe, we expect similar observations of GRBs in the future, which will push to even greater distances and provide insight into the first generation of stars that formed after the Big Bang.



ImageCredit: Imke de Pater (UC Berkeley), Heidi B. Hammel (Space Science Institute), Travis Rector (University of Alaska Anchorage), Gemini Observatory/AURA

Figure B-2 – The recent comet impact of Jupiter is a good example of the flexibility of Gemini's queue based science operations. On the first opportunity to view the impact site since its discovery, MICHELLE was used on Gemini-N to record this mid-IR image of the impact site in Jupiter's upper atmosphere. This single image beautifully illustrates several key strengths of Gemini Observatory (fast response, image quality, infrared optimized).

The other area of future research that Figure B-1 portends is in the field of exoplanets. In the span of about six months, research conducted at Gemini led to the announcement of the first exoplanet orbiting a star of similar mass to our own Sun (central pane of Figure B-1) and then, even more importantly, a trio of exoplanets orbiting a nearby star (HR8799, in the bottom pane of Figure B-1).

This single image of an exoplanetary *system*, first discovered at Gemini and confirmed through observations at several other facilities, beautifully captures the discovery potential of Gemini. It also brings into light the type of breakthrough research that should be possible with the Gemini twins, as originally envisioned by those who designed Gemini, long before ground was first broken on the summits of Cerro Pachón or Mauna Kea.

The historical context of this single image of HR8799 is profound. The last time an image of a planetary system was first released to the public was 400 hundred years ago through the sketches Galileo made of Saturn, Jupiter, Mars, and Venus. Given that this image was taken without the use of Gemini's most formidable tools for exoplanet research bodes well for this field in the future when Gemini's Near Infrared Coronagraphic Imager (NICI) and Gemini Planet Imager (GPI) are used at Gemini South in comprehensive exoplanet surveys.

The NICI exoplanet survey is now underway and the GPI survey will be executed during the 2011-2015 timeframe, the latter holding the promise of not only detecting significant numbers of self-luminous Jovian class planets, but for the first time it will be possible to characterize their compositions, masses, and luminosities. In other words, research conducted at Gemini will help take exoplanet research from the *census process* of the past decade (i.e., mainly counting planets and inferring their properties) to actual demography *characterizing* them through direct imaging and spectroscopy.

Other research areas abound in Gemini's future, between the limits of the nearby exoplanets and the most distant GRBs. The combination of a laser-based MCAO system and an 8-m class telescope in the Southern Hemisphere makes the Galactic Center an obvious target in the future. We anticipate making considerable strides over the next few years in research on this complex and mysterious region of our own galaxy.

Thanks to Gemini's multi-conjugate adaptive optics system, it will be possible to tile the region around SgrA* with exquisite imaging resolution and stability, enabling astrometric measurements on a significantly larger scale than has been practical using the single-laser beacon technologies currently available. Some of the most compelling evidence to date for the existence of a massive black hole in the center of our galaxy has emerged from such AO observations (Ghez *et al*. 2005). With MCAO on Gemini South, it will be possible to map the complex dynamics of a much larger swath of space surrounding the galaxy's potential well. This will provide insight into the possible existence of other black holes in the vicinity, the complex nature of star formation in such a chaotic and highly energetic region, and the chemical composition and evolution of stars populating this dense region of space.

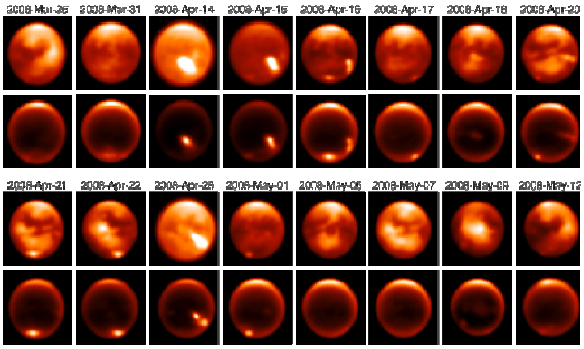


Figure B-3: Gemini NIRI/ALTAIR adaptive-optics image sequences of Titan in several bands show the obvious tropical storm on 2008 April 14 rotated back to observable limb on April 28.

B.1 Tropical Storms on Titan

Enabled by the Gemini queue observing system, Titan has regularly been imaged in the infrared using adaptive optics at Gemini North for systematic ongoing monitoring of its weather for the last six years. The first bright, transient, tropospheric clouds have recently been observed in the tropical latitudes of Titan (Figure B-3). The extent of the cloud system is ~15 degrees in latitude. This initial pulse of cloud activity generated planetary waves that instigated cloud activity at other latitudes across the moon that had been cloud-free at least several years. The Cassini surface map shows that the storm is located in an unremarkable region; and it is *not* a site of cryo-volcanic activity observed earlier with Gemini and Keck. These new findings may explain the presence of dunes, and methane-carved rivers and channels near the Huygens landing site – without the need to invoke once-per-century storms (Schaller et al. 2009).

B.2 Imaging Exoplanets

The last quarter of 2008, Gemini played a leading role in obtaining *first images* of Jovian planets around solar type stars. The centerpiece of this effort was the discovery of the first multiple-planet family around the 60-million year-old F2-type star, HR 8799 (Figure B-4). Coordinated imaging with the Keck and Gemini-North telescopes characterized this multi-planet system. The planets are at separations similar to Uranus and Neptune (~ 20 and 40 AU) and have masses between 3 and 13 $M_{Jupiter}$. Adaptive optics, combined with a special observing technique (angular differential imaging) that removes the effects of optical aberrations, and powerful processing algorithms, that were fine tuned in the previous Gemini Deep Planet Survey

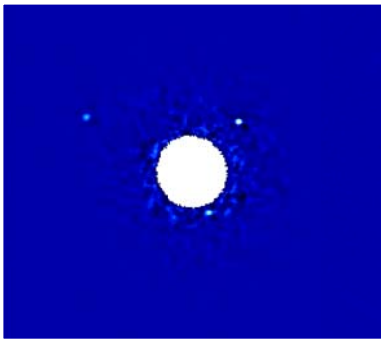


Figure B-4 - This September 2008 2.2 µm Gemini/ALTAIR NIRI image shows the HR 8799 planetary system. The Keplerian orbital motion of all three planets is counterclockwise.

(Lafrenière et al.2007), were essential to this stunning breakthrough (Marois et al. 2008).

B.3 Smashing Planetary Embryos

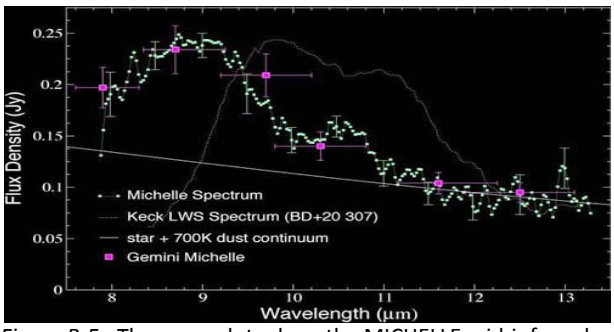


Figure B-5 - The green dots show the MICHELLE mid-infrared spectrum of HD 23514 obtained with the Gemini North Telescope. Another dusty star spectrum (dotted line) is shown for comparison. The line represents the added contributions from the star spectrum and the continuum emission from dust at 750K. The bumps above it are due to various minerals, especially silicates, in the dust.

Mid-infrared spectroscopy of the Pleiades from Gemini North has revealed the formation of young rocky planets around the star HD 23514 in this 100-million year-old star cluster (Figure B-5). This star had been identified by its unusual infrared excess, as measured by the Infrared Astronomy Satellite. The dust temperature of 750K derived from Gemini observations indicates that the material is located in the terrestrial planet zone between about ¼ to two astronomical units from the parent star. Rhee (University of California Los Angeles) and his colleagues propose that the dust properties betray catastrophic collisions in an evolving young planetary system around an adolescent-age solar-type star. The current collision processes are estimated to have generated a mass of debris comparable to the collision that generated the Earth's Moon nearly 4.5 billion years ago (Rhee et al. 2008).

B.4 The Most Distant Object?

Gemini's two telescopes provide rapid transient follow up from both hemispheres. Rapid near-infrared imaging follow-up from Gemini North and Gemini South provided key photometry revealing that Gamma Ray Burst 090423 is currently the most distant object ever seen in the Universe (Figure B-6). With its visible light completely absorbed by early-universe intergalactic hydrogen gas, this GRB was glowing brightly in the near infrared. Photo-z measurements from the NIRI (and UKIRT) images and subsequent observations at VLT indicate that the host is at a record redshift z = 8.3. This object shows that massive stars were being produced, and dying as GRBs only about 625-million years after the Big Bang (Tanvir et. Al. 2009).

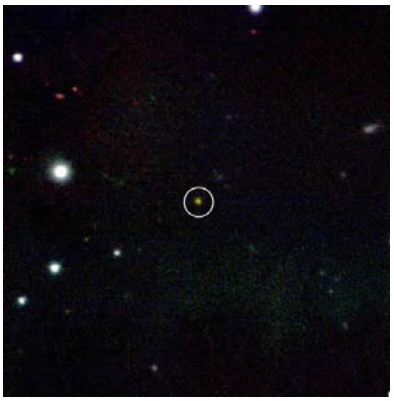


Figure B-6 - Figure 3-2: The fading infrared glow of GRB 090423 is in the center of this Gemini North NIRI image. D. Fox and A. Cucchiara (Penn State Univ.) and E. Berger (Harvard Univ.).

Finally, the Observatory would like to highlight the significant spectroscopic follow-up contributions made by both Gemini telescopes (with the Keck, VLT, and Magellan telescopes) to the Supernova Legacy Survey (SNLS). The goal of SNLS was to produce a definitive sample of distant type-Ia supernovae to distinguish between the different theories of dark energy. Gemini provided spectra for 230 objects of the 400 spectroscopically confirmed supernovae, requiring 500 hours over five years.

"Gemini's key role was to provide spectroscopic redshifts and classification of the SN types for the most distant (hence faintest) supernovae candidates. The nod and shuffle mode on GMOS made this possible by greatly reducing systematic effects associated with sky subtraction." – Isobel Hook (Oxford University)

B.5 Community Users Research Programs (Semesters 2008B and 2009A)

The Gemini North and South telescopes were operated predominantly in queue mode for Semesters 2008B and 2009 A. Of the 251 programs scheduled on Gemini North during these two semesters 94% were queue scheduled while 91.3% of 195 Gemini South programs were queue scheduled. This includes exchange programs with Keck and Subaru which must be classically scheduled.

There were a total of six classical programs scheduled on Gemini North in 2008B, two of which were part of the time exchange with the W.M. Keck Observatory and one which was part of the time exchange with the Subaru Observatory. The Gemini community had one program scheduled on Keck and five on Subaru in 2008B. There were six classical programs scheduled on Gemini South during Semester 2008B. Of these, two were part of the time exchange program with Subaru and one was part of the time exchange program with Keck.

In 2009A the number of classical programs on Gemini North increased to 9 including two Subaru exchange programs. The Gemini community had two programs scheduled on Keck and four programs on Subaru as part of the time exchange with these observatories. There were eleven classically scheduled programs on Gemini South in 2009A, including one Subaru exchange program and two Keck exchange programs. Most of the non-time exchange classical programs scheduled in semesters 2008B and 2009A originated from the US. Most of the other Gemini partner countries had no classically scheduled programs.

Semester 2008B also saw the start of the NICI planet finding campaign. NICI is a high-contrast AO-imager specifically designed to detect faint planets within 1 arcsecond of nearby stars. This program will continue until at least Semester 2011A.

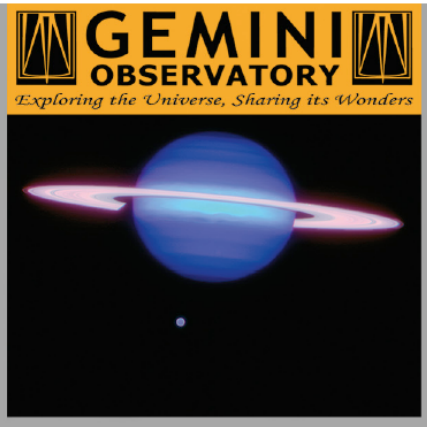
Scheduled programs can be found as a PDF document at:

http://www.gemini.edu/files/governance/annual_reports/2009/AppendixI.pdf

Gemini Staff Research Programs in 2008B and 2009A

During the year covered by this report, Ph.D. astronomers at both Gemini South and North sites were active in several research programs – many done in collaboration with community members. The programs cover a wide-range of astrophysical topics from our own solar system to merging distant galaxy clusters. The list below provides a representative sample of the areas of research investigated using the suite of optical, near-infrared and mid infrared instruments on both Gemini telescopes:

- Primordial materials on the most primitive solar system objects
- The spatial behavior of the unidentified molecular bands in planetary nebulae
- Black holes and the nature of tori in active galactic nuclei
- Ages and abundances of cluster galaxies at a redshift of 0.3
- Spectroscopic studies of high proper-motion brown dwarf candidates
- Kinematics and stellar populations of the most massive galaxies
- Determining the ages of old white dwarf stars
- Surveying the gas phase of post-AGB stars
- Late-time observations of the extremely bright SN 2008es



SECTION C

Gemini Observatory Plan

2009 Overview & Status Reports

C. 2009 Observatory Plan Execution & Accomplishments

In the following sections brief summaries are provided to spotlight a cross section of projects that were pursued on during the reporting period in an effort to provide the reader with "snapshots" of activity across the entire observatory. All of these projects are listed in the table at the end of this section, which provides project names and percent completion statistics for each project sorted according to the various functional branches of Gemini. In this annual report, these completion statistics reflect work through the end of 2009. This type of clear-cut reporting is intended to provide our community, funding agencies, and all of Gemini's stakeholders with good visibility into the basic performance of the Observatory.

C.1 Instrumentation

DEV08-15: WFMOS and the Aspen Program

The Observatory completed the design study phase of this project, on schedule and budget, which came to a head through a down-select review in March 2009. Comprised of scientific, engineering, and program management experts, an independent review committee recommended that the JPL led WFMOS team's proposal be carried forward for consideration by the Gemini Board for funding. The Observatory agreed with this recommendation and, during the May 2009 Gemini Board meeting, presented the results of the multi-million dollar WFMOS studies to the Board for funding consideration. The Board's response is captured in their resolution -

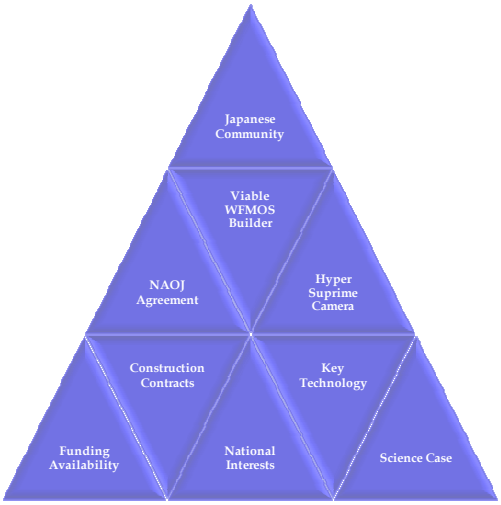


Figure C.1 – The work conducted as part of project DEV08-15 was actually just a subset of a broader effort to secure all of the elements needed to carry the WFMOS project forward. Other elements of this effort included working closely with NAOJ and the Japanese community to embrace WFMOS, the HyperSuprime Camera project, which enabled WFMOS through technology synergies, developing key technologies, etc. Of these elements, the cost of WFMOS exceeded the funding available across the Gemini Partnership, resulting in the termination of the project.

"The Board recognizes there is strong science support in the Gemini community for the development of WFMOS, intense interest in developing an effective collaboration with NAOJ, and strong science motivation for the project. However, WFMOS has significantly increased in cost, and the Gemini Partnership can identify neither the necessary resources to proceed to WFMOS PDR, nor the totality of funds required in the out years to successfully complete the instrument. The Board regretfully terminates the WFMOS Aspen initiative.

The Board unequivocally endorses the GPI project as the completion of the Aspen program."

It is important to note that not only was WFMOS terminated, but the entirety of the Aspen program sans the Gemini Planet Imager. A few lessons learned are worth noting given the enormous importance of the Aspen program for Gemini and, accordingly, the implications of not going forward with it. First, Aspen was a "blue sky" approach to developing a strategic plan. While well intended it was not bounded initially by hard budget constraints. Those were eventually set but, in time those budget constraints contracted, eventually making it impossible go forward with the program. Second, the intent of the

Aspen program was to capitalize quickly on the investments made in new pair of 8 m telescopes. It was designed to establish Gemini's scientific legacy early, before the era of JWST and the ELT's. Accordingly Aspen produced instrument concepts that were vastly more expensive than the first generation of 8 – 10 m class instruments - a "moon shot" by previous instrument standards. A $75M "planning budget" was established and "pay as you go" approach adopted rather than firm funding commitments. In practice, funding was provided ~1/2 as fast as needed, which slowed down the program badly, yet astronomy moved on. All of this, combined with a global economic crisis and a Gemini Partnership that is in a state of transformation (International Agreement expiring), arrived at the worst possible time and collectively led to the termination of the Aspen program.

DEV08-33 - GMOS-N CCDs

Excellent progress was made during the reporting period on the procurement of new CCDs for GMOS-N. These detectors are intended to replace the E2V CCDs originally supplied with GMOS-N nearly a decade ago, allowing Gemini's community to push much deeper into the universe in search of high-z quasars and galaxies. They are fully depleted CCDs, yielding much higher red photon capture efficiencies than previous CCD technologies using partially depleted layers in the CCD's structure. They have a slightly larger pixel pitch than the current GMOS CCDs, which will yield a different plate scale when deployed in GMOS, but the GMOS optics are compatible with these devices and the impact of this difference will be handled via the commissioning of these new detectors, which is currently planned for 2010. With the Gemini procurement of these detectors essentially completed (a final assessment of their performance remains), the Hertzberg Institute of Astrophysics in Victoria, Canada is now contracted to integrate them into a single mosaic focal plane, using a test dewar Gemini provided and a new array controller which has the necessary high voltage capabilities to drive these CCDs. It will feature 12 output amplifiers, yielding much faster readout times than the current GMOS array controller and E2V CCDs yield.

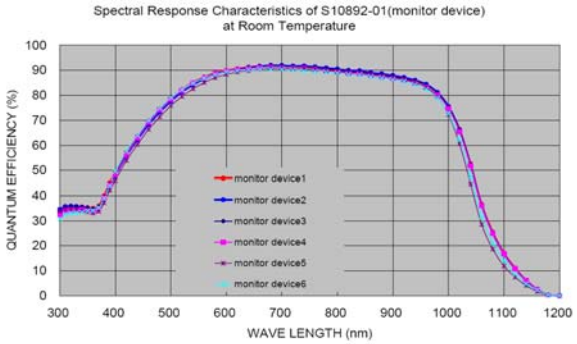


Figure C.2 – QE plots for the actually CCDs purchased for GMOS-N are shown. Note the extraordinary red sensitivity of these devices, reaching ~75% QE at ~1 µm.

C.2 Administration

DIR09-003 - Energy Conservation and the "Greening" of Gemini

Though formally listed as a Directorate level project, the bulk of the effort expended in this project was performed through the Administrative group, in concert with essentially all observatory branches, hence its summary in this section. This year marked the beginning of the greening of Gemini, which has knock-on benefits across the observatory. Some of the early tangible aspects of this project included replacing older A/C units in the HBF with modern, more energy efficient A/C systems. Not only do the new units use less power, but they yielded rebates from the local

Figure C.3 – Gemini's green initiative started with a "green blog" which was used to gather a plethora of ideas from the staff about how Gemini can cut power usage, recycle more effectively, etc.

electric company. In addition, the "tall poles" in the energy budget of the entire observatory (base and summit facilities) were analyzed and the summit chillers on Cerro Pachon were reprogrammed to switch on/off at different times to not only reduce power consumption but yield a better match between dome and external air temperatures, yielding (theoretically) better delivered image quality at Gemini-S. In Hawai'i this project (which is a multi-year effort) includes the initial steps in seeking LEED certification of the HBF, which will provide an independent assessment of the HBF's design as an efficient and environmentally responsible facility. Gemini's green initiative goes well beyond power consumption though, and includes extensive recycling opportunities (paper, batteries, etc.) for the entire staff, discontinuation of the use of paper cups (the staff donated ceramic cups for general use), the use of motion sensing light switches, evaluation of ultra-efficient LED lighting, etc.

In the end we anticipate that this initiative will leave Gemini with a significantly more energy efficient and environmentally friendly work place for the benefit of our entire staff. Beyond near term benefits though, this initiative is one of many in which Gemini is demonstrating singular leadership in astronomy by pushing in new directions that heretofore have either received inadequate attention in astronomy or are being developed to support the unique aspects of Gemini's mission.

DIR09-005 – Hiring & Training of New Deputy Director

During 2009 an essential recruitment was completed when Dr. Nancy Levenson from the University of Kentucky was hired as Gemini's new Deputy Director. She started in July 2009 in Hawai'i before transitioning full time in Chile. With degrees from Harvard, Oxford (Rhodes Scholar), and UC Berkeley, Dr. Levenson brings an impressive set of credentials to Gemini and quickly demonstrated an exceptional ability to grasp the complexities of an organization like Gemini.

Figure C.4 – Dr. Nancy Levenson joined Gemini as our new Deputy Director in 2009. She represents Gemini in Chile on behalf of the Directorate and also serves as our Head of Science.

Like her predecessor, Dr. Jean-Rene Roy, she represents the Gemini observatory in all matters in Chile. This crucial position is consistent with Gemini's splitting of the Directorate positions evenly between both sites, with the Director, AD for Administration, and AD for Development stationed at Gemini-N, and the Deputy Director, AD for Engineering, and AD for Science Operations at Gemini-S. Establishing this bilateral reliance across sites is an important part of firmly establishing our "two telescopes, one observatory" which has decision making authority split across sites.

Though not formally part of this project, in addition Gemini recruited a replacement for Dr. Joe Jensen, Gemini's former Head of Instrumentation. Today Dr. Eric Tollestrup now works at Gemini as our new AD for Development, the distinction between Head of Science and AD for Development primarily being that the AO program (in addition to the instrument program) all falls under a single person. Dr. Tollestrup joined us from the NASA Infrared Telescope Facility on Mauna Kea, where he served as Deputy Director, and has decades of experiencing building facility class instrumentation.

HR09-005 - Employee Newsletter

Improving communications across Gemini's diverse and highly distributed staff, to maintain our operating paradigm of "two telescopes, one observatory", requires effort essentially on a daily basis and on a myriad of fronts. This single aspect of Gemini, i.e. keeping everyone pointed in more-or-less the same direction, sensing a common direction to fulfill a joint mission, is arguably one of the most challenging from a management perspective. Accordingly Gemini's HR team launched a new project in 2009 to release an internal newsletter which provides an abundance of information for our staff. Each newsletter starts with an article by a member of Gemini's directorate, consistent with the directorate's commitment to improve their communication with the staff through a variety of mechanisms. Short essays are generally provided which give background information about new members of Gemini's staff, updates on activities of broad interest at Gemini, reminders of important dates approaching, birthdays, a forum for the staff to express their views on happenings at Gemini, and much more.


GEMINI OBSERVATORY
Exploring the Universe, Sharing its Wonders

The Observer
April 2009

In this issue:
Announcements
Directorate Connect
At Large
Getting to Know...
The Latest
Sustainable Gemini
HR Corner

Suggestions? Comments? Material? Please send to gmagnuson@gemini.edu

Directorate Connect

The power of words, when carefully chosen and skillfully delivered, has never ceased to amaze me. Words capture concepts and allow us to share meaning in vastly more sophisticated ways than any other tool at our disposal. Words crystallize our sense of being and, through them, we are able to alter the sense of being in those hearing them. Perhaps one of the best current examples of this is the new US president who is able to penetrate complex issues and explain them in ways that resonate with millions. Surely this skill played a major role in his recent election and will no doubt be a determining factor in his tenure as President. Likewise, history has repeatedly demonstrated that words can galvanize entire societies, taking them forward in missions of conquest or in search of peace. How many times have you heard "The pen is mightier than the sword" during your lifetime? Though this famous phrase was coined in the 1800's, the concept behind it dates back to age of Greek philosophers. Interestingly, words used sparingly are often the most powerful.

This is why I insisted, during the formation of our statement of purpose, that we strive to achieve the essence of Gemini Observatory in as few words as possible. With just six words, "Exploring our universe, sharing its wonders", we captured a myriad of activity at Gemini and distilled it all down to a simple concept that acts as a guiding light for our mission. These words represent vastly more than a slogan – they are literally the words I use to ground my perspective about Gemini while making some of the most challenging decisions I am faced with as Director. Whether spoken or written, centuries of history have demonstrated how a few choice words, when strung together with twines of imagination and passion in a form never previously conceived, can rock the soul of the listener.

It is for these reasons that I am so excited to help launch "The Observer" – Gemini's newsletter which is intended to share ideas, information, and perspectives across our diverse Observatory in a fresh format. This newsletter is as one of many new tools of communication emerging in 2009 within Gemini that I expect will collectively begin to address some of the long standing challenges we face as a team and organization. Almost invariably these challenges are rooted in communication problems which, if addressed, would unlock the true potential of our Observatory. The Observer is a communication "lens" through which we can view Gemini from different perspectives, in great magnification or, as I am attempting to do in this brief introductory article, from a great distance. In the pages and editions of our newsletter to follow, I encourage the entire staff to read and participate in the development of this new arrow in our communication "quiver" because, unlike our powerful telescopes which point up each night, The Observer points down at us and is ultimately a reflection of the time, energy, and interest we all put into it.

This month's Directorate Connect brought to you by Doug Simons (left), pictured in his natural habitat.

Figure C.5 – The Observer, Gemini's new internal monthly Newsletter was released in 2009. Part of the HR departments efforts to improve communications across Gemini's highly distributed staff, The Observer features articles written by members of the staff, with lead articles written by members of Gemini's Directorate.

Like many initiatives of Gemini's HR team, the genesis for this project was their desire to help unify Gemini and an understanding that, essential to Gemini's operating paradigm, is that we speak a common "language". This isn't about the languages spoken by the 20+ nationalities represented on Gemini's staff but, rather, the single language spoken by a team on a common mission.

HR09-008 - On-line Employee Performance Evaluation

Another important project launched by Gemini's HR team in 2009 was to overhaul the form used to support our annual employee evaluations. The project stems from a desire to switch to a web based fully electronic and interactive system to simplify what has historically been a time consuming process for the staff. To avoid "reinventing the wheel", Space Telescope was consulted with an eye toward learning about and ultimately adapting their evaluation software for Gemini. The new software will feature a step-by-step method of completing evaluations that can be saved at any stage in the process. Data (e.g., performance scores) can be evaluated and shared, as required, much more efficiently than the previous paper forms supported. Other requirements used to help define the new evaluation system include –

- Elimination of employee self-appraisal & manager appraisal of employee's performance on major job duties.
- Ability for employee & manager to comment on progress on each goal throughout the year.

- Ability for employee & manager to modify goals throughout the year to reflect changing priorities. Goals will be frozen by a certain date (nominally, December 1) so that performance towards those goals may be evaluated.
- Action plans automatically triggered if employee gets below "successfully meets".
- Interim review is available, not required.
- Summary page of goal and performance standard ratings and what each level means.

Beyond the infrastructure for Gemini's performance evaluations being extensively upgraded and as implied by the above requirements, the nature of the evaluations is also being overhauled to bring them into better alignment with Gemini's project-driven culture. An essential element of this culture change is to link employee compensation with performance demonstrated through projects they committed to complete at the beginning of the year.

HR09-014 - Broadening Participation

Gemini has a deep commitment to its Broadening Participation program. Through it, the Observatory effectively engages our diverse community on everything from our hiring practices to our outreach programs to our science programs. More than a cold legal requirement, diversity at Gemini is an integral part of who we are. The locations of the Gemini base facilities lend naturally to a diverse staff, however Gemini's core commitment to diversity runs much deeper than the 20 nationalities represented on Gemini's staff.

Figure C.6 – Gemini's long term commitment to its Broadening Participation program is reflected in a variety of ways.

Through a diversity of staff we gain a diversity of ideas, which we use as the basis for our evolution and growth as an organization and a team. By reaching out and touching the community, young and old, gifted and neglected, rich and impoverished, Gemini's embracing diversity becomes an essential element in the lifeblood of the healthy organization we build each day. Nature's lesson is that monolithic environments may seem strong at first, but are in fact fragile when confronted with new challenges because they cannot adapt to them. Through creative outreach, ingrained diversity, and a tireless effort to broaden the impact of Gemini on society as a whole, we are planting seeds that will grow in ways that are as countless as they are unexpected. Some of the more tangible aspects of our 2009 Broadening Participation program include organizing mentoring training, sending staff to participate in the Women in Science and Society of Women Engineers conferences, and a variety of follow-up to the 2009 AURA Climate Survey.

ISG09-003 - Transition to MS Exchange 2007

Figure C.7 – A new MS Exchange server was installed at Gemini in 2009, yielding a modern highly integrated workspace for the staff to use for e-mail, setup calendars, schedule meetings, etc.

A large scale project, the transition to new central exchange server to support e-mail, meeting scheduling, contact information, and other elements of the MS Outlook application was executed smoothly by Gemini's Information Systems group in 2009. The new system provides a comprehensive toolkit for improving communications across Gemini that is either accessible through Gemini's internal (secure) network, or when staff are on the road via a VPN link to their laptop or any web browser. Meetings at Gemini are now scheduled using the integrated scheduling tool which not only queries all participants for their availability, but assigns

the necessary conference room(s) to support the requested meeting. Training was provided to the staff by the IS group as part of this project, as well as on-going technical support. The new system is compatible with those on the staff using Apple computers and has proven to be reliable and adaptable to meet Gemini's needs.

ISG09-007 - Cyber Security Program

Excellent progress was made in 2009 with Gemini's cyber security project. Like other multi-year projects, we anticipate on-going efforts on this front, essentially throughout the lifetime of Gemini to maintain not only our cyber security awareness but resilience to possible attacks. Per guidance received by the NSF, the project to date has been substantially designed to account for Gemini's various cyber sensitive products, analyze the level of protection they need, and develop comprehensive strategies to ensure they remain secure. Tangible elements of our strategy to maintain the integrity of Gemini's cyber systems include firewalling Gemini's network, isolating development platforms (which often require development "sand boxes" that must be isolated), and maintaining the physical security of key computers, both at the base facilities and summits.

C.3 Outreach

PIO09-002 - Local IYA Programming

Figure C.8 – IYA activities were conducted around the world in 2009 and Gemini certainly played its part in the celebration of the 400th anniversary of Galileo's seminal observations with a small telescope.

The international Year of Astronomy has been a huge success across the globe and Gemini's project PIO09-002 helped with that success. This project contains a multitude of elements including leading the "Around the World in 80 Telescopes" program, in which live video links were established to telescopes around the globe by a central host where staff explained how their facilities were being used, telescope or site specifics of interest, the instruments currently available, etc. IYA activities were incorporated into the 2009 Journey Through The Universe program, which gave nearly 8000 students on the Big Island the opportunity to have a lesson presented by astronomers or those involved in the astronomy profession. IYA was part of the AstroDay activities in Hawai'i (organized by the University of Hawai'i) and Chile (organized by Gemini). Also in Chile was a remarkable program in which Gemini outreach staff and representatives from local universities spent a week on Rapa Nui, offering astronomy outreach programs to nearly 1/3 of the island's inhabitants. Given the unique connection Rapa Nui has with both Chile and Hawai'i as a cultural nexus spanning ~10,000 km, and the fact that Rapa Nui will be the site of a solar eclipse in 2011, this spectacularly successful outreach project was among the most innovative of those accomplished to date in Gemini's overall PIO program.

In parallel, in Hawai'i , IYA activity included a series of guest lectures by each of the Mauna Kea observatory Directors at the Keck lecture hall facilities in Waimea and the 'Imiloa planetarium in Hilo. It also featured a day long "block party" on the street on the UH-Hilo science park which is home to most of the observatory offices on the Big Island. The thousands of attendees enjoyed demonstrations of mirror (snow) cleaning technologies, the opportunity to observe the sun and moon through telescopes, and a variety of learning activities designed to engage the youth of Hawai'i .

PIO09-007 - Gemini Overview Video Clip

Figure C.9 – An impressive video clip was produced using internal resources at Gemini in 2009 which summarizes the observatory for the novice to our facility.

Among the many projects successfully completed by Gemini's outreach team in 2009 is a video clip that beautifully captures and conveys a variety of information about the observatory. Geared to inform and entertain the novice to Gemini, it includes an overview of the "two telescopes one observatory" concept, a time lapse movie of coating a Gemini mirror, explains our laser AO system, summarizes of how observations are carried out through Gemini's queue, makes clear how Gemini is uniquely configured to discover exoplanets, and presents a myriad of outreach opportunities the public has with Gemini. This video clip is available through YouTube or via -

http://www.gemini.edu/gallery/v/Special-Images/Video/Picture+1.png.html

C.4 Science

DIR09-006 - Joint Gemini/Subaru Science Conference

Figure C.10 – In May 2009 the first ever joint science conference between the Subaru and Gemini communities was conducted. The traditional group photo is shown above, with participants standing in front of the outstanding conference facility.

One of the most pivotal events in 2009 for Gemini's science team was the organization and participation in the first ever joint science conference between Gemini and Subaru. Set among the beauty of Kyoto University, Japan about 200 users and staff of the Gemini and Subaru observatories and the National Gemini Offices participated from 18-22 May 2009. The 5-day meeting provided an opportunity for participants to share a wide range of research topics spanning studies of our solar system and exoplanets to cosmology and the high red shift universe. Users also shared innovative observing techniques, unique collaborations and looked toward the future of both observatories and how they can work together to best serve our users and remain competitive. In particular, methods and procedures for coordinating the use, planning, and construction of future instruments were discussed.

The goals of the conference were to promote a mutual understanding of both communities and to highlight the international nature of modern astronomy. These goals were clearly achieved. Key scientific topics of the conference included -

- Cosmology, Large-scale Structure and Galaxy Formation
- Black Holes, AGN and Active Galaxies
- Stars and Compact Objects
- Solar System and Exoplanets

- Star Formation and Interstellar Medium
- Future Prospects of Subaru/Gemini

The conference concluded with the 3rd Gemini Users Meeting on May 22 where staff updated users on issues related to doing science on Gemini and provided a forum for user input.

SCI09-076 - NICI Campaign

The first of its kind at Gemini, the campaign launched at Gemini-S with the Near-infrared Coronagraphic Imager (NICI) promises to be a trend setting study in the field of exoplanets. During the initial phases of this campaign the combination of NICI and Gemini-S was demonstrated to be the most sensitive coronagraphic system used anywhere in astronomy, providing greater the a million-to-one rejection of halo light within ~1 arcsec of host stars. With its own AO system and highly optimized dual-channel infrared camera, NICI is being used to record images via two methods, namely azimuth differential imaging (ADI) and spectral differential imaging (SDI). The combination provides exceptional sensitivity to faint planetary companions. The NICI campaign team is being led by Dr. Mike Liu from the University of Hawai'i and is nominally using ~500 hrs of queue time to conduct a survey of nearby stars suspected of harboring planets. After completing its first season of NICI observations, the program has moved on to begin to observe candidate companions to confirm their nature via common proper motion.

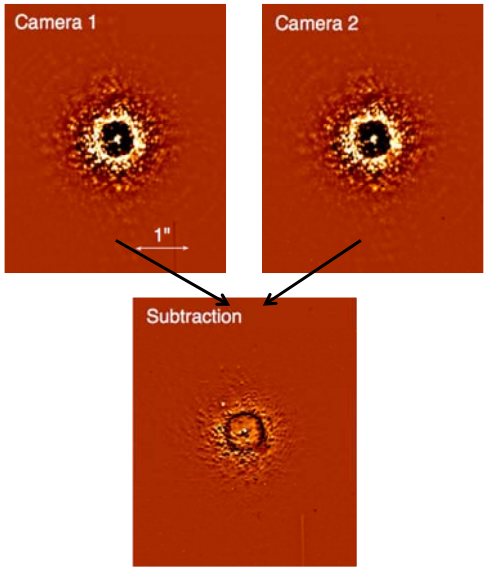


Figure C.11 – The basic technique behind spectral difference imaging is illustrated. Two images, made on either side of the methane absorption band prevalent in low temperature companions (but not in host stars) are subtracted. This helps remove speckles in each image and reveal faint companions that might otherwise remain invisible in the suppressed halo of the host star.

SCI09-097 - DataFlow Project QA Pipeline

Gemini has attempted to develop an automated data-reduction pipeline for the purposes of enhancing data quality assessment at the telescope and ultimately providing science quality reduced data for the community. Unfortunately, although great progress has occurred in developing recipes and moving existing IRAF scripts under the more robust PyRAF environment, so far this effort has not reached its ultimate goals. The current DataFlow Project has yet to produce a working pipeline, despite a target completion date of the end of 2007 and, most recently, failed its Preliminary Design Review in February 2009. As a result, a number of changes have been made to better define the scope, management, and execution of this project. While the Observatory will continue to lead the generation of advanced reduction software and recipes, which will be incorporated into the pipeline reduction system, the pipeline itself will be contracted out but only after an extensive internal review of requirements to help ensure that the design is adequately described and scoped to succeed under this new development model. Furthermore, the community-based Data Reduction Working Group has been re-engaged and communications between the DataFlow team and the project's prospective users has been bolstered to ensure that the product of this effort meets their needs and expectations.

C.5 Engineering

ENG08-033A - FLAMINGOS-2 AT and Eng. Commissioning

An enormous amount of progress was made during 2009 with FLAMINGOS-2. The instrument was delivered to the summit of Cerro Pachon mid-year, after nearly a decade of development at the University of Florida. Soon after delivery, during the initial health checks of the system, it was discovered that one of the quadrants of the detector delaminated en route to Chile. As a result Gemini immediately launched a new detector procurement with Teledyne, who are at the time of this report manufacturing a replacement science grade detector for this instrument. Despite this setback, the remaining good 3 quadrants of FLAMINGOS-2 allowed significant progress to be made with the final on-telescope acceptance testing and limited commissioning of the instrument at Gemini-S. To date this includes good progress with the imaging and single slit spectroscopy mode, as well as use of the extremely important on-instrument wavefront sensor which, like GMOS, is used to support both guiding and precision offsets on the sky.

Future work remains on FLAMINGOS-2 before it can be released for scientific use, most notably the science detector will be replaced in 2010. Additional engineering will be performed in parallel with this activity through, primarily to increase the reliability and robustness of the instrument, yielding an instrument that can be used effectively in Gemini's multi-instrument queue system.

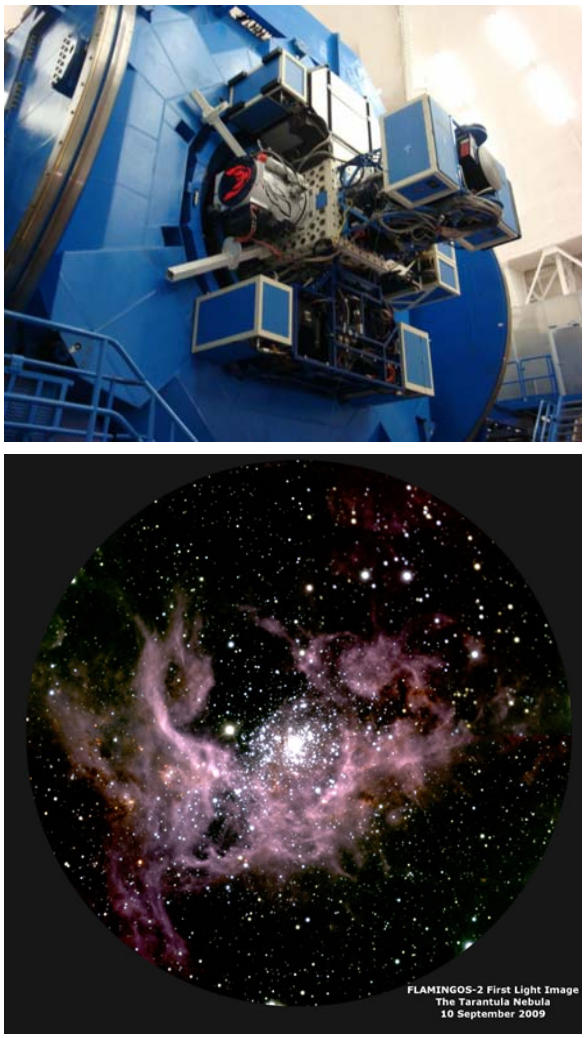


Figure C.12 – FLAMINGOS-2 was delivered in 2009 to Gemini-S, where it is currently being commissioned, in anticipation of being released for community use in 2010. Shown above is FLAMINGOS-2 on the up-looking port of Gemini-S. Shown below is one of the first light images recorded with FLAMINGOS-2 of the Tarantula Nebula.

ENG09-032 - GNIRS Repairs

Like FLAMINGOS-2, good progress was made during the reporting period with restoring GNIRS to a fully functional state at Gemini-N. At the time of this report GNIRS has been fully integrated and is undergoing extensive cold flexure tests on the flexure rig in the Hilo Base Facility instrument lab, the preliminary results of which look promising. The dominant delays experienced in 2009 in this project were driven by the spontaneous delamination of anti-reflection (AR) coatings on several of the GNIRS lenses. This setback triggered an extensive effort by Gemini, the source of the coatings, and ultimately other labs to find a solution. To prevent this setback from injecting further delays in the repair of GNIRS, a combination of spare uncoated and ThF_4 coated lenses (which regretfully are radioactive so will slightly increase the background flux) are being used until new lenses that have been properly AR coated are procured (likely in 2010). In any event, the intent of the GNIRS rebuild project is to not just restore

previous functionality, but to improve the performance of the instrument in a number of key areas, including image quality (through the use of new optics) and sensitivity (through a new science detector). Unlike its Gemini-S configuration, GNIRS will be commissioned at Gemini-N with ALTAIR, providing Gemini's community with a world-class near-infrared spectroscopic capability featuring target isolation at the ~0.1 arcsec level.

Figure C.13 – GNIRS is shown on the HBF flexure rig, undergoing an extensive series of tests before it is deployed on Gemini-N in 2010.

Through the deployment of GNIRS at Gemini-N and FLAMINGOS-2 at Gemini-S, the Observatory will for the first time in its history provide our community with state-of-the-art infrared spectroscopy capabilities across the entire sky. We anticipate that this will spark considerable demand and interest in Gemini by our diverse community, given the incredibly broad range of science that can be achieved with these instruments on the world's most infrared optimized telescope platforms.

ENG09-018 - SOAR M1 Coating

This project demonstrates the broader applications of technologies developed at Gemini, for the benefit of our neighboring observatories. In 2009 the SOAR primary mirror was re-aluminized using the Gemini-S coating chamber. The SOAR facility does not have their own coating chamber and critically needed a new coating as many years had passed since the last time it was coated. The intermittent use of Gemini's coating system has always been part of the long-term operations plan for SOAR, to avoid the duplication of costs between observatories. During the mirror handling, cleaning, and coating, SOAR personnel perform most of the work and any costs incurred upon Gemini (parts or labor) were covered by SOAR.

Figure C.14 – The successfully aluminized SOAR primary mirror is driven back to its home, across the ridge on Cerro Pachon.

While such a project does not directly benefit Gemini, it is nonetheless a valuable reminder of the support role that a world-class facility like Gemini has. When and where Gemini can provide help to other facilities, with minimal impact on our own operations, Gemini should demonstrate such support and leadership. Other areas where this approach applies is in developing advanced adaptive optics technologies like laser and deformable mirrors, instrumentation, detectors, etc.

ENG08-034 - Water Vapor Monitoring

As indicated by the project code, this project started in 2008 and was completed in 2009, primarily due to an underestimation of the complexity of deploying a GPS based water vapor monitor. The system uses the differential timing of radio signals from GPS satellites as they cross the sky to gauge the extent of water vapor in the atmosphere. The underlying driver for this system was to improve our the execution of programs in the mid-infrared queue with T-ReCS. Prior to its deployment, water vapor was measured using trial measurements with T-ReCS, using precious telescope time to configure and sample the sky over the course of a night to determine if/when conditions were conducive for 10 or 20 µm observations. Thanks to the sub-mm facilities on Mauna Kea, which are critically sensitive to atmospheric water vapor, measuring the water content of the sky to support MICHELLE observations at Gemini-N has been relatively straightforward. This has unfortunately not been the case at Gemini-S though, which does not have the benefit of neighboring facilities which are measuring water vapor, hence the need to deploy a system of our own.

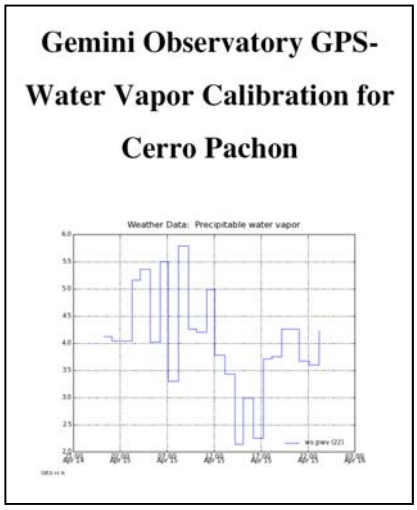


Figure C.15 – The cover page of a penultimate report summarizing the successful development and deployment of a GPS based water vapor monitor on Cerro Pachon is shown. The system now allows our science staff to monitor real-time water vapor content of the sky, assisting greatly in the execution to queue based mid-IR observation with T-ReCS.

Despite the unanticipated challenges, the water vapor monitoring project at Gemini-S was a major success and testament to the ingenuity of Gemini's engineering team. Now, on a routine basis, it is possible to determine the water vapor content of the sky above Cerro Pachon and efficiently execute our mid-IR program with confidence. When coupled with advanced weather models for Cerro Pachon (currently under development at a Chilean university), it will be possible to both forecast and nowcast atmospheric water vapor content at Gemini-S with considerable sophistication.

ENG08-061 - LINUX Migration

One of the longer duration projects in Gemini's project queue has been the LINUX migration project. Designed to upgrade a multitude of computers to run on LINUX instead of Solaris, this project required an enormous amount of planning, testing, and troubleshooting to ensure a smooth transition to the more modern, widely used, and versatile platform LINUX offers. Likened at Gemini to replacing the engines on a jet in mid-flight (noting that Gemini operates 365/24), this project required extensive coordination between essentially all sectors of Gemini – with the administrative group (which encompasses the IS group), engineering (which encompasses the software group), and with science operations. The project included an extensive test program for all LINUX based systems at the summits as a result of alterations made to a large number of Capfast programs, EPICS based systems, the Observatory Control System (OCS), Data Handling Systems (DHS), etc. The project touched essentially all subsystems including the sequence executor (a core application on the summit), ALTAIR, GMOS, and essentially all other instruments, laser systems, including the laser traffic control system used at Gemini-N, the Gemini Engineering Archive (GEA), and much more.

Though it started in 2008 formally as a project, the LINUX migration project was started even before then, given the depth and breadth of the impact of this project on Gemini. Now that it is completed though, we will reap rewards for years to come from transitioning to this modern computing platform.

ENG08-031 – MCAO (Phase 1 and 2)

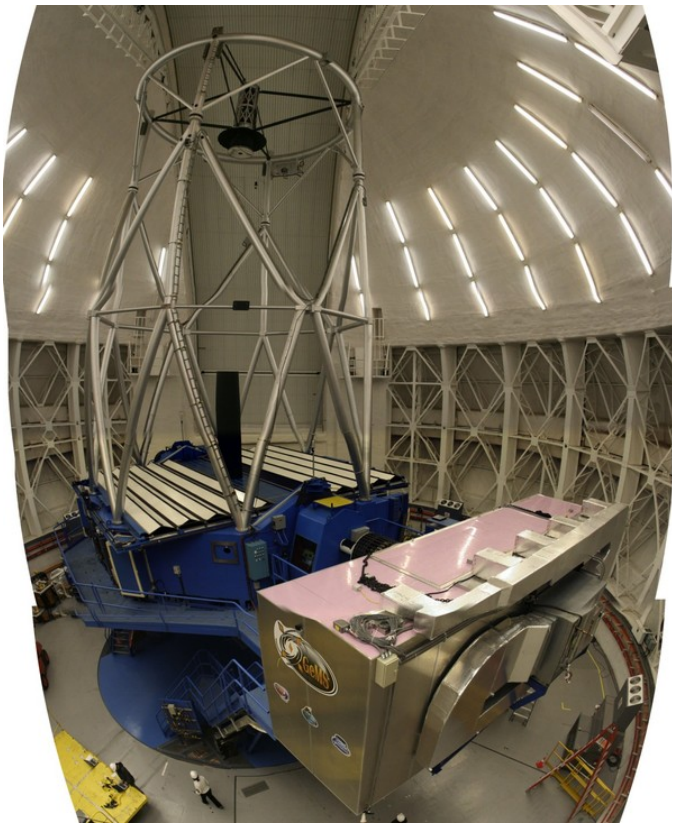


Figure C.16 – The new MCAO laser service enclosure is seen in the foreground, attached to the Nasmyth service platform on the Gemini-S telescope. The 50 W sodium laser needed for MCAO will be installed in this thermally and vibrationally isolated structure in 2010.

Finally, to close our sampler of 2009 projects, the "crown jewel" of Gemini's development program is described. Once again considerable progress was made with MCAO during the reporting period. Given the size of this development project though (which dwarfs all other internal development projects), MCAO has been under-resourced in terms of effort for several years. In fact MCAO typically receives only ~1/2 of the effort requested, and to some extent represents the main non-operations resource pool that is drawn upon as higher priority projects (e.g. FLAMINGOS-2) emerge. Such is the nature of pursing an extensive range of important projects with a finite resource based – priorities must be set and, inevitably, many projects do not receive enough effort to sustain them at the desired rate. Despite this, the MCAO team has made excellent progress as the AO bench (Canopus) has been worked on extensively. Particular attention has been paid to the cooling system, which was delivered defective by the vendor and a large amount of unplanned effort has been invested to design and build a new system. In addition the Beam Transfer System (BTO) is approaching completion at the component level, before it is deployed in the telescope in 2010. By far the most visible aspect of progress with MCAO has been the new laser service enclosure (LSE), which was built in-house and attached to a Nasmyth service platform at Gemini-S. An enormous structure, it will ultimately house the Gemini-S laser (under development by LMCT), in a temperature controlled and vibrationally isolated environment. Underneath the LSE is a labyrinth of new support steel structures, tied to the telescope mount. Prior to installation of the LSE a dummy load was placed on the Nasmyth platform to verify that the telescope points and tracks nominally (which it does). This reflects the enormity of the mass of the telescope structure itself.

Progress on the laser has been good though late in 2009 complications emerged with LMCT as they attempt to ensure the laser is completed within a fixed time frame (early 2010). While Gemini applauds the timely delivery of the MCAO laser, we have also made it clear to LMCT that it must be fully operational and demonstrated to be reliable before it is shipped. At the time of this report, we remain optimistic that the laser will be delivered in a completed state in early 2010.

C.6 Summary

The projects identified above emphasize novel activities over the year. However, the annual plan encompasses both the standard work of maintaining operations as well as new endeavors. The vast majority of effort is in fact devoted to ongoing operations and maintenance, and a key result of the

planning process is that nearly all of the operations tasks are completed fully. Nighttime operations proceed fully staffed, and the daytime efforts required to support those activities are fulfilled.

These regular operations tasks appear in the project listings for both Engineering and Science Operations divisions, which together account for most of the 2009 program plan tasks and effort. Figure C.17 shows the summary of projects and their completion by group. The large number of Science Operations projects includes many specific operations tasks, such as support for individual instruments, queue planning, and nighttime activities. In contrast, Engineering enumerates fewer projects; for example, "Routine Operational Tasks" is a single entry.

The one group with a large fraction of incomplete projects relative to the total is Safety. During 2009, a new Safety Manager joined Gemini. He had not developed the 2009 projects and therefore was not expected to complete the specific projects that his predecessor had defined. Looking forward, we expect success with the comprehensive 2010 plan he has developed and has committed to execute.

Overall, measured by either number of projects or effort, the total completion rate is approximately 75%. Most projects are entirely completed. Compared with past years, the trend is positive, with more projects completed and fewer projects remain showing no progress. This result is largely attributable to improvements in planning, as the Observatory learns what is truly feasible to accomplish over a year.

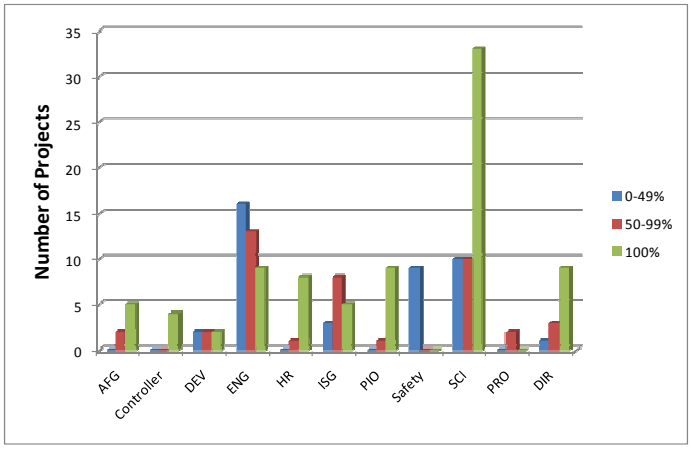


Figure C.17 – 2009 projects and completion, by group.

Summary of 2009 Band 1 Projects for the Directorate (DIR)

Project Name	Project Description	% Compl.
DIR09-001 WFMOS Agreement	Negotiate agreement for joint development and operation of WFMOS with Japanese community.	100%
DIR09-003 Energy Initiatives	The purpose of this initiative is to make some advances in the area of energy improvement, building on the initial staff input received in the blog which was established with this objective, in the same time period that the longer term plan is developed. The outcome of this initiative will be the realization of several specific energy improvement initiatives during the first 6 months of 2009. The initiatives include: developing ways to ensure a reduction in energy consumption during off peak hours, when fewer staff are working, but many PCs and electrical appliances remain in use; making energy savings from ensuring staff computer and printer settings are set up properly for optimum energy saving, plus printer consolidation; the elimination of disposable cups and glasses; improved recycling and a travel carbon footprint awareness initiative.	100%
DIR09-004 Energy Planning Oversight & Control	The purpose of this initiative is to assess Gemini's current energy performance and to develop a long term energy plan for Gemini, building on the initial staff input received in the blog which was established with this objective. The outcome of this initiative will be the presentation to the Director by June 30th, 2008 of a formal Gemini Energy Plan. The project involves the development of Gemini energy consumption base data, with clear key performance indicators, against which the impact of future initiatives will be assessed....	93%
DIR09-005 Hiring and training new Deputy Director	Hire new DD and cross train before Jean-Rene departs for NSF	100%
DIR09-006 2009 Joint Subaru/Gemini Science Conference	Organize, in collaboration, Joint Gemini/Subaru science conference	100%
DIR09-007 2009 Gemini Users' Meeting	Support GSC's organization of User's Meeting in Kyoto, following Gemini/Subaru science conference	100%
DIR09-009 Create Call Out Policy	Research and create a call out policy for nighttime and weekend support of telescope operations	100%
DIR09-010 Create On-Call Policy	Research and create an on-call policy for nighttime and weekend support of telescope operations	34%
DIR09-011 AURA Compensation Study Follow-up Work	Earmark directorate and HR time in anticipation of an AURA Corporate initiative that could take a great deal of Directorate and HR Manager time.	90%
DIR09-012 NSF Business Systems Review Preparation & Site Visit	Directorate and Admin Group time associated with coordination and preparation of materials for the NSF Business Systems Review in 2009	100%
DIR09-020 NSF Funding Proposal	Develop 5 year funding proposal for submission to NSF Fastlane	100%
DIR09-030 SPIE 2010	Co-chair and organize 2010 SPIE conference in San Diego, CA	100%
DIR-A083 Cell phone policy	Develop and implement a policy governing the cell phone assignment, compensation, requirements.	59%

Summary of 2009 Band 1 Projects for the Administration and Facilities Group (AFG)

Project Name	Project Description	% Compl.
AFG09-004 Establish long term Base Facility security measures (access/cameras) at both sites		94%
AFG09-007 AFG Web Page Development	Design, develop, implement and enhance AFG's communication through the Gemini internal website, using best practices to provide and update key information and tools for users, while setting a benchmark for the Gemini internal website presence.	100%
AFG09-008 Review of Processes and Forms	Comprehensive review of material in internal web page to purge outdated material – consistent with communication issues identified through staff surveys	100%
AFG09-009 Planning Process for 2010	Develop plans for next year	100%
AFG09-010 Warehousing Review	Review warehouse needs at Gemini North; develop and implement best-efficiency plan to accommodate ongoing space needs and inventory management at the FTZ and HBF for Administration, Engineering, Accounting and HR.	100%
AFG09-011 (AFG08-A4) In-house travel ticketing	In-house travel ticketing	83%
AFG09-012 Mauna Kea Collective Transport Study	The objective of this project is to prepare and present a feasibility study, in conjunction with administrative and operational representatives of other MK observatories, concerning the possible establishment of a collective transport service, using vans and shuttle buses to move Mauna Kea observatory personnel and authorized visitors among base facilities in Hilo and Kamuela, the Hale Pohaku Lodge, and the summit telescope facilities.	100%

Summary of 2009 Band 1 Projects for the Controller group (CTR)

Project Name	Project Description	% Compl.
CTR08-1 Managerial Access to Financial Reporting	This would allow budget managers to access up to date financial reporting, with access to detail expenses.	100%
CTR09-001 New Payroll Software Setup	The setting up and implementation of a new payroll and HR software.	100%
CTR09-003 Update Web Presence	We will be updating our web presence regarding forms, policies, contact info, etc. to make it easier for employees of Gemini to get the answers or help they need.	100%
CTR09-005 Financial Month End Closing	Investigate ways to determine if there is a more feasible way to close financial month ends in order to get financial data into the hands of the managers quicker. Bear in mind the other systems we need information from in order to do this - NOAO and AOSS.	100%

Summary of 2009 Band 1 Projects for the Human Resources group (HR)

Project Name	Project Description	% Compl.
HR09-003 Create Retention Program for all Employees	Retention programs	100%
HR09-004 Upgrade Relocation Services	Revise relocation policies to reflect best practices; research other relocation polices; survey newly relocated staff upon arrival at Center	100%
HR09-005 Create Employee Newsletter	In order to increase awareness and improve communication, develop a monthly staff newsletter highlighting new hires, changes in benefits, additions to benefits, Gemini events and parties. Will initially create a paper version and once the self service HRIS is implemented will place on line	100%
HR09-006 Develop standard procedure for follow-up on Employee Survey Results	Develop a formal standard for all departments to incorporate for follow-up on the Employee Survey	85%
HR09-007 Continuation of creation of internal webpage for ADM -HR side	Continue with the creation of the webpages of forms and services for the internal webpage	100%
HR09-008 Implement online performance evaluation	Implement online performance evaluation	100%
HR09-009 New Software for HR & Payroll	Plan and implement program for use by HR & payroll.	100%
HR09-013 Planning Process for 2010	Plan priorities for 2010	96%
HR09-014 AURA Broadening Participation	Preparation and attendance at AURA Broadening Participation Workshop and follow up on agreed actions arising	100%

Summary of 2009 Band 1 Projects for the Information Systems Group (ISG)

Project Name	Project Description	% Compl.
ISG08-IN105 Deploy Certificate Services - NSF	Hardware Ready. Required also for HR/admin to comply with data privacy laws.	88%
ISG08-IN107 Deploy Single-Sign-On Solution - NSF	SSO provides centralized management and authentication of staff credentials.	14%
ISG08-IN314 Consolidate HBF WEB servers	Virtualization of HBF Web servers and upgrade to Solaris 10	60%
ISG08-IN321 Network Redundancy	Purchase, Install & Configure Network hardware to reduce/eliminate single points of failure.	77%
ISG08-IN326 Helpdesk/FRS enhancements	Host a workshop with a Remedy consultant to gather requirements. Implement recommendations.	100%
ISG09-003 Transition to MS Exchange 2007	Upgrade will provide new features for mobile device support, improve OWA interface and better support for Mac OSX	86%
ISG09-004 Upgrade Backup infrastructure	Upgrade will provide more online and off-line storage capacity for both GN/GS summit and base facilities.	36%
ISG09-005 SQL Database Consolidation	Migrate all single instances of SQL to a redundant SQL cluster (GN)	100%
ISG09-006 VM Cluster Deployment	Consolidation of services/servers, both Windows and UNIX to Virtual Machine cluster.	79%
ISG09-007 Gemini Cyber Security Program	Establish IT controls, policies and procedures to comply with NSF article 51	59%
ISG09-008 Web Services Optimization	Create and Document Graphic Style Guide, Convert dynamic content to static HTML. Use or create a Content Distribution Network (CDN)	100%
ISG09-009 WAN speed optimization	Investigate & deploy a solution to drastically improve file sharing, remote collaboration etc ...	84%
ISG09-013 Enhancements to ISG Monitoring Systems	Upgrades to Zenoss, Solarwinds & provision 'out-of-band' access/alerts	100%
ISG09-018 Plan Enterprise Linux OS upgrades	Ensure that all production Linux boxes comply with Gemini standard. Evaluate new releases of RH Enterprise Linux	100%
ISG09-051: (SCI09-032) Remove GN dependencies from GS web site mirrors	Make GS mirrors more useful, simplify off-site access (SCI08-121)	95%

Summary of 2009 Band 1 Projects for the Procurement group (PRO)

Project Name	Project Description	% Compl.
PRO09-005 Property and inventory tracking web application	Develop web application that performs all functions currently done by FATS database, plus add: online forms for property transactions, tools to enable staff to query property data, tools to track inventory, automated input of data from USL, and other features. Reduce manpower needed to operate existing property tracking system and provide new tracking capabilities to staff to reduce duplicative purchasing and delays due to inventory depletion.	90%
PRO09-011 Reqless continued development	Add to capabilities of Reqless to reduce labor spent on entering and processing requisitions	5%

Summary of 2009 Band 1 Projects for the Safety group (SAF)

Project Name	Project Description	% Compl.
SAF413 Emergency Plan	Write the emergency plan	25%
SAF09-001 Gemini Safety Standards	Implement 20 safety standards	27%
SAF09-002 Gemini MSDS Management Program	Implement on-line MSDS management	23%
SAF09-003 Comprehensive Fall Hazard Survey	Fall Hazard Assessment of GN in Q1 and GS in Q3. Timely corrective actions implemented in 2009.	29%
SAF09-004 Gemini Fire Life Safety Assessment	GN assessment Q1, GS assessment Q3	27%
SAF09-005 Implement Safety and Health Committees	Implement engaged GN and GS Safety Committees tasked with inspections, leadership, safety incentives, and additional elements.	0%
SAF09-006 Safety Culture Integration Initiative	Assess current status and chart measureable path forward to world class EHS performance in Gemini.	16%
SAF09-007 Gemini Disaster Preparedness Plan	Finalize the Gemini Disaster Recovery Plan	0%
SAF09-008 EHS Training Qualifications	Implement role based EHS training qualifications across Gemini. 20% target audience trained success criteria for 2009, 80% 2010, > 95% 2011.	0%
SAF09-009 Office Ergonomics Program	Implement effective office ergonomics process at Gemini	1%

Summary of 2009 Band 1 Projects for the Public Information and Outreach group (PIO)

Project Name	Project Description	% Compl.
PIO09-001 PIO Base Operations	Ongoing PIO programming and services, including local outreach programming, publications, press releases, Legacy Imaging, Web content updates, Community Engagement funding logistics, partner country conference support (IAU, AAS, Gemini/Subaru Science Conf) etc.	100%
PIO09-002 Local IYA Programming	Implementation of IYA Programming in Hawai'i and Chile - limited to host community events and activities	100%
PIO09-004 Evaluate/Address Web Presence/Planning/Mgmt	Hire independent consultant to evaluate our webpages and develop a plan to address issues related to content development, management and overall site design.	100%
PIO09-005 Web Redesign Implementation	Implement consultant recommendations as endorsed by directorate	100%
PIO09-006 Plan/Implement Press/Publications Office/Resources	Develop a plan to establish a world-class press office at Gemini that will also support publications functions across the observatory.	100%
PIO09-007 Gemini Overview Videoclip	Produce Gemini Video Overview for IYA Observatory Tour and for overall web background content. Approximately 5-minutes long...	100%
PIO09-008 Identity Program Integration	Complete integration of "Statement of Purpose" for all printed and electronic delivery. Includes guidelines for use in communications etc. for staff and partner offices etc.	100%
PIO09-010 Partner Planetarium Resources	All-dome video distribution and partner translation of Mauna Kea Update from Imiloa for all partners.	100%
PIO09-012 New Media Development	Expand dissemination of PR materials into new media (eg. Twitter, Second Life) and develop new materials for WWTN, Google Sky and podcasts.	100%
PIO09-013 GeminiFocus Reader Survey	Conduct Survey of GeminiFocus readers to provide input on content and other relevant issues	87%

Summary of 2009 Band 1 Projects for the Development group (DEV)

Project Name	Project Description	% Compl.
DEV09-005 GPI support	Support GPI development	100%
DEV09-006 WFMOS Conceptual Design Study support	Support competitive conceptual design studies, conduct design review	100%
DEV09-010 F2T2 support	Support for the F2T2 tunable narrow band filter integration, testing, and use on FLAMINGOS-2	5%
DEV09-011 GMOS-N CCD replacement	Procure new CCDs, provide support for construction of a new focal plane, detector testing and characterization, installation in GMOS-N, and recommissioning. High priority for 2009.	90%
DEV09-016 GMOS-N/S filter and GMOS-N grating procurement	Procure, install, and commission new red-blocking and various NB filters for GMOS-N (in priority order as defined by the GMOS team): red blocking filter #1 (700 nm > lambda) (or) red blocking filter #2 (600 nm > lambda) S II He II + He II Cont O III + O III Cont The latter two sets have been proposed by Don Figer's team, and they may have some funding to support the purchase.	76%
DEV09-020 : Development group Long Range Planning process	Develop the DEV long range plan and budget proposal elements; work with the GSC to develop instrumentation strategy and plans; instrument deployment plans; instrument decommissioning plans; plan for and execute next community instrumentation meeting ("A" meeting)	85%

Summary of 2009 Band 1 Projects for the Engineering group (ENG) (Part 1)

Project Name	Project Description	% Compl.
ENG08-012: GN LGS fac improv	The purpose of this project is to finish undone tasks related to LGS system. Most of the tasks are geared towards improving night time efficiency, and fixing faults.	93%
ENG08-031: MCAO (phase 1 and 2)		70%
ENG08-033A: FLAMINGOS 2 AT and Eng Commissioning	FLAMINGOS 2 (AT and on-sky AT support). This project is a candidate to roll over 2009 considering that Aug 2008 AT failed to pass. An AT-2 is considered to be performed on Oct/Nov 2008. F2 AT and Eng commissioning means to have F2 ready for F/16 (No MCAO) on-sky commissioning as Facility Instrument. F2 Science commissioning is a SCI project for 2009.	100%
ENG08-034: Water Vapor Mon upgrade	Water vapor monitor upgrade	100%
ENG08-035: ASCAM	This project is developed to build 2 modular All Sky Cameras to detect early aircraft trajectories flying over the observatories airspace. The ASCAM modules will be networked (URL) connected via TCP/IP with the LTCS and TCS (Observatory Systems). The idea is to build the first ASCAM to install on MK, after some test on Palomar, then to build the second one.	100%
ENG08-041: Eng Tools Corp Approach	Engineering Tools corporate Approach project includes two main sub-projects: The Gemini Management Planning Tool and the Engineering Documentation Management Tool (DMT). The appropriate DMT is being searched to implement and deploy it during 2008. At the end of 2008 the Planning Tool (PI) will be at the 98% level of completion and the DMT will be at the level of 80% level. Most of the roll over task to 2009 are related to store OLD Gemini documentation in the DMT.	59%
ENG08-049: MK UPS upgrade	MK Site Emergency electrical Power Upgrade (ENG05)	67%
ENG08-061: Linux Migration		100%
ENG09-010 : SALSA (ENG03)	ASCAM & BOCAD integration, FAA approval of camera systems, SOP for laser use	16%
ENG09-011 : GNIRS Eng AT + Commissioning	Install GNIRS on the GN telescope and perform instrument recommissioning from Engineering point of view.	9%
ENG09-018 : SOAR M1 Coating	Coat SOAR M1 mirror (after GS M1 shutdown	100%
ENG09-023 : Engineering Training Program	Safety and technical training	94%
ENG09-030 : Spares procurement	Develop a long-term equipment renewal plan; spares inventory based upon risk, use of CMMS for inventory management, spares storage and spares purchasing	49%
ENG09-032 : GNIRS Repair completion	This project involves completion of the GNIRS repair work that is currently being performed at the HBF.	64%
ENG09-032A : GNIRS Lenses Recover Project (R.Oram)	This project is to procure and recover GNIRS lenses for final science configuration.	28%

Summary of 2009 Band 1 Projects for the Engineering group (ENG) (Part 2)

Project Name	Project Description	% Compl.
ENG09-040 : GEA Re-code and Functionality Improvements (ENG13)	This project is to re-code GEA and improve its functionality considering dynamic channels addition and as part of functionality and improvement provide IQ pages upgrades, Instrument/AO calibration upgrade, MCAO integration, etc..	0%
ENG09-055 : Guiding Improvements	Improve deficiencies in guiding performance in current system: astigmatism converence, non-chopped image elongation, dynamic skyframe, actuators out of range, centroiding algorithms. The first phase, consider acquire a good understanding of the guiding process currently implemented.	4%
ENG09-082 : Planning Tool Upgrades	Customizations and support for the Gemini Planning Tool. Operations weekly planning improvements. Science and Telescope planning integration. As first component, the planning involves long range projects and daily routines; the goal is to integrate all useful information into a "big plan" system.	100%
ENG09-085 : Gemini Application Platform	A common application framework that will unite all the disparate user interfaces and applications used in observing today behind a common platform architecture. It will provide a consistent and efficient user experience by accessing all parts of observing configuration and status information in a uniform way. This is 4-phase project, where the first phase will be mostly planning and having a Design Review for most part of 2009, and actual construction taking place until 2011 in three-phases namely; Foundation/Framework, Transition of the existing tools to this new Framework, Dashboard - Integration of all the high-level tools into one single Dashboard/UI instance.	0%
ENG09-091 : Laser Upgrade B. Improved diode reliability and lifetime	Issue Statement: The 12W 589nm laser system at GN is pumped by 12 high powered laser diodes @808nm. The diodes are assembled in a fiber array packages FAPs and are purchased directly from the manufacturer-Coherent Laser, Santa Clara, CA. At GN, we are experiencing an operational MTBF of the FAPs of approx 1000 hrs whereas a more typical industry standard is ~ 20,000 hrs. The premature failure reduces the availability and uptime of the LGS and also impacts the quality and stability of LGS performance. Reducing the MTBF of the FAPs will increase reliability and availability of LGS system and will reduce operational costs of consumption of these expensive components. These reliability improvements could be applied to the GS &K systems and future LGS systems. Project Objective Statement (POS): Utilizing existing resources found at GN and GS we will investigate and then implement new 808nm pump laser diodes controllers and operating procedures with improved MTBF on the GN 12W laser. Make available the results to our worldwide partners that use the DPSS LGS as best practices.	61%
ENG09-122 : ISS Vibration mitigation	Reduce the vibration level at the ISS. This task includes the following: 1. Program planning phase 2. ISS vibration measurement and data analysis campaign 3. Cryo pump vibration mitigation engineering 4. Instrument vibration characteristics measurement and analysis 5. Altair vibration investigation	21%
ENG09-162 : Procedures writing process	Engineering must create a data base that shall contain all the procedures for the tasks that are performed on a regular basis at both sites. This project is driven by technical requirements and also by safety requirements imposed by Chilean law.	37%
ENG09-163 : OM Management Tasks	This project describes all those activities that are OM management tasks. Among these activities we have executing the TIO-M and TTM role, including training for new TTMs.	100%

Summary of 2009 Band 1 Projects for the Engineering group (ENG) (Part 3)

Project Name	Project Description	% Compl.
ENG09-164 : OM Routine Operational Tasks	This project describes all tasks that are routinely performed on the telescope and/or instruments.	98%
ENG09-165 : OM Corrective Maintenance Tasks	This project describes all faults that are pending in all telescope and instrument systems as per FRS. The listing of all pending fault that we need to work in 2009 will be issued in December 2008.	49%
ENG09-166 : OM Preventive Maintenance Tasks	This project describes all tasks that are preventive maintenance to facility, telescope, and instrument systems.	92%
ENG09-167 : OM Project Tasks (Upgrades or New Developments)	This project describes tasks that are modifications to current systems driven by telescope/instruments operation or maintenance purposes. In general are small in manpower and cost. If a task here needs more than 160 man-hours to get implemented, it should not be in this category and deserves to be considered a new project.	34%
ENG09-170 : Observing Software Enhancements	This project manages the regular updates to the Gemini operations software including the Gemini public software releases (OT and PIT), Phase I process support, the remaining elements of the OCS (QPT, seqexec, TCC/TCS, WDBA, ODB, e-obslogs), ISDs, public ODB database pages, instrument dm and other control screens, mask tracking database, and other tools used by the observers or SSAs and maintained by the software group. The releases of all components are tied to the public releases of PIT and OT, which occur four times a year.	100%
ENG09-173 : GS Laser Mask cutting project	GS Laser cutter system installation, commissioning and startup operations. This project include not only the laser mask cutting machine, and the GSmask tracking database also the reality of the Gemini South/CTIO operations staff related to the cutting and shipping, budget, and environment.	100%
ENG09-174 : Eng managers duties	This project summarizes all the management tasks to be performed by the engineering mangers throughout the year	83%
ENG09-175 : TAC Software Requirements	SCIENCE GOALS: The Time Allocation Committee (TAC) process is an important link in the chain of Gemini Observatory operations. It is the means by which a submitted proposal is given an allocation of time for observation and assigned a ranking band. The process begins with the submission of staff proposals to the Gemini Staff server and delivery of submitted proposals from the partner countries....	0%
ENG09-209: New M2 Control H/S (ENG08-026)	Rollover of 08 Band 1. Replace the obsolete HW for M2 CEM and upgrade SW. Re-scoped to go from start of PD phase to pass of CDR	15%
ENG09-210A: Engineering Safety (Chas Cavedoni)	For planning purposes shutter tie off is going to be considered done by the end of 2009 For planning purposes enclosure access door will be considered done at GN by the end of 2009	35%
ENG09-211: Tel Earthquake readiness (ENG08-029)	Project Name Changed to identify it as 2009 Band1 (was roll over)	85%
ENG09-900: Data Flow 2009	Restructuring of the Data Flow Project plan, April, 2009	58%

Summary of 2009 Band 1 Projects for the Engineering group (ENG) (Part 4)

Project Name	Project Description	% Compl.
ENG09-901: NICI at Up-Looking Port (Part of SCI09-118)	As approved by the ADs CCB this project is to improve NICI and have it fully functional at a Gemini Facility Instrument. The main tasks of the project are related to make it fully operational at the ISS up-looking port and assist on the array controller new firmware test to be developed and delivered by MKIR.	41%
GS A&G 6 Month Maint (May)		89%
GS A&G 6 Month Maint (Sept)		92%

Summary of 2009 Band 1 Projects for the Science group (SCI) (Part 1)

Project Name	Project Description	% Compl.
SCI09-011 Data reduction support F-2	Science Goals: Provide the PIs with the essential data reduction tools for Flamingos-2 Description: Includes support for Imaging, Long slit, and MOS, in that order. This project covers requirements, design and development, testing, and documentation. The data reduction support for Flamingos II will make use of the toolkits described in item SCI09-074.	20%
SCI09-014 Update current GMMPS to support F2	Allow mask design creation for F-2 (SCI08-046)	4%
SCI09-015 GMOS science support	Science Goal: Provide user support for GMOS-N and GMOS-S Description: This project contains all effort on GMOS-N and GMOS-S science support (on-sky checks, day-to-day support, web updates, semester changes, etc) as well as improvements done by the science team (AST, DAS, SSA). The instrument team will add detailed sub-projects and tasks and draft the priorities for these.	100%
SCI09-016 NIFS science support	Science Goal: Provide user support for NIFS. Description: This project contains all effort on NIFS science support (on-sky checks, day-to-day support, web updates, semester changes, etc) as well as improvements done by the science team (AST, DAS, SSA). The instrument team will add detailed sub-projects and tasks and draft the priorities for these.	100%
SCI09-017 T-ReCS science support	Science Goal: Provide user support for T-ReCS. Description: This project contains all effort on T-ReCS science support (on-sky checks, day-to-day support, web updates, semester changes, etc) as well as improvements done by the science team (AST, DAS, SSA). The instrument team will add detailed sub-projects and tasks and draft the priorities for these.Improve user support for T-ReCS (place holder task, need description) (SCI08-132)	100%
SCI09-020 Michelle science support	Provide baseline support for MICHELLE sci-op's.	100%
SCI09-025 Web Form for All Science Visitors	Improve visit organization (Complete NGO Visit web form SCI08-125)	63%
SCI09-026 Procedure and requirements for data reduction software provided by Aspen instrument teams	Science Goal: Enable implementation and integration of reduction software for the Aspen instruments, essential for the science productivity of these instruments (SCI08-111) Description: Ensure that the data reduction software that is to be provided by the Aspen instrument teams addresses the broad scientific needs of the Gemini community, and that its integration into the next generation toolkit is straight forward. For the Aspen instrument, the data reduction software will be part of the contract. It is imperative that procedures and requirements be set by Gemini to ensure that our needs and the needs of our users are addressed. Proper documentation needs to be written and passed along to the instrument teams.	32%
SCI09-027 Gemini Science Archive Operations	Science Goal: Ensure accessibility and usability of Gemini data to both our PIs and to the public user community Description: Gemini's side of GSA operations. Cost is as per the GSA Operations Contract.which I don't have the final version of to hand. Additional costs include ~ 1 CADC visit / year by GSA scientist approx $4000, also there are some hardware costs for example the gsag(n,s) transfer machines at each site. Suggest budgeting $1000/yr on average for hardware.	100%

Summary of 2009 Band 1 Projects for the Science group (SCI) (Part 2)

Project Name	Project Description	% Compl.
SCI09-030 NIRI science support	Science Goal: Provide user support for NIRI. Description: This project contains all effort on NIRI science support (on-sky checks, day-to-day support, web updates, semester changes, etc) as well as improvements done by the science team (AST, DAS, SSA). The instrument team will add detailed sub-projects and tasks and draft the priorities for these.	100%
SCI09-059 Nighttime Summit Support	Active collection of science data (SCI08-113)	100%
SCI09-060 Queue planning and daily preparation	Efficient queue execution: QC, daytime SSA, masks etc. (SCI08-114)	100%
SCI09-061 Long term queue planning (core QC, ITAC/TAC)	Science Goal: Maintain effective long-term queue management and QC training (SCI08-115) Description: group is tasked with long-term (semester and longer) queue management. This includes monitoring queue progress throughout the semester, and participating in the development of queue planning tools including qpt, ODB reports, etc. OpsWG preparations and participation and CfP also included here.	100%
SCI09-062 Data quality assessment and distribution	High quality and timely science product (SCI08116)	62%
SCI09-063 Phase II Support	Produce error-free observations ready for execution, all CS duties (SCI08-117). Summary tasks are split between GN & GS and semesters 09A & 09B. Total estimated hours for the year (used in annual planning) are 2236. This is an on-going operations project.	100%
SCI09-065 Science staff recruiting	Keep science staff positions filled (was SCI08-133). This project includes time spent on hiring committees to review applications and conduct interviews, as well as staff time to host visiting candidates, conduct summit tours, etc. For 2009, estimates assume 3 AST positions (openings as of Sept 2008), and 1 for each of the other groups (no current openings, but included as buffer against possible departures).	100%
SCI09-066 Science staff training	Better trained observers, SSAs and DAS for improved efficiency at night and better scientific product (SCI08-120). Includes QC training. Development of training documentation.	83%
SCI09-067 Lead SSA Duties	Time required by Leads SSAs at both sites (SCI08-200)	100%
SCI09-068 Lead DAS Duties	Time required by Head of the DAS at both sites 194 hours assigned to northern DAS group assuming 3 positions 181 hours assigned to southern DAS group assuming 2 people	100%
SCI09-069 Lead DPD Duties	Time required by Head of the DPDs. Manage a team of 6 (including supervisor) software developers and scientists involved in the development and maintenance of the Gemini data processing software used by the PIs and the upcoming pipeline. The task includes: Project management, team management, performance evaluations.	100%
SCI09-070 Research Productivity	Science Goal: Produce science (SCI08-127). Description: Much of the science staff has a research component in their contracts and this should be tasked and tracked like any other work. Measure time spent through timecard charging, and productivity relative to research-related performance goals.	71%

Summary of 2009 Band 1 Projects for the Science group (SCI) (Part 3)

Project Name	Project Description	% Compl.
SCI09-071 Science Mentoring	Science Goal: Increased scientific productivity and job satisfaction (was SCI08-131). Description: Time for senior astronomers to meet with junior astronomers for scientific guidance, particularly related to personal research work but can include support work and other aspects of career development. This project specifically covers astronomer mentoring only.	56%
SCI09-073 Maintenance of the data reduction package for operations and PI support	Science Goals: Support daytime and nighttime operations, and support the PIs with their data reduction. Description: Continue to provide the observatory with stable facility installation of IRAF, PyRAF and Python, and support the users of the Gemini Data Reduction Package....	100%
SCI09-074 Development of next generation data reduction toolkit	Science Goals: Facilitate new and improved modular data reduction tools that can be driven from both the pipeline and the interactive data reduction package (SCI08103) Description: The building blocks of Gemini's future DR needs. In 2009, we will be building onto a system developed in 2008....	76%
SCI09-075 Data reduction support for NICI	Science Goals: Provide the PIs with the essential data reduction tools fo NICI (SCI08110A) Description: NICI has very special data reductions needs that are not currently covered by the current package. New tools are needed. In 2009, complete, if necessary, the 'point-source' support. Then add to the suite support for the reduction of observations of extended source. The NICI campaign has its own software pipeline tools. Gemini will require development of similar tools to support queue observers.	20%
SCI09-076 NICI Campaign	This project encompasses effort required to conduct the NICI campaign (was SCI08-042). It is expected that the campaign will start in 2008 and so most of the "start-up" work will be completed by 2009; however, the NICI campaign will likely continue to require support above "typical" operations support provided to other queue programs. The FTEs listed here are guesses, detailed resource analysis is not done yet.	100%
SCI09-077 Instrument Performance monitoring	Regularly measure the total throughputs of all instrument to monitor system health (SCI08-001) The 2009 effort is to implement the plan fully as developed in 2008 and to continue the ongoing monitoring effort.	10%
SCI09-079 Improvement of the external sciops web pages	Improve staff access to information necessary to perform, plan and publish Gemini observations/data (SCI08-126)	98%
SCI09-080 Career Development and training	Staff development and improved productivity (SCI08-129)	100%
SCI09-081 Science staff travel between sites	Science goal: GN/GS interactions and consistent operations. Description: includes travel time only. (SCI08-134)	100%
SCI09-082 Head of SciOps Duties	Tasks associated with running science operations at each site	100%

Summary of 2009 Band 1 Projects for the Science group (SCI) (Part 4)

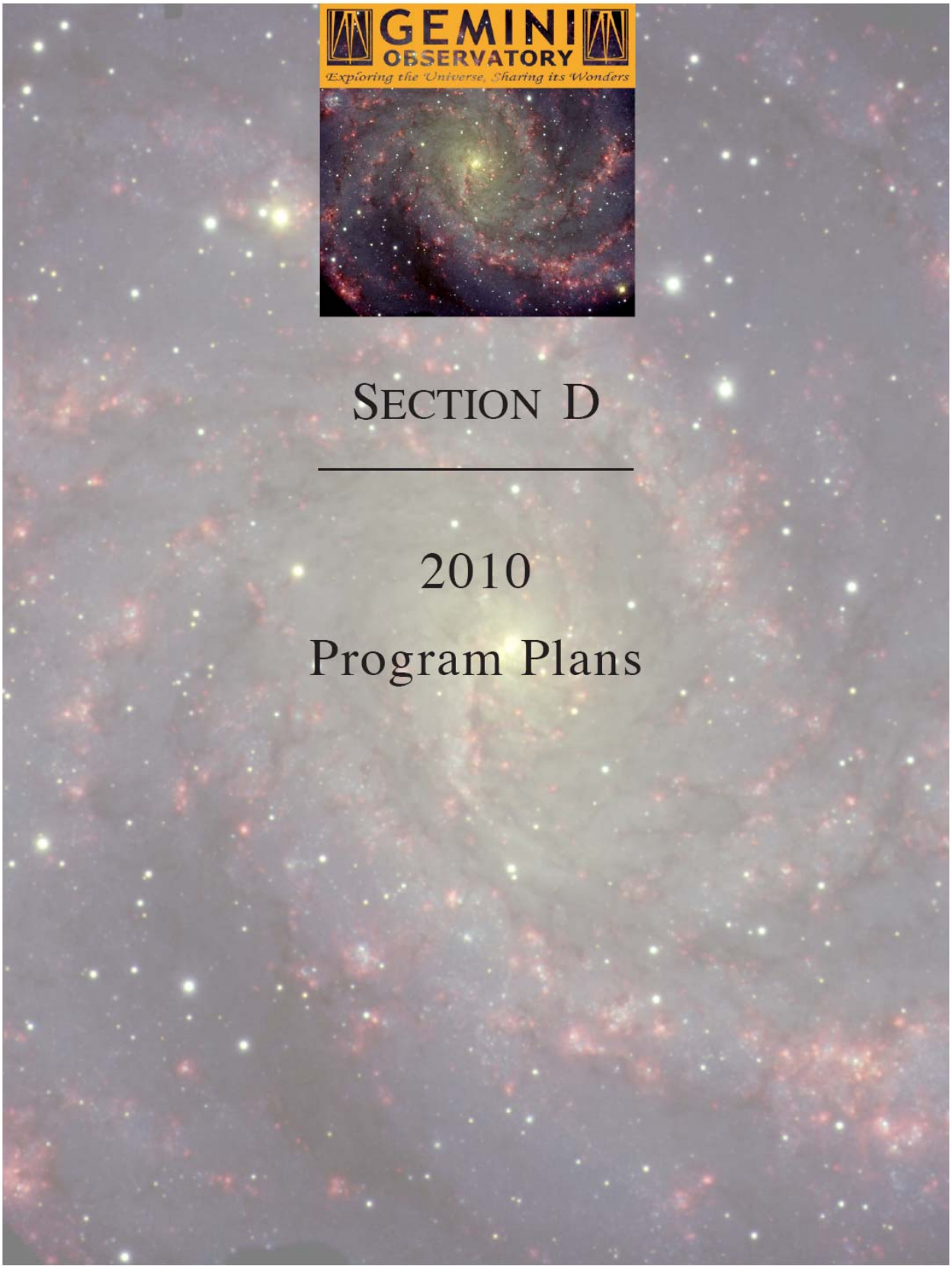
Project Name	Project Description	% Compl.
SCI09-092 Planning Process	Science Goals: We need to track the effort needed for the science staff participation in the observatory planning process. Description: This project includes the science staff effort needed for general observatory planning including developing the planning process (e.g. Project Insight), SPT work that does not fit into other duties, and work associated with the 2010 planning retreat. Estimated cost: $15000 for travel expenses	100%
SCI09-093 Observing Condition Review	A working group will review the way in which observing condition constraints are defined and utilized	100%
SCI09-094 NGO Interactions	This project covers staff visits to NGOs or partner National meetings as well as preparation of training presentations for the joint science staff meetings	91%
SCI09-096 Upgrade FITS Data Storage Infrastructure		53%
SCI09-097 Datalow Project QA Pipeline	Science Goals: Near-Real-Time automatic QA data assessement Description: Proceed with the dataflow project plan at least as far as deploying a QA pipeline at the summits. Includes: infrastructure, non data reduction components design & development (covered elsewhere). Eg. Calibration Manager, Recipe Processor, etc.) In this project we concentrate on the Science Staff contributions.	98%
SCI09-105 GSA Improvements	Science Goals: support, improve and streamline the data and metadata ingestion and distribution in the Gemini Science Archive. Description: there are several sub-tasks included here. The estimated effort and overall resourcing are done for the main task but detailed distribution of the resources needed can be different for each of the sub-tasks. Also includes the time required to support normal GSA operations (by the Gemini Project Scientist, indicated as GSAst below) - GSA operations support: required as a separate task only for the Gemini Project Scientist; for the DAS is part of the normal daily operations activities. The allocation for this task is 104hrs of GSAst resource time...	100%
SCI09-109 AstroData	Science Goals: Facilitate data reduction software development, automation, and robustness via a comprehensive data access infrastructure. Description: AstroData (formerly GeminiData) is at the center of the new Python data reduction software development. The specifics of each type of data is encapsulated and 'hidden' behind a generic interface. The first implementation is completed, it now needs to be cleaned up, documented, and a few additional features need to be added....	27%
SCI09-111 Data Reduction Recipes Development	Science Goals: Speed up data quality assessment and data reduction in general. Define standard way to reduce Gemini data. Support pipeline. Description: Each bullet is an independent subproject. Depending on the priorities for 2009, the selection of a subset of those will likely be required. Help from the instrument scientists or specialists in the reduction of a particular type of data will be required....	22%

Summary of 2009 Band 1 Projects for the Science group (SCI) (Part 5)

Project Name	Project Description	% Compl.
SCI09-113 GS Weather Forecasting System	Science Goal: Provide QCs and Observers with the tools to produce a near and short-term forecast of CP weather. Description: The current weather monitoring and forecasting tools for CP are limited. Recently, we have begun to receive limited forecasts from separate university groups in Chile. While this is a step in the right direction, we need to advance the system for the near-term (easy monitoring, limited forecasting) and prepare for the needs of the long-term and beyond (real-time queue scheduling)....	100%
SCI09-114 Pipeline PDR	Science Goals: Improve efficiency and data quality. Facilitate data reduction. Description: - Prototypes & Tests - Documentation for review - Presentation preparation - Preliminary Design Review - Response to the review committee Estimated budget is as follows: 4 external committee members, ~3 people form Gemini South $2000 for travel, $500 Hotel + other expenses. = 7* 2500 = $17500. This assumes we hold the meeting at HBF[X], not hire space at eg Imiloa. The biggest cost uncertainty is the price of flights.	100%
SCI09-117 External Astronomy Work: Professional and Public Outreach	Science Goals: Science staff participation in professional and public astronomy outside Gemini. DESCRIPTION: This project encompasses all of the astronomy work that staff do outside of Gemini support work and personal research. The professional activities that fall under this project include (but are not limited to) refereeing papers, serving on external TACs, proposal and grant review committees, and organizing meetings. This project could also include attending colloquia and science coffee, if we choose to define it that way....	100%
SCI09-119 Altair science support	Science goal: Provide user support for Altair. Description: This project contains all effort on Altair science support (on-sky checks, day-to-day support, web updates, semester changes, etc) as well as improvements done by the science team (AST, DAS, SSA). The instrument team will add detailed sub-projects and tasks and draft the priorities for these.	100%
SCI09-120 GNIRS science support	Science goal: Provide user support for GNIRS. Description: This project contains all effort on GNIRS science support (on-sky checks, day-to-day support, web updates, semester changes, etc) as well as improvements done by the science team (AST, DAS, SSA). The instrument team will add detailed sub-projects and tasks and draft the priorities for these. This project does not start until commissioning is complete.	100%
SCI09-121 Phoenix science support	Science goal: Provide user support for Phoenix. Description: This project contains all effort on Phoenix science support (on-sky checks, day-to-day support, web updates, semester changes, etc) as well as improvements done by the science team (AST, DAS, SSA). The instrument team will add detailed sub-projects and tasks and draft the priorities for these.	100%
SCI09-122 NICI science support	Science goal: Provide user support for NICI. Description: This project contains all effort on NICI science support (on-sky checks, day-to-day support, web updates, semester changes, etc) as well as improvements done by the science team (AST, DAS, SSA). The instrument team will add detailed sub-projects and tasks and draft the priorities for these.	100%

Summary of 2009 Band 1 Projects for the Science group (SCI) (Part 6)

Project Name	Project Description	% Compl.
SCI09-123 GNIRS science commissioning	Science goal: To make GNIRS available for science use. Description: This project contains the science effort involved in bringing GNIRS back to operations on GN. Detailed description and planning will be provided by the GNIRS science team. The team will use this project for planning and tracking the science effort for the commissioning.	4%
SCI09-124 Science Operations Statistics	Science goal: To track science operations efficiency and identify areas for improvement. Description: This project includes top-level time accounting for both sites, and science operations statistics: acquisition times, open shutter efficiency, coordinate distributions, instrument mode demand etc. This is an ongoing operations project. The effort for 2009 includes ongoing training of a DAS.	82%
SCI09-131 Flamingos-2 Science Commissioning	Description: This project includes on-sky commissioning work and all work required within science to prepare F-2 for operations. The bulk of the science effort will be included in this project, although some science FTEs will also be in the engineering F-2 commissioning project (and some eng. FTEs will be included here). Additional Notes From 2010 Planning: 30% left to do in 2010; this includes R3K grating.	23%
SCI09-134 LGS SciOps Improvements	SCIENCE GOALS: To obtain higher efficiency, especially during LGS runs. Description: This project includes improvements to LGS operations requiring mainly Science effort. This does not include the normal operations work which should be listed under the Altair support or engineering improvements which are in the engineering LGS project. FTE loading is set assuming we will use the available AST FTEs in the Altair team for this project as well as part of the effort from the GN AO scientist.	38%
SCI09-136 Science administrative tasks and meetings	The project carries the FTEs for admin within the staff. Also includes effort for participating in science staff meetings - joint and site specific.	100%
SCI09-139 Other Science Effort-Unplanned	This is not a real project, but a way to log time spent on unplanned tasks in the science group.	100%
SCI09-140 Science Software Development	This project will track the science staff effort needed for general software development not covered in other specialized Band 1 projects. The effort includes: -administering software planning in Project Insight, including working with scistaff to define and prioritize new tasks and requirements -strategic software development planning -logistics of software releases including general testing, web page updates, and science staff presentations -meetings with the software engineering group that discuss requirements, testing, and release planning. This work is tracked in the general software engineering project for 2008 (ENG08-011) and had been included in the similar project for 2009 (ENG09-170) during the planning process....	100%



SECTION D

2010

Program Plans

D. 2010 Program Plans

Overview

Figure D.1 – A candid shot of various members of the Directorate during the 2010 annual planning retreat, held in Kona, Hawai'i .

Similar to the format used in the previous section, here we describe a "sampler" of projects planned for 2010. These projects were developed across the entire observatory in the June-September 2009 timeframe before being assessed at Gemini's annual planning retreat in October 2009. It is during that annual retreat that much of Gemini's management team meets for two days to collectively discuss the merits/issues of projects proposed, and analyze the effort required to complete them. In practice only about 1/3 of the projects proposed make it through this process as "retreat approved band 1" projects. The remainder are generally moved to Band 2 status and will be considered for promotion to Band 1 during 2010 only if resources permit. Alternatively, they may be revisited during the next annual planning retreat.

It should be noted that the non-operations projects listed (the vast majority) are activities above and beyond what is considered nominal day-to-day baseline effort. In a sense they represent efforts across the entire observatory to grow, develop, and improve, consistent with Gemini's working culture in which we do not accept the status quo.

DIR10-007b – Data Reduction Workshop

Part of a broader initiative to improve direct communications between the Observatory and our community, this project is intended to bring together experts from Gemini's science staff and members of the community interested in learning the optimal methods for reducing their data. Nominally planned for mid 2010 in Tucson, this workshop will encompass a range of techniques for reducing optical and infrared data. Beyond members of Gemini's science staff, we also anticipate the workshop being supported by data reduction experts in the community, who have used Gemini's reduction software on a variety of data and will share their experiences with the community.

DIR10-007 – MCCWG Staff Training Classes

Though the effort for this project is coming primarily from the members of the Managing Communications and Commitments Working Group, to emphasize the importance of this training it is officially listed under the Directorate's project list. This training has its origins in the Landmark program that essentially all Gemini staff have had the opportunity to participate in, which is focused on communications, leadership, and the importance of maintaining institutional integrity through the preservation of our individual commitments. The training covers the gamut and includes e-mail (how to avoid being swamped with e-mail, the importance of prompt responses and techniques to ensure them, etc.), how to run more effective meetings (the use of agendas, minutes, written actions, etc.), managing commitments (following up, etc.), multitasking methods (patterned after the "Getting Things Done" book by David Allen), and making time to think (the importance of reserving time in our busy schedules for creative thinking, methods for achieving this, etc.).

AFG10-005 – Gemini North Transportation Efficiency

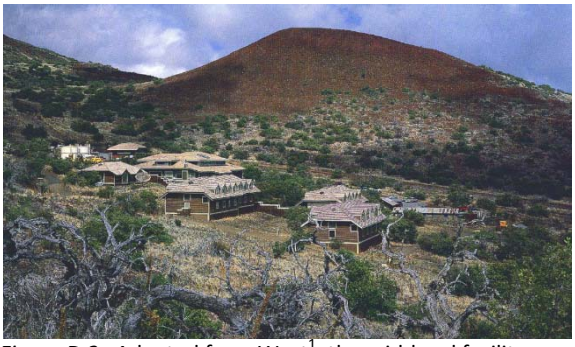


Figure D.2 –Adapted from West[1], the mid-level facility known as Hale Pohaku is the evening gathering place for astronomers who come from around the world to observe from the summit of Mauna Kea. Finding more cost effective methods to transport Gemini's staff to/from this facility will be the subject of project AFG10-005.

A follow-up to AFG09-012 (Mauna Kea Collective Transport Study), this project will analyze options to reduce our transportation costs at Gemini-N, principally through car pooling with other observatories. A much more extensive assessment was made in 2009 across the MK observatories but, in the end, it was not adopted. In Gemini's case, the cost to participate in the Hilo/Waimea to Hale Pohaku transportation system exceeded what it now costs Gemini to operate its own transportation service. Nonetheless, it was identified through that project that a cheaper alternative may exist in the form of simply pooling existing vehicles when/where possible rather than centralizing transportation services and using new vehicles. During 2010, through AFG10-005 we will look in detail at scheduling possibilities for transporting staff between Hilo and Mauna Kea using existing fleet vehicles.

AFH10-007 – LEED Compliance Feasibility

As mentioned in the previous summary of DIR09-003 (Energy Conservation and the "Greening" of Gemini), the second year of Gemini's multiyear effort to reduce energy consumption and our carbon footprint on the environment includes an assessment of achieving LEED certification of the Hilo Base Facility. It is our expectation that through this well established program, Gemini can achieve further reduction in its consumption of various resources, ranging from energy to water and paper. Borrowing from the LEED web page –

"The LEED green building certification system is the preeminent program for rating the design, construction and operation of green buildings. 35,000 projects are currently participating in the LEED system, comprising over 4.5 billion square feet of construction space in all 50 states and 91 countries."

Figure D.3 – In 2010 Gemini will assess the feasibility of achieving LEED certification of its Hilo Base Facility.

Gemini looks forward to joining this program as part of our multifaceted approach to demonstrating leadership for our community, be it through safety systems, planning and management, communications, and of course, world-class science.

CTR10-003 – Web Based Time Card Solution

For many years Gemini achieved time accounting through the use of paper forms that were individually filled out, signed, and transferred across the facility to support payroll, track hours for special programs, research time, etc. That system migrated to an entirely electronic, web based system several years ago, which has been deployed at both sites (i.e., in English and Spanish). While a large improvement, other central software resources have moved on, in particular our administrative group now uses Ultipro for a

[1] M. West, "A Gentle Rain of Starlight: The Story of Astronomy on Mauna Kea", Island Heritage Publishers, 2005.

range of applications (finance and HR). Furthermore, the need to track hours through Project Insight in a systematic manner to improve our time estimation process has been an issue for several years. This project is an attempt to consolidate several electronic systems currently used with the ultimate objective of a single system used to enter/track hours for everyone on the staff in a seamless, efficient manner.

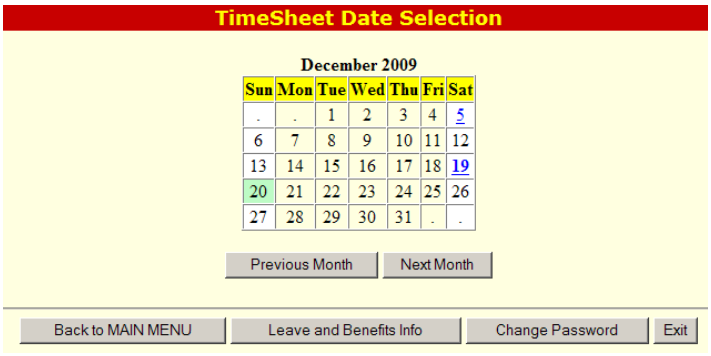


Figure D.4 – Gemini migrated from a paper timecard system to an electronic system (above) several years ago. The next step in the evolution of this system is to link UltiPro, the new accounting and HR software being used across AURA, with Project Insight, to form a single comprehensive time accounting system

HR10-001 – Mentoring Program

An essential element of Gemini's Broadening Participation program is to nurture a workplace that promotes mentoring across all sectors. The ultimate objective of this project is captured in the final sentence of its description, as loaded into Project Insight –

"The result of an effective mentoring process is a self-confident and competent professional who also values what employees can do collectively on behalf of their organization and its strategic initiatives."

Gemini's staff includes a remarkable array of talented individuals which collectively have an enormous amount of experience to share, particularly with members of the junior staff. This project is going to target junior members of the science and engineering staff, as a test program for an expanded mentoring effort in future years. Ideally a program like Gemini should be a launching pad for the careers of many on its staff, as new opportunities arise and interests develop beyond those crystallized through college experience. Developing a mentoring program which makes it easy for the younger members of our staff to tap the experience our senior staff is an excellent way to promote career development. In the end, professional experience is but one aspect of the life experience. Given the large amount of time we dedicate to our careers, it only makes sense to ensure that experience is as rewarding as possible.

Figure D.5 – In 2010 Gemini will upgrade its aging "fleet" of videoconferencing systems to provide higher quality and reliability telecommunications for our highly distributed staff. Leveraging off past investments, the move to more advanced video systems will further enable Gemini's push to reduce travel and, with it, operating costs.

ISG10-007 – Polycom Upgrades

Consistent with the strategic planning already devised within the administrative group, this project intends to upgrade Gemini's various Polycom systems with more modern hardware, including high definition video systems. They will provide a more seamless, integrated Videocon system for Gemini's staff to use for years to come. Part of our long term plan is to rely more on this type of infrastructure and less on travel to support our operations. With the spiraling cost of oil, not to mention the significant carbon contributions aircraft leave in the atmosphere, Gemini has already taken steps to reduce its travel budget. For a highly distributed

operation like Gemini, this is not a small matter but past investments made in high speed telecommunications systems, including broadband fiber links to S. America, have enabled such telecommuting. It makes sense for Gemini to leverage off these existing investments to keep travel to a minimum in the years ahead. That said we do not envision stopping all travel by staff between sites. While Gemini staff are extremely adept already at videoconferencing, key personnel which exist at only one site still need to periodically visit the other and some tasks simply cannot be pursued through electronic means.

SAF10-006 – Emergency Preparedness

Started last year, this is a continuation and modification of a project already in the works. It will include developing plans and procedures for handling a variety of natural disasters (e.g., earthquakes, hurricanes and epidemics), as well as other risks to Gemini's staff and business operations. Past delays in finalizing these plans have in large part been due to the retirement of Gemini's previous safety program manager in 2007, together with unplanned but higher priority activities driven by external agencies on Gemini's Directorate. Nonetheless, we anticipate making progress on this important component of our safety program in 2010 under the leadership of Gemini's new safety program manager, Rodrigo Sandoval.

DEV10-003 – GMOS-N CCD Upgrade

A continuation of project DEV09-011, the procurement of red sensitive CCDS, this project features contracted work primarily at HIA in 2010. Activity will focus on the integration of the already delivered Hamamatsu CCDs into a single focal plane, including the precision metrology needed to yield a well defined assembly that is opto-mechanically compliant with the stringent requirements demanded by the GMOS camera. An advanced new SDSU-III controller will be used in this new GMOS detector configuration, providing much faster readouts than were ever possible using the previous generation SDSU controller and E2V CCDs. The focal plane will be fully tested in a dewar to evaluate its speed and noise performance and verify that inter-channel cross-talk is minimized. Once the standalone performance of the focal plane is established in this test environment, it will be transferred into GMOS-N in mid 2010 before being commissioned by the Gemini science staff and released for general use to the community.

ENG10-032 – GNIRS Repair

The final phase of the repair of GNIRS will be completed under this project in 2010. In parallel with the necessary commissioning project led by our science operations team (SCI10-207) this project represents the culmination of an enormous effort to disassemble, clean, repair, and reassemble GNIRS in the HBF lab to provide this enormously important research tool back in the hands of our community. This project includes a final planned pair of cold cycles in the HBF lab, to complete mechanism and flexure testing under various orientations with the new science detector installed in GNIRS. Once the instrument has been verified to be ready for on-sky tests, ENG09-011 (GNIRS AT + Commissioning) begins in concert with our science operations projects to wrap up all the steps needed to bring GNIRS back into service. As mentioned before, this activity, combined

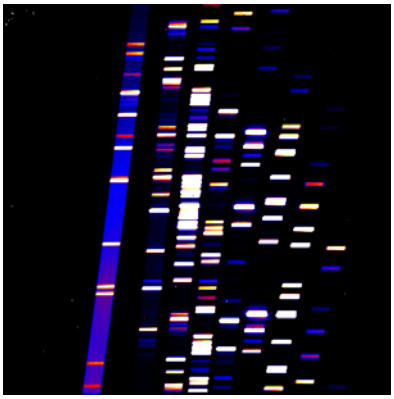


Figure D.6 – One of the first spectra recorded by GNIRS in the lab in its cross-dispersed mode is shown. This was a welcome sight for an instrument that had been on "life support" for a couple of years, but is about to begin its second life on Mauna Kea in 2010.

with repair work on FLAMINGOS-2 (replace its science detector which was damaged during shipping) will yield for the first time in the observatory's history first class multi-purpose near-infrared spectrometers on both Gemini telescopes. We anticipate many years of service from these instruments in the future and a spectacular wealth of science through their use by our community.

ENG10-016 – F2 Fixes and Improvements

This project includes not only the crucial replacement of its partially delaminated detector, but also mechanical work to improve the reliability of a number of component in FLAMINGOS-2, including its internal deployable baffle adjacent to the instrument's large gate valve, possible modifications to the MOS dewar's cooling system, and a thorough analysis of the instrument's vacuum performance, which has shown fairly large variations on short time scales for unclear reasons. The instrument's high resolution mode has not been demonstrated yet due to a pre-ship failure of the R3000 grism which it was agreed would be installed later, when a new grism is available. To be clear, the vast majority of the instrument's acceptance tests have been passed through a series of pre-ship and post-shipment testing, but the Observatory is going to take several steps in conjunction with replacing the science detector to help ensure the reliable operation of FLAMINGOS-2 after it is released for general use at Gemini-S.

SCI10-244 – GMOS-N CCD Science Commissioning

This project, which is led by science operations, follows the aforementioned DEV and ENG projects in 2010 which are collectively designed to yield the most significant upgrade to Gemini's most scientifically productive instrument since it was delivered nearly a decade ago. A number of important tasks are included in this project including charge transfer tests, evaluations of bias stability, nod-and-shuffle tests, geometric field transformations using a precision pinhole mask, spectral throughputs, World Coordinate System measurements, and much more. These are essentially the same steps used successfully when GMOS was originally delivered to Gemini-N.

SCI10-301 – LGS tip/tilt with P1

Part of Gemini's effort to improve its northern AO system performance includes testing it in the absence of a tip/tilt guide star illuminating the NGS sensor in ALTAIR. The intent of developing this mode is to at least achieve good enclosed energy (vs. high strehl) across the entire sky. For NIFS, which samples the sky using pixels that are large compared to the diffraction limit of the telescope, increasing the AO system performance in terms of sky coverage while providing good enclosed energy (with respect to the NIFS spatial sampling on the sky) will mean NIFS can be used on essentially any object in the northern sky. Combined with the demonstrated sensitivity gain of NIFS with respect to competing instruments on Keck and VLT, opening this mode up for our community will

Figure D.7 – Laser AO operations on Mauna Kea are arguably the most advanced on any site worldwide, as demonstrated here with sodium lasers being concurrently propagated by Keck, Subaru, and Gemini. The considerable experience Gemini is gaining from the ALTAIR LGS system is being incorporated into MCAO at Gemini-S. Photo credit: Subaru Observatory

give Gemini an irrefutable lead in near-infrared integral field spectroscopy. Before we can make that claim though, a variety of tests in SCI10-301 must be completed to evaluate adaptive optics image quality using this hybrid wavefront sensor feed, in which the wavefront sensor signal is coming from a peripheral guide probe instead of the ALTAIR natural guide star sensor, which is limited in sky coverage by the field lens currently used to ground conjugate ALTAIR (which yields wider field correction).

2010 Retreat Approved Band 1 Projects for the Directorate (DIR)

Project Name	Project Description
DIR10-020: Revised Budget Proposal	This project is in response to the Nov. 2009 Board meeting directive to develop options to continue to operate Gemini in light of the UK's withdrawal post 2012. To first order this means operating Gemini with ~25% less funding, though details of the actual level of funding available and the exact timeframe over which cuts are made remain to be determined. At this point this project is merely a planning exercise for the future. The nominal timeline for this project extends through March 2010, the time of the Board Retreat. It may be extended past that date as options are iterated with the Board and further effort is needed to resolve uncertainties.
DIR10-013 Implement better support for Instruments	Develop revised approach for transition instruments from Dev to ENG, and supporting them thereafter.
DIR10-007b: Data Reduction Workshop	Data reduction workshop, in collaboration with NGO(s), to help Gemini users obtain their scientific results and publish their data. Part of the larger program to engage the Gemini community.
DIR10-015: Hiring ADSciOps	Selection and mentoring of new AD SciOps to replace Dennis
DIR10-009: Internal Web Page Portal Redesign and Planning for Site Overhaul	Redesign internal home page, establishing top-level links that will be available from it and uniform Observatory links accessible from secondary pages. Set policies as required for internal website, including identifying content that should be public. Define the scope of a future project to eliminate outdated information and reorganize content, especially with respect to areas of overlapping interest among groups. Estimate the resources required to complete a full site upgrade.
DIR10-006: Establish Concerns/Suggestions Blog	Establish a Concerns/Suggestions Blog on the internal website where employees can post concerns and suggestions. Members of the Directorate will commit to checking the blog at regular intervals to addressing the issues and suggestions in staff meetings, the blog itself or some other suitable venue.
DIR10-017: Establish availability of in-house resources for development and support of instruments	Some development and support of instruments are contracted out, which in some cases is not an ideal solution. As such, identify those in-house resources (from Engineering, IS, and Dev) that could produce a better result.
DIR10-018: Directorate Operations	This project is a place holder for Directorate members.
DIR10-004: International Agreement Negotiations	This is a placeholder Band 2 project that will be detailed and promoted to Band 1 in 2010 when Gemini's role in these negotiations is defined by the Board, at which point we can begin to plan resources consistent with that role.
DIR10-005: MCCWG Staff Training Classes	Training programs provided by members of the MCCWG, providing tools that help individuals to manage their communications and keep track of their commitments. Five classes will be available: Email training, task management, setting deadlines and following up with integrity, effective meetings and making time to think.
DIR10-007: Community Engagement	A multifaceted project intended to increase the level of bilateral exchange between the Gemini Observatory and user community. The project consists of several parallel tracks, recognizing that no single strategy is likely to significantly improve community relations/engagement on its own. These include the use of blogs, town hall meetings, sponsoring a data reduction workshop for the community, and speaking engagements at key universities and institutions.
DIR10-011: Implementation plan of the new GS summit crew work schedule	Elaborate a plan to implement this new schedule

2010 Retreat Approved Band 1 Projects for the Administration Facilities Group (AFG)

Project Name	Project Description
AFG-010: 003 AFG Operations	AFG day-to-day operations include the maintenance of base-facility buildings and grounds, vehicle fleet management, travel services, visitor support, reception services, and administrative support for various departments, including the Directorate.
AFG-010-002: Earthquake Risk Mitigation	Both Hawai'i and Chile have suffered Earthquakes in the past. The purpose of this project is to provide people with a safe working environment and to be as prepared as possible for earthquakes at both sites. Reports have already been produced indicating areas for improvement at both sites. This work is considered a high priority for the base facilities in 2010.
AFG-010-004: Security Measures - Keyless Access	A key component of Gemini's long term security initiative is the installation of an electronic keyless access system at both Gemini sites, Hawai'i and Chile, based on the Keyscan access system expanded in 2009 at HBF and MK summit. The system will provide programmable, controlled and trackable access to selected areas of buildings and facilities at SBF and Cerro Pachon, improving building and staff security. As an integrated program across both sites, the keyless access system will also improve the quality and efficiency of the visitor handling process.
AFG-010-005: Gemini North Transportation Efficiency	Establish safe, more energy and cost-efficient transportation for staff travel between HBF and Mauna Kea.
AFG-010-007: LEED Compliance Feasibility	Using the U.S. Green Building Council's operation and maintenance guidelines for Leadership in Energy and Environmental Design (LEED) certification standards for Existing Buildings, determine the feasibility, approximate costs and expected benefits of seeking LEED certification for the Hilo Base Facility. LEED provides a complete framework for assessing building performance and meeting sustainability goals. Based on well-founded scientific standards, LEED emphasizes state-of-the-art strategies for sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality. LEED for Existing Buildings (LEED-EB) is a set of performance standards for the sustainable operation of existing buildings. It includes building operations and upgrades of systems in existing buildings.
AFG-010-008: Online forms, digital signatures and Docu-Share	To introduce Docushare within AFG in 2009, in order to be able to better share large volumes of administrative and facility related material across the organization in an user-friendly manner, increase group collaboration especially for virtual teams, to better manage and securely store such information and to promote materials and storage cost savings, improved process efficiency and work quality.
AFG-010-009: Committee Archives uploaded to Docu-Share (or similar on-line document storage system)	To facilitate the needs of the Committees, Directorate and AFG, save time and always have access to the latest version of any modified document and to ensure that a proper historical record is kept and readily available for such Committees; ensuring regulatory compliance.

2010 Retreat Approved Band 1 Projects for the Controller Group (CTR)

Project Name	Project Description
CTR10-001: Daily Operations	Daily Operations
CTR10-002: CONTROL Budget Training and Setup	Setting up a system that will help us streamline our budgeting process by: 1. Setting up a system/method to budget employee wages 2. Enable our managers to enter their budgets and than allow us to import after verification 3. upgrade to Version 9
CTR10-003: Web Based Time Card Solution	After converting to the new payroll software, UltiPro, we would like to investigate and implement a new web based timecard system that will be compatible. This process will include looking at solutions within UltiPro, third party vendor solutions (canned packages), and developing a solution in house.
CTR10-003a: Web Based Time Card Solution Implementation	To develop the solution for our web based time cards. This solution will be based upon the results of CTR10-003. This could be a totally in house developed solution, a canned package that has been purchased and possibly modified, or some other tyoe of solution. This project is currently resourced based upon an in house development solution which should require the most resources of the anticipated solutions.
CTR10-004: Accounting Internal Web Pages	To update the information and look of the accounting departments internal web pages.

2010 Retreat Approved Band 1 Projects for the Human Resources Group (HR)

Project Name	Project Description
HR10-001 Mentoring program	Develop a pilot mentoring program to cover Junior Scientists and a targeted group within Engineering at Gemini. Also to include, through Broadening Participation, remote mentoring of Science students external to Gemini in supporting their successful attainment of a PhD. External Mentoring of students could involve partnering with Fisk/Vanderbilt universities in the US and the development of other pilot initiatives for areas such as Journey through the Universe. The Mentoring Process (from the International Mentoring Association). A developmental process in which a new and an experienced employee commit to working and learning together in a mentoring relationship over at least two years for the purpose of mutual support and professional development. The mentoring process includes a series of phases in which the mentor's leadership of the process is adapted to the developing strengths and changing needs of the mentee. The result of an effective mentoring process is a self-confident and competent professional who also values what employees can do collectively on behalf of their organization and it's strategic initiatives.
HR10-002: Develop Habits to Support Our Working Culture	Develop habits to support our working culture using suggestions from the Managing Communications & Commitments Working Group, Vanto Principles, and working culture document. Create campaigns and other "marketing strategies" to develop habits associated with the six values in the working culture. Use various methods of communication and training to support positive habit forming aligned with working culture.
HR10-003: HR Operations	Basic Operations
HR10-004 : Research Feasibility of Offering Telecommuting and Flexible Schedules	Research the feasibility of offering telecommuting and flexible schedules
HR10-005: Planning Process of 2011	Develop plans for next year.
HR10-006: Development of formal internship program	Formalize and expand current Gemini internship program to ensure best practices. Development of a consistent and successful internship program to include position descriptions, durations, process, recruitment, sourcing, outreach, inductions, benefits, security and safety, admin support, projects, conclusions, follow-up practices.
HR10-007 : Development of HR pages on the internal website	In order to increase communication and provide support to all staff, development of HR pages on the internal web. Will assist in the consistent implementation of policies and pay practices, will be available 24 hours and will just be a good thing to have.

2010 Retreat Approved Band 1 Projects for the Information Systems Group (ISG) (Part 1)

Project Name	Project Description
ISG-10-001 : Rearchitect Gemini DNS	Upgrade/replace aging Solaris based Domain Name Servers at each site
ISG-10-002 : Windows 7	Research merits and pitfalls of upgrading to Windows 7. Develop deployment plan as appropriate
ISG-10-003 : WiFi Enhancements	Replace/supplement existing AP's at all sites with faster units that support the 802.11n standard
ISG-10-005 : SBF Server upgrades/Replacements	Upgrade/replace aging SPARC and X86 hardware at the SBF base facility. Identify standalone hosts/services and appropriate applications for virtualization.
ISG-10-006 : ISG Internal website	Improve look, usability and content. Add policies, guidelines and howto's
ISG-10-007 : Polycom upgrades	Upgrade all meeting rooms with High Definition systems. Redeploy newer VSX series to other public systems. Replace all legacy 'viewstation' series with newer models.
ISG-10-009: MK Summit Server upgrades/replacements	Upgrade/replace aging SPARC and X86 hardware on MK summit. Identify standalone hosts/services and appropriate applications for virtualization.
ISG-10-010 : HBF server upgrades/replacements	Upgrade/replace aging SPARC and X86 hardware at the Hilo base facility. Identify standalone hosts/services and appropriate applications for virtualization.
ISG-10-011 : PIX Firewall replacement	Replace PIX Firewalls at each site with more modern Cisco ASA series firewalls. Redeploy PIX hardware within the internal network i.e. to provide additional protection to the Telescope.
ISG-10-012 : IS Configuration Management System	Develop/purchase system(s) to manage Information Systems configurations, i.e. router, firewall and switches, end-user machines and systems that fall outside of what KBOX can manage.
ISG-10-014 : Centralized Storage Expansion & Redundancy	Upgrade Netapp filers at all sites with 10TB of extra storage space. Install 'snap mirror' on each filer to permit cross-site data duplication.
ISG-10-015 : Syslog services	Upgrade/enhance Syslog services. Research & test syslog solutions i.e Qradar, splunk and deploy chosen solution at each site
ISG-10-017 : GN Print Server	Deploy new print services at Hilo - green initiative to monitor & reduce printing waste
ISG-10-019 : Gemini CyberSecurity Program (Phase 2)	Continued implementation of security controls, creation of policies and guidelines, introduction of staff cybersecurity training program
ISG-10-020 : Daily Email Digester	Millicent's alma mater, Pomona College, developed an ingenious way of dealing with large numbers of internal email that needed to be posted like a bulletin board type of thing. They call it The Digester. If you wanted to email everyone, you just went to this webform and put in your message. Every day this would be compiled automatically and would be sent out to all the students ONCE a day in the morning. It is an html email with set categories each with clickable subject lines. Clicking on the subject lines you are interested in jumps you to the relevant part of the Daily Digest.
ISG-10-021 : Improved Gemini Search Tool	A Gemini.edu search tool to enable searches through our entire on-line presence (including our blogs, document archives, etc.)
ISG-10-022 : Summit Web Servers for Telops	Deploy dedicated web servers on each summit to host information critical to night time operations

2010 Retreat Approved Band 1 Projects for the Information Systems Group (ISG) (Part 2)

Project Name	Project Description
ISG-10-023 : CP Summit Server upgrades/replacements	Upgrade/replace aging SPARC and X86 hardware on CP summit. Identify standalone hosts/services and appropriate applications for virtualization.
ISG-10-025: Remedy Enhancements	Users have requested enhancements to the new Telescope Fault Reporting and Helpdesk Systems.

2010 Retreat Approved Band 1 Projects for the Procurement Group (PRO)

Project Name	Project Description
PRO-10-000: Procurement Department Operations	Baseline operations.
PRO-10-002: Address BSR issues, including Improve sole source justification and price analysis compliance	Goal: Improve compliance with sole source justification and price analysis requirements as required by BSR report and address other recommendations from the BSR report.
PRO-10-007: Continued Pita development	Continue development of the Property Inventory Tracking Application.
PRO-10-010: Improve export regulation compliance	Goal: Review Gemini's compliance with export control regulations, especially in the area of "deemed exports" (foreign nationals working with export controlled items inside the US) and modify policies and procedures as needed.
PRO-10-011: Additional backup for Dom and Alice	Goal: To find and train an additional person (besides Winnie) to cover for Alice and/or Dominic when they are out. Ideally this would be someone who we could hire a temp to cover some of their regular duties when they are substituting for Alice or Dom.

2010 Retreat Approved Band 1 Projects for the Safety (SAF)

Project Name	Project Description
SAF10-001: 4.2 S&H Policy	Annual Review, Communication, Proof of training
SAF10-002: 4.3.1 Hazard Identification	Support Engineering Group in performing "Risk Assessment" in their operating procedures using Standardized Flow Chart (SFC) and Standardized Work (STW).
SAF10-003: 4.3.3 Objectives and Targets	Work with each group to define Safety KPI's according to their operations
SAF10-004: 4.4.2 Competence & Training	Provide and confirm legally required Safety training occur in Gemini
SAF10-005: 4.4.6 Operational Control	Review and update Safety procedures: Fall prevention, Lockout, Electrical Safety and Confined Space.
SAF10-006: 4.4.7 Emergency Preparedness	Development and review of Emergency procedures: Evacuation, fire, use of extinguishers, drills, earthquake, disruption plan, severe weather, riot acts, bomb threat, communications.

2010 Retreat Approved Band 1 Projects for the Public Information and Outreach Group (PIO)

Project Name	Project Description
PIO10-001 Ongoing Operations	This includes all ongoing PIO activities as detailed in the individual tasks that are included in this project.
PIO10-002 Gemini South Mirror Coating Documentation	Time lapse (HD video and still photography) documentation of entire coating process for the GS primary mirror. This includes training by Kirk Puâuohau-Pummill with Manuel P. and full-presence for all stages of mirror coating from instrument removal to installation. This product is helpful for safety and overall process training as well as educational programming related to careers, as a media resource and sharing overall operations with public/media.
PIO10-003 GeminiFocus "Evolution Plan"	Reduce data from December 2009 GeminiFocus reader survey and partner country distribution plans and develop plan for future content, media (printed vs. electronic) and distribution of GeminiFocus.
PIO10-004 GN/GS Program Parity	Begin implementing a Journey through the Universe-type program in Chile as pilot project by engaging scientists in local classrooms and provide limited training to scientists to prepare for classroom visits. Goal will be to have at least 6 Gemini scientists participate in first year program with invitation for up to 4 CTIO scientists as well in 2010.

2010 Retreat Approved Band 1 Projects for the Development Group (DEV)

Project Name	Project Description
DEV10-001 : GPI Support	Support for GPI- includes build phase support and management, required software development as Gemini deliverables, and commissioning contracting negotiations.
DEV10-003 : GMOS-N CCD Upgrade	Continuing contracted work started in 2009 to procure and integrate new red-sensitive deep-depletion CCDs into GMOS-N with an upgraded controller and other misc. components. CCD vendor is Hamamatsu; integration vendor is HIA.
DEV10-007 : 2010-2015 Instrument Plan Development	We need to develop the plan for the next generation of Gemini instruments. The process will include meetings in each individual partner country and culminate in a large collaboration-wide meeting, similar to the previous Aspen meeting. Astronomer time is mainly to attend and contribute to National and Aspen-like meetings.
DEV10-008 : 2011 Planning	We need time to make our 2011 plan.
DEV10-009 : Professional Development	Development Group members professional development and training.
DEV10-013 : Presentations and Meetings	Development makes lots of presentations to the Board, GSC, OPSWG, etc. This task encapsulates the time necessary to accomplish all of them.

2010 Retreat Approved Band 1 Projects for the Engineering Group (ENG) (Part 1)

Project Name	Project Description
ENG10-101: O&M GS Months May Shutdown (B. Walls)	Detailed plan to execute the shutdown. Detailed plan of preparations to execute the shutdown.
ENG10-102N: O&M GN in Situ Wash (R Wyman)	Detailed in situ wash plan. Detailed in situ was improvements plan. Detailed in situ was preparation plan.
ENG10-102S: O&M GS in Situ Wash (T. Vucina)	Detailed in situ wash plan. Detailed in situ was improvements plan. Detailed in situ was preparation plan.
ENG10-103: O&M Eng. Spares Project (S. Hardash)	Current spares inventory list. Spares inventory list update program. Each group spares procurement plan development program.
ENG10-104: O&M Eng. writting procedures (G. Arriagada)	Each group writing procedures plan for the year.
ENG10-105: O&M 2010 GS coating facilities preps (B. Walls)	All the preparatory tasks needed to successfully execute GS M1 coating shutdown. It does not include the coating process preparatory work.
ENG10-106: O&M 2010 GS coating process preps (B. Walls)	All the activities related to the coating process preparatory work that needs to take place before the M1 coating shutdown. To mention: Coating chamber mechanisms functionality. Coating chamber vacuum system functionality. Magnetron and coating equipment functionality. Wash cart rotation functionality. Coating process definition. Coating samples production.
ENG10-107: OM 2010 GS coating shutdown (B. Walls)	Details plan that includes all the activities to be executed during the shutdown.
ENG10-108: O&M Eng managers duties (G. Arriagada)	Time allocated to execute all the tasks in the engineering managers duties instructions set
ENG10-109N: O&M GN Management Tasks (S. Hardash)	GN TIO M planning duties Attendance of eng, managers and techs to coordination meetings and safety meetings TTMs shifts time accounting.
ENG10-109NA: O&M GN Management Tasks (S. Hardash)	In this project is placed the TTMs calendar. Due to the different work schedule this task was treated as separately.
ENG10-109S: O&M GS Management Tasks (R. Rogers)	This project covers: GS TIO M planning duties Attendance of eng, managers and techs to coordination meetings and safety meetings TTMs shifts time accounting.
ENG10-109SA: O&M GS Management Tasks (R. Rogers)	In this project is placed the TTMs calendar. Due to the different work schedule this task was treated separately.
ENG10-110N: O&M GN Predictive Maint & Routine Ops Tasks (M Calderara)	This project covers: All routine daily telescope and instrument functional checks performed by the day crew All daily, weekly, monthly, etc. routine plant room, fifth floor checks, dome checks, instruments checks. All routine clerical work. All routine janitorial work. Preparation and operation of laser system.
ENG10-110S: O&M GS Predictive Maint & Routine Ops Tasks (D Maltes)	This project covers: All routine daily telescope and instrument functional checks performed by the day crew. All daily, weekly, monthly, etc. routine plant room, fourth floor checks, dome checks, instruments checks. All routine clerical work. All routine janitorial work.

2010 Retreat Approved Band 1 Projects for the Engineering Group (ENG) (Part 2)

Project Name	Project Description
ENG10-111N: O&M GN Corrective Maintenance Tasks (S. Hardash)	Telescope, enclosure, instruments and support building corrective maintenance tasks included in this project are: Escalation team related activities. Escalation team triggered corrective maintenance tasks. Fault Reports triggered corrective maintenance activities. Corrective maintenance activities triggered by predictive maintenance inspections. Pending corrective maintenance tasks identified by previous year's Fault Reports list. Snow removal activities. Hurricane threat activities. Big Earthquake triggered activities. Any other corrective maintenance activities not covered by the list above.
ENG10-111S: O&M GS Corrective Maintenance Tasks (R. Rogers)	Telescope, enclosure, instruments and support building corrective maintenance tasks included in this project are: Escalation team related activities. Escalation team triggered corrective maintenance tasks. Fault Reports triggered corrective maintenance activities. Corrective maintenance activities triggered by predictive maintenance inspections. Pending corrective maintenance tasks identified by previous year's Fault Reports list. Snow removal activities. Big Earthquake triggered activities. Any other corrective maintenance activities not covered by the list above.
ENG10-112N: O&M GN Preventive Maintenance Tasks (S Hardash)	Telescope, enclosure, instruments and support building preventive maintenance tasks included in this project are: Site maintenance programs triggered activities. Instrumentation maintenance program triggered activities. Telescope systems and enclosure maintenance program triggered activities. LGSF maintenance program triggered activities.
ENG10-112S: O&M GS Preventive Maintenance Tasks (R Rogers)	Telescope, enclosure, instruments and support building preventive maintenance tasks included in this project are: Site maintenance programs triggered activities. Instrumentation maintenance program triggered activities. Telescope systems and enclosure maintenance program triggered activities.
ENG10-113: O&M Software Tasks (V. Upadhya)	This project covers: All OCS improvements tasks in preparation for releases. All Fault Reports triggered corrective maintenance tasks. All Escalation Team triggered corrective maintenance tasks. All operational needs triggered improvement tasks. All engineering needs triggered improvement tasks.
ENG10-115: O&M GN Jan & Jul Months Shutdown (B. Walls)	This project includes the detailed plan to execute the shutdown. Detailed plan of preparations to execute the shutdown.
ENG09-032 : GNIRS Repair completion	This project involves completion of the GNIRS repair work that is currently being performed at the HBF.
ENG09-032A : GNIRS Lenses Recover Project (R.Oram)	This project is to procure and recover GNIRS lenses for final science configuration.
ENG09-011 : GNIRS Eng AT + Commissioning	Install GNIRS on the GN telescope and perform instrument recommissioning from Engineering point of view.

2010 Retreat Approved Band 1 Projects for the Engineering Group (ENG) (Part 3)

Project Name	Project Description
ENG10-016 F2 Fixes and Improvement (M Lazo)	This project will contain all the tasks needed to fix, upgrade and improve F2 to be able to operate the instrument in a safe, reliable manner during normal operations. Not necessarily to turn F2 into a full facility instrument. Areas to be considered to be included in this project. Electronics & instrumentation, Detector replacement, Cryocooling and vacuum behavior characterization, Other electronic issues, Mechanics, GV baffle redesign and implementation, Wheels reliability issues, the mechanical related issues, Optics (R3K Grism) Software, Pending integration of F2 software with the rest of the observatory, Other software related issues.
ENG08-041: Eng Tools Corp Approach	Engineering Tools corporate Approach project includes two main sub-projects: The Gemini Management Planning Tool and the Engineering Documentation Management Tool (DMT). The appropriate DMT is being searched to implement and deploy it during 2008. At the end of 2008 the Planing Tool (PI) will be at the 98% level of completion and the DMT will be at the level of 80% level. Most of the roll over task to 2009 are related to store OLD Gemini documentation in the DMT (I hope).
ENG10-001: SPIE 2010 (G. Arriagada)	Encourage Engineers to present a paper at the conference. 16 vacancies for presenters plus four to be filled per CE's discretion. Project plans subject to 2010 budget approval.
ENG10-013: A&G Handling Carts (Gabriel Perez)	Once every six month the A&G assembly is removed from the telescope, disassembled into its modules and transported from the observing floor to the Instrumentation Laboratory for inspection, maintenance and eventually for modifications or repair works. With the current facilities available in the Instrumentation Lab, handling of the A&G modules is awkward, unsafe and inefficient. This project proposes the fabrication of Handling Carts designed to transport, inspect, repair and calibrate each module in a safe and efficient way. Four carts would be fabricated for Gemini North and four carts for Gemini South. The fabrication cost per cart is estimated to be $8,600. The man-power is estimated to be 52 hours of a mechanical engineer and 316 hours of a mechanical designer.
ENG10-114: O&M Engineering Training (G Arriagada)	This project covers: All the annual training activities for the entire engineering group. It also includes 7 hours per FTE requested by Polly to train people on MCCWG Staff Training Classes.
ENG09-210A: Engineering Safety (Chas Cavedoni)	For planning purposes shutter tie off is going to be considered done by the end of 2009 For planning purposes enclosure access door will be considered done at GN by the end of 2009

2010 Retreat Approved Band 1 Projects for the Science Group (SCI) (Part 1)

Project Name	Project Description
SCI10-001: Nighttime Science Operations	Part of baseline science operations
SCI10-002: Daytime Science Operations	Part of baseline science operations
SCI10-003: Altair Science Support	Part of baseline science operations
SCI10-004: Flamingos-2 Science Support	Part of baseline science operations
SCI10-005: GMOS Science Support	Part of baseline science operations
SCI10-006: GNIRS Science Support	Part of baseline science operations
SCI10-007: Michelle Science Support	Part of baseline science operations
SCI10-008: NICI Science Support	Part of baseline science operations
SCI10-009: NIFS Science Support	Part of baseline science operations
SCI10-010: NIRI Science Support	Part of baseline science operations
SCI10-011: Phoenix Science Support	Part of baseline science operations
SCI10-012: T-ReCS Science Support	Part of baseline science operations
SCI10-013: Data Reduction Package support for Operations and Users	Part of baseline science operations
SCI10-014: Semester Science Operations	Part of baseline science operations
SCI10-015: Science Operations staff management	Part of baseline science operations
SCI10-016: Lead DAS Duties	Part of baseline science operations
SCI10-017: Lead DPD Duties	Part of baseline science operations
SCI10-018: Lead SSA Duties	Part of baseline science operations
SCI10-019: Scientific Research	Part of baseline science operations
SCI10-020: Annual and Long-term Science Planning	Part of baseline science operations

2010 Retreat Approved Band 1 Projects for the Science Group (SCI) (Part 2)

Project Name	Project Description
SCI10-021: Career Development and Training	Part of baseline science operations
SCI10-022: External Astronomy Activities	Part of baseline science operations
SCI10-023: Miscellaneous Science Staff Support	Part of baseline science operations
SCI10-024: Science Software Development	Part of baseline science operations
SCI10-109: Instrument performance monitoring	Science Goal: Regularly measure the total throughputs of all instruments to monitor system health (SCI08-001) Description: This general item applies to all instruments. Instrument scientists have been tasked with putting together the description for each of their instruments. For GMOS-N/S, work has been done in 2007 on the photometric imaging zero-points (AST, DA), plans are being developed for the spectral throughput monitoring (AST). The outcome of the monitoring may result in revised input to the ITC...
SCI10-207: GNIRS science commissioning	Science Goal: To make GNIRS available for science use. Description: This project contains the science effort involved in bringing GNIRS back to operations on GN. The team will use this project for planning and tracking the science effort for the commissioning. Additional Notes From 2010 Planning: 75% in 2010, not on the sky until Apr/May 2010.
SCI10-208: Flamingos-2 Science Commissioning	Description: This project includes on-sky commissioning work and all work required within science to prepare F-2 for operations. The bulk of the science effort will be included in this project, although some science FTEs will also be in the engineering F-2 commissioning project (and some eng. FTEs will be included here). Additional Notes From 2010 Planning: 30% left to do in 2010; this includes R3K grating.
SCI10-603: Data reduction support F2	Science/Operational Goals: Provide the PIs with the essential data reduction tools for Flamingos-2. Specific milestones: (to be revised once FTE loading is completed) 1. Patch release of Gemini IRAF with post-commissioning support for F2 (Imaging, Longslit, MOS) [Must be Band 1] 2. Iteration 1 design of the Python-based data reduction support. [Must be Band 1] 3. Implementation of the Iteration 1 design. 4. Integration of Iteration #1 to Gemini IRAF package and gemini_python package. 5. Programmer and user documentation for Iteration #1. Note: Scope of Iteration 1 is still to be defined as it depends on the performance of the adapted CL scripts currently being work on. This will be better defined as the planning process advances. Description: The objective is to first ensure that the data reduction tools developed from the existing CL scripts is adequate for a standard science reduction. The initial version of that software will need to be updated to integrate the things learned during the commissioning of the instrument. The second phase is to design the Python-based suite and the user interface. The high-level tools will be developed as part of this project. Low-level toolkits will be developed in the Toolkit project. For each development iteration, effort is required for testing and documentation.

2010 Retreat Approved Band 1 Projects for the Science Group (SCI) (Part 3)

Project Name	Project Description
SCI10-607: Data Reduction Support for GNIRS	Science/Operational Goals: Support the re-commissioning of GNIRS on Gemini North. Ensure that it is possible to reduce new and old GNIRS data with the Gemini data reduction software. Description: (see also Project Planning Requirements Document, attached) Re-factor the current GNIRS IRAF software to support the refurbished GNIRS. Since the new optical components will be given new ID numbers and the software gets all its configuration from lookup tables, it should be fairly straightforward to add support of the new version of GNIRS while keeping backward compatibility....
SCI10-112: SSA Training in the use of ASCAM	An automated airplane detection system has been delivered to Gemini North. We would like to have ASCAM implemented at Gemini North to streamline the LGS operations at night and to fulfill our obligation to the LGS program on Mauna Kea. Training the SSAs is in the operations and troubleshooting of ASCAM is required before we can go live on MK.
SCI10-225: Staff review of MIR capabilities and future direction at Gemini	Science Goal: To provide a recommendation to the Directorate on mid-IR capabilities at Gemini and their priority relative to other capabilities.
SCI10-244: GMOS-N CCD science commissioning	Description: Commissioning of GMOS-N red CCDs. This project is to cover the part of the project after the CCDs are in GMOS-N and the instrument is back on the telescope. All work in this project is expected to be in 2010. The project still needs editing to distribute earlier tasks to the ENG and DEV projects (Inger 2009sep30).
SCI10-250: GPI preparation	The Gemini Planet Imager (GPI) will be integrated in 2010 and is planned to arrive at Gemini in 2011. Effort in 2010 will be needed to prepare the instrument and Gemini for the acceptance testing and commissioning. Tasks in this project include: preparing commissioning plans; attending team meetings and traveling to the integration sites; participating in reviews or acceptance tests that occur in 2010; and finalizing software requirements and software testing.
SCI10-301: LGS tip/tilt with P1	This is the development of a new mode of operation which should permit 100% sky coverage with LGS yielding improved IQ over the seeing (FWHM ~ 0.2 to 0.4 arcsec depending on the wavelength), i.e. having an IQ=20% whenever it is IQ=70%,CC=50%. The initial phase will be to test and characterize the performance. If successful this will be followed by a rigourous commisioning of the mode including characterization metrics. This has been discussed for some time for use with NIFS, but it does have applications for GNIRS and GMOS as well, especially since there is a GNIRS item to to LGS tip/tilt with the GNIRS OIWFS (see below). (SCI09-134)
SCI10-305: LGS Twilight Propagation	The laser is currently not propagated during twilight. This means that of the order of 30-45 minutes per night (at dusk and dawn) is not used when we could actually be taking science data (or more likely setting up). The plan is to investigate the possibility of propagation during twilight and would be coordinated with the Laser Safety Officer (Richard Oram) in the Optics group. Currently WMKO are working with 8 degree twilight limits.
SCI10-308: Existing LGS Tasks	

2010 Retreat Approved Band 1 Projects for the Science Group (SCI) (Part 4)

Project Name	Project Description
SCI10-407: ITC General Improvements	The Integration Time Calculators are web tools for calculating exposure times from signal-to-noise and conditions or vice-versa. These tools are essential for the Phase I (proposal) process and also highly used during the Phase 2 process. Tasks for ITC changes for specific instruments are usually part of instrument commissioning or science support projects. However, some important tasks do not fall within instrument projects. This project is for planning and execution of important general ITC work.
SCI10-502: FITS Storage Project	Science Goals: Improve observing reliability, and reduce routine maintenance load on staff. Prevent loss of valuable FITS data. Description: Improve the hardware, software and procedures we use to store and manage our FITS data internally. This will prevent loss of time due to full disks etc in a way that requires less staff load than the current system. Also provide a long term off-line "disaster recovery" archive which we can use to recover data that would otherwise be lost....
SCI10-606: Data Reduction Support for GMOS-N Red-Sensitive CCDs	Science/Operational Goals: Ensure that it is possible to use the data reduction package to reduce GMOS-N data once the new CCDs are in place. Ensure backward compatibility. Description: Not all the changes required are yet known. However, it is known that the data reduction software will need to support 6 extensions in 2 amp mode (instead of 3) or 12 extensions in 4 amps mode. The software must be backward compatible and work on old GMOS-N data. It must also still work for GMOS-S. The change will affect all GMOS observing modes (imaging, longslit, MOS, IFU). New tests for the regression test framework will need to be created and added to the suite. Documentation will need to be revised.
SCI10-608: Development of Data Reduction Toolkits	Science/Operational Goals: Facilitate new and improved modular data reduction tools that can be driven from both the pipeline and the interactive data reduction package. Those toolkits are the building blocks of the next generation data processing software. In 2010, driven by F2, NICI and Pipeline needs. Description: This is very long-term project to gradually build up a suite of toolkits to support the next generation of Python data processing software. In 2010, the primary drivers are the Pipeline Project, the F2 data reduction support, and the NICI data reduction support...
SCI10-612: Data Reduction Cookbooks and Documentation	Science/Operational Goals: One of the most frequent complains we receive from the users is the lack of clear instructions on how to reduce their data. The goal of this project to remedy this problem by providing the user of the Gemini Data Processing Software adequate cookbooks and documentation. Description: The first iteration through the documentation should aim at improving the “examples” distributed with the data reduction package. Most examples are confusing or incomplete, and have very little explanation for each step. An html file with snapshot of the outcome of each steps and classic problems should support the examples....

2010 Retreat Approved Band 1 Projects for the Science Group (SCI) (Part 5)

Project Name	Project Description
SCI10-613: User-friendly distribution system for gemini_python	Science/Operational Goals: Help our community users install the gemini_python software and dependencies (mostly PyRAF dependencies). Reduce the load on the Gemini Helpdesk due to people having problems installing all the software by hand. Description: (see also SPT Planning Requirements Document, attached) As well as installing the new Gemini Python package in 2010, PIs will have to install more than 20 Python or IRAF related dependencies, some of which can be tricky to build. This will place a substantial load on the Gemini Helpdesk, since there is no external institution fully responsible for platform support as there was for IRAF. Internally, we also maintain a complete PyRAF installation at each site for operations, something which has consumed significant staff effort during 2008-2009. These problems are shared by STScI, whose recent DR software working group recognized the need for easier software installation as their top priority (from private communication)....
SCI10-614: GPI Data Reduction Software	Science/Operations Goal: Provide general purpose data reduction software to GPI user. Facilitate the re-development of the GPI instrument team's IDL data reduction tools by initiating the transfer of knowledge early. Ensure that the contracted GPI data reduction tools (IDL) is on track. Description: The GPI instrument team was contracted to produce data reduction tools. Unfortunately, they have chosen to write them in IDL. IDL is not compatible with the Gemini data reduction framework. Also, without an IDL license, the users wouldn't be able to customize the code to address their specific needs....
SCI10-703: DPD / DAS Projects Coordination Initiative	Science/Operational Goals: Optimize the resources by coordinating the software development done by the DPDs and the DAS. Description: Both groups, DPD and DAS, could benefit from the software developed by the other. With the coding environment is the same, Python/PyRAF, it makes sense to coordinate the development of the tools and avoid re-inventing tools. This "project" purpose is really to get this coordination going. It is hope that once the procedures and the communication channels are established, no special project will be needed....
SCI10-802: Improvement of the internal sciops web pages	Improve staff access to information necessary to perform observatory support work (SCI08-122) NOTE: A new project lead must be identified. I recommend someone who is about ~ one Gemini year old (some one new enough to have suffered from our current state of the web pages) and someone who will stay for at least two years from the start of this project since this project will take significant amoutn of time. . Since there was not a good handover from Thomas Dall to Richard McDermid, the project suffers from continuity. Some re-evaluation of the resources/adjustment of the project is expected once a new lead is identified.
SCI10-807: Training sponsored by other divisions	This project contains the effort for training sponsored by other divisions. Mandatory safety training is in SCI10-021.
SCI10-904: Gemini Science Staff: Life in 2015	With the 1st generation software and hardware commissioned, this is the time to re-evaluate and think where we want to be 5 years from now in terms of operation from the science staff's perspective. The purpose of this project is to project a future we want Science Operations at Gemini to live into. In the light of the problem with FTE loading, it is time for us to re-evaluate the daily operation model and activities. At the bottom of this section is the original description of the project. But the charge given to me 2009oct28 is to evaluate all tasks in operations to find saving in FTE loading that right now and not wait until 2015....