

Gemini Observatory

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Facility Description

The Gemini Observatory consists of twin 8.1-meter diameter optical/infrared telescopes located on two of the best observing sites in the world: Maunakea in Hawaii and Cerro Pachon in Chile. From these two locations, Gemini's telescopes can collectively provide access to the entire sky. Gemini was built and is operated by an international partnership of five countries including the United States, Canada, Brazil, Argentina and Chile. These Participants and the University of Hawaii, which has regular access to Gemini, each maintain a "National Gemini Office" to support their local users. Any astronomer in these countries can apply for time on Gemini, which is allocated in proportion to each Participant's financial stake. For the US, Gemini provides the largest publicly-accessible optical/infrared telescopes.

Formally, the Mission Statement is "To advance our knowledge of the Universe by providing the international Gemini Community with forefront access to the entire sky." Gemini achieves this by supporting peer-reviewed science proposed by the astronomical communities in the participating nations, and providing competitive instrumentation and observing modes in doing so. Over the five-year period between 2012 and 2016, more than 1000 individual Principal Investigators applied for Gemini observing time, from more than 300 academic institutions across the Gemini Partnership.

The Gemini web site: <http://www.gemini.edu/>

Key products/services

The direct product of Gemini observatory is observational data, taken in appropriate observing conditions, and placed in an archive for access by Principal Investigators (PIs). The service provided to PIs, jointly between the observatory and the NGOs, is to help prepare their observations, then to execute them on the telescopes or support the PI in executing them. Some PIs visit the telescope to make observations, others have their observations taken for them by staff operators. Gemini provides the preparation tool for PIs to create their observations. It also provides a data reduction package for all facility-class instruments. Currently this is based on the standard "IRAF" package distributed by NOAO.

Facility CI

The Gemini Observatory CI (computers, storage and networking; we do not include software in the definition) addresses the combined requirements of telescope operations, data handling and administrative support functions. Each of the four Gemini sites operates identical key services; a redundant core network service to support the distributed network environment, a redundant data storage system capable of replicating data offsite/cross-site in real time, a virtual machine cluster, a physical server farm, a virtual tape library backup environment, which also replicates data offsite, and

instrumentation support infrastructure - such as per-instrument server hardware, network connectivity, remote power management and system monitoring.

The two main Gemini sites (Gemini North and Gemini South) are connected via site-to-site VPN tunnels, that utilize the Internet 2 network infrastructure in the US, with interconnections to the REUNA research network in Chile.

Additionally the two base facility sites in La Serena, Chile and Hilo, Hawaii are equipped with high power computers. These units offer Gemini scientist the possibility of efficiently processing data locally to support their research. While for the most part the consumption of these key services and components is separated, non-operational functions, such as research, project and document management, telecommunications and internet access, enjoy the benefits of increased redundancy and high availability.

The median age of these key CI components is largely dictated by the manufacturers recommendations and enterprise support capabilities and experience in the field. These numbers are in turn transposed to the observatories longevity/obsolescence plan and are therefore understood in advance of the budget cycles. The networking equipment, for example, has a general operating age of around eight years, at which point the support contracts are no longer offered and spares are difficult to procure. The current core network hardware was replaced in 2014 and is set to be replaced in 2022. Similar examples can be made for each key CI component within Gemini, ensuring that the technology will also meet the observatory's long term requirements.