

A STRATEGIC PLAN FOR THE GEMINI OBSERVATORY

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Vision Statement – from the Gemini Board, September, 2004

We are poised to advance into an exciting and challenging scientific era, having created a first-rate institution, the Gemini Observatory. We see the Observatory establishing a leadership role in a global effort to define, address, and solve compelling scientific questions. The answers to these questions will have a fundamental impact on our view of the Universe and our place in it. Gemini, by exploiting its unique strengths and capabilities, will be a keystone in that global effort. Among our strengths are the breadth of the partnership, the diversity and depth of our communities and staffs, our connections with other institutions sharing common scientific aspirations, and the energy and vision of our Observatory.

A. The Gemini Observatory Mission

“To address compelling astrophysical questions by providing state-of-the-art, productive observing capabilities that will enable the Gemini community to be a leader in OIR ground-based astronomy.”

B. Customer

The funding Agencies as influenced by the astronomical communities and the public through the Actions and Resolutions of the Gemini Board.

C. Context

1. Competition

Gemini competes with, and is directly compared to, two well-funded international 8m-class observatories, the ESO VLT and Subaru which appear to be better funded on a per telescope basis than Gemini. In addition, Gemini operates in an environment where the Keck 10m telescopes have been in operation some 5 - 6 years before Gemini's first light but, in fact, appear to be less well funded than Gemini on a per-telescope basis. None of these observatories has to operate 8m in both hemispheres simultaneously.

2. Funding limitations or changes directly affecting Gemini

- a. Any investment in the Gemini Observatory requires the agreement of six national funding Agencies, which may have divergent views of the role of Gemini.
- b. Since Gemini operates only two 8m telescopes, it has little flexibility in the allocation of resources. On the other hand, VLT and Subaru's 8m's are components of larger entities, and their funding agencies can alter the funding mix in response to changing priorities.

3. External factors or trends affecting future funding levels by funding agencies

- a. Several of the Agencies currently have to make investments in ALMA and have a number of competing priorities within ground-based O/IR astronomy. All these commitments have the potential to put a downward pressure on Gemini funding, which is now perceived as “being in routine operations.”
- b. Astronomy is perceived by many other scientific fields to be “well funded”, with astronomers in most countries now having access to a wide range of ground-based and space based, world-class facilities.

- c. Due to new technologies like adaptive optics and the past underestimation of costs, future costs for 8m-class instrumentation will far exceed those projected on the basis of inflation.
- d. The United States is running a large budget deficit that will put downward pressure on discretionary funding for agencies like the NSF, Gemini's largest funding partner.

4. Strategic strengths and weaknesses of the current organization

Strengths:

- a. The Gemini partnership is extremely broad with a strong tradition of ground-based astronomy. This means a rich diversity of talent and ideas can be channeled through the Gemini Observatory.
- b. The international nature of the Gemini partnership allows the Observatory to plan with relatively stable long-range funding.
- c. Gemini is the only observatory that can access both hemispheres, and it is gaining a reputation for enabling astronomy through the provision of superb image quality and infrared performance on both its telescopes.
- d. The scientific and technical staff at Gemini is as good or better than those doing comparable mission support work at other international 8m-10m observatories. They are now able to achieve and sustain telescope availability and Queue observing efficiencies as high as any world-class ground-based 8m-10m facilities.
- e. The organization is gaining considerable expertise in operating geographically separated telescopes as a single Observatory.
- f. Gemini is considered a transparent and cost-effective operation.

Weaknesses:

- a. Because Gemini has a 'stand alone', fully funded operation and instrument program, none of its costs can be allocated across other facilities. Thus, the 8m telescopes and its instruments can be perceived as 'expensive' to some partner communities.
- b. As noted above, Gemini lacks flexibility in the allocation of resources and is therefore vulnerable to a changing budget environment.
- c. The diversity of the Gemini partnership means there is a diversity of expectations for the Observatory, which range from: Gemini is our only access to 8m telescopes, Gemini has unique capabilities, Gemini enables cutting edge investments in instrumentation and technology, to Gemini is a world class collaboration. This diversity can lead to a lack of consensus amongst the stakeholders as to future directions and re-investments for the Observatory. Even when there is a clear consensus, local economic conditions within each country can preclude clear commitments from any individual partner.

5. Requirements and the organization's desire to meet the needs of stakeholders other than those directly articulated in the mission

- a. Supporting the partnership's strong desire to retain some level of national investment and involvement in the operation of the Observatory by supporting the "distributed model".
- b. Public education, both local and international outreach and the stimulation of student interest in science, engineering and mathematics are high priorities of at least one of Gemini's major funding Agencies.

- c. The US government contract places a high priority on employing and developing a diverse workforce.
- d. There is an implicit understanding that the Observatory should support the employment of an international staff drawn from all the partner countries.

D. Actions

1. Become the most scientifically productive O/IR ground based observatory by 2009

- a. Achieve a fully-optimized operational model by 2007, increasing the efficiency of both telescopes by being able to support multi-instrument queue observing every night
- b. Provide quality-assured data, with the telescope and instrument signatures removed, for all Gemini observing modes
- c. Enable high quality “end-to-end” science support of the community by both maintaining a quality science staff able to execute the queue and optimize instrument performance at world-class levels and effectively managing the distributed model in partnership with the NGOs
- d. Provide tools to enable the community to more effectively access and exploit the Gemini Science Archive
- e. Serve as a primary data source for the International Virtual Observatory
- f. Maintain the effectiveness of the Public Information Office in the arenas of news and informal and formal education

2. Maintain and enhance Gemini’s performance and competitiveness as a world-class Observatory:

- a. Maintain and further optimize instrument and telescope performance, particularly image quality and emissivity
- b. Increase operational reliability, sky coverage and science hours available, including provision of new, infrared-capable acquisition and guide units
- c. Achieve a fully operating laser guide star MCAO capability by 2007
- d. Enhance the scientific productivity of the Gemini North telescope by enabling the existing instrument suite to exploit the Mauna Kea site conditions through the provision of an enhanced seeing capability
- e. Identify future compelling scientific questions and areas of scientific productivity and pursue the GSC’s top-priority “Aspen” instruments that take full advantage of Gemini’s capabilities
- f. Explore new modes of astronomical observation and lead in the evolution of necessary cultural, managerial, and institutional changes. For example by enabling and undertaking large-scale, partnership-wide astrophysics projects on Gemini
- g. Further improve the transparency and cost effectiveness of Gemini’s information and administrative services

3. Develop and exploit strategic partnerships with other institutions to the benefit of the Gemini partnership

- a. Initiate and continually strengthen scientific and technical partnerships with other 8-10m observatories to share developments and operating costs and avoid instrumentation and capability duplication.
- b. Increase the Gemini communities’ access to competitive capabilities through time trades with other 8-10m telescopes

- c. Enable long-term scientific collaborations between partners centered on Gemini's scientific strengths.
- d. Commit to the long-term strategic goal that by 2015 the partnership and its international "system partners" should have a far simpler but broadly accessible "system of telescopes" able to cost effectively support the 30m – 100m telescopes now under consideration. On Mauna Kea, this could be comprised of two 8m and two 10m telescopes (Gemini North, Subaru, Keck). In the South, VLT, Gemini (and perhaps Carnegie), could evolve into equally complementary, system of telescopes.

E. Metrics

1. Evaluation of Strategy

- a. Science productivity for each telescope measured through publication rates
- b. Science impact measured by citation indices and 'science productivity measures'
- c. Number of programs executed and users served
- d. Quality of services provided through the distributed model (users support, data delivery, science program support) relative to competitors
- e. Delivery and cost performance of instrumentation and development contracts

2. Need to track/maintain

- a. Performance evaluations by partnership
- b. Average cost of an available science hour/semester/telescope
- c. Effectiveness and impact of PIO program
- d. Quality of staff