Report of the Gemini Visiting Committee

and Midterm Management Review Committee

Executive Summary

The Gemini staff has made impressive progress in the transition from construction phase to regular operation despite the limitations of geography, resources, and the state of the delivered telescopes and instruments. However communication both within the Observatory and between the National Gemini Offices and the Observatory still requires improvement. Scientific productivity is growing and compares well with that from other 8-metre facilities. The Board faces several immediate and important decisions each having significant cost and resource implications. The primary conclusions of the Committee are the following:

- We strongly recommend that the completion and streamlining of the 'end-to-end chain' be the highest priority: from proposal submission, to undertaking observations, to rapid receipt and archiving of processed data for PIs. The Board should fully understand and commit the resources required to achieve this. The key output of the Observatory is the scientific program, which is maximized by telescope time spent on the scientific program.
- Although the Committee recognizes the structural difficulties, we recommend that the Board remain committed to the distributed support model, but with some modest midcourse corrections to its structure and implementation. An essential prerequisite for the situation to improve is a firm commitment by the NGOs and Gemini management to the distributed model, based on open, frequent and frank communication.
- The current staffing level and profile is not adequate to complete all the tasks of the Observatory in a timely fashion. Many factors contribute to this situation. A number of staff positions remain unfilled. Also a clear policy must be developed on the proportion of queue, classical, guaranteed, and engineering observing times, with appropriate support staff funded to achieve these goals.
- The 'Aspen process' has provided a wide range of possibilities. The proposed suite of new instruments carries significant additional cost and resource implications. The Board must establish clear priorities, and ensure these are properly resourced. The new procurement plan promises to be more effective than previously. The commissioning of new instruments should formally involve the instrument builders.
- AURA management has been efficient and cost-effective and at this time we consider the risk of destabilization outweighs the need for immediate re-competition. However, we feel that this would be an appropriate time for the Gemini Board to consider retaining a management consulting firm to assess in depth both Gemini's management structure and practices and AURA's

stewardship of Gemini. Such an assessment, if conducted by a firm with appropriate management experience and background, could provide valuable independent insights and suggestions.

Outline of Review Process

The Gemini Visiting Committee and the Midterm Management Review Committee met over the four days, 23-26 March 2004 at the Gemini Observatory Base Facility in Hilo, HI. Roberto Gilmozzi joined the committee by video-conference for a session on each of the final two days. Presentations were made to the Committee by Bill Smith (AURA), Matt Mountain (Director), the Associate Directors: Jim Kennedy, Doug Simons, Peter Gray, Jean-Rene Roy and Phil Puxley. In addition, the Committee spoke with most of the scientific staff and Gemini Science Fellows, the Controller, Polly Roth, several support staff and a senior mechanical engineer at Gemini-S. All staff were offered the opportunity to talk to the Committee, and one staff member asked to do so. Additional written submissions were received from two staff members.

The Committee traveled to the summit on the third day, visiting Gemini-N and the Subaru Telescope. Finally, a document The Gemini Distributed Support Model: Perspective from the National Gemini Offices was submitted to the Committee, and Isabel Hook and Taft Armandroff from the UK and US NGO's, respectively were interviewed.

The work of the committee was substantially enhanced by the excellent video-conferencing facilities available at Gemini-N and Gemini-S and the NGO offices.

Findings of the Review Committee

The Gemini Observatory occupies a unique niche in the class of 8-10 metre telescopes:

- It is optimized to perform at high angular resolution and in the infrared
- It manages two identical telescopes, one in each hemisphere of the globe
- It is a collaboration of seven partners on four continents

Each of these aspects provides real strengths to the collaboration, but also requires creative management to frame a new model for an international observatory.

Under the leadership of Matt Mountain, the Observatory has moved from the construction phase to full operation. The Observatory is an emerging facility, operating at the edge of technological knowledge. This review provides a timely opportunity to re-assess the assumptions and expectations for its operation and management.

The Committee was impressed with the achievements and dedication of the Observatory staff. However, there was a clear impression that the Observatory goals, both those explicitly planned and those arising from the operational imperatives, were beyond the resources of the current staff. *The Board and the Observatory management need to collaborate to determine the priorities for staffing within the current funding envelope,*

and the additional resources which would be required to achieve a higher and more desirable level of support to the partner countries.

A.The Gemini Observatory as a Scientific Enterprise/Enabler

The scientific program of the Gemini Observatory is the responsibility of the partner communities. The Committee did not undertake an exhaustive review of the scientific output of the telescopes. It is premature to evaluate the quality of the scientific program. However, using the obvious benchmarks, such as rate of refereed publications, the Gemini telescopes have a comparable record to the Keck and Subaru telescopes, but fall short of the impressive record of the VLT telescopes. The substantial potential of the Gemini telescopes is already being realized by outstanding scientific programs, such as the Gemini Deep Deep Survey.

The Observatory has articulated a bold vision for the next five year period [2006-2010]. *The partnership must decide the instrumentation priorities for the Observatory, and ensure that it is properly resourced to achieve those goals.*

B.The Gemini Observatory as a Facility for the Partnership

The operation of the Gemini telescopes has moved from its commissioning phase to the early stages of its operational phase. Many of the systems which are in place for the operation of the telescope have been developed independently, and it is now time to tune the full 'end-to-end' operation to achieve the highest quality and quantity of throughput. The Gemini staff have already achieved a very substantial amount, and the last 10% or so of the fine-tuning process will always be the most difficult. In particular, since the resources of the observatory are already over-stretched, the final stages of the process will require both prioritization of tasks and/or additional resources.

The Committee considered that the highest priority for the Observatory in its next phase should be increasing the amount of time that the telescopes are on-sky doing science. In the last two semesters, Gemini has advertised 70% science time on the two telescopes. Roberto Gilmozzi advised that currently at the VLT, 87% of time is used for science and 13% is used for engineering and instrument commissioning. The Committee considered a reasonable aim for the Gemini telescopes at the current time would be 80% science time and 20% for engineering and commissioning. *These operational targets need to be considered and established by the Board.*

One of the primary reasons for the large allocation of commissioning and engineering time has been the late delivery, and requirements for subsequent commissioning, of the first suite of instruments. This process has now produced a complete set of instruments, and the committee considered it to be more important to limit the telescope time allocated for future instrument commissioning, and maximize the time available for science on the telescopes.

There was considerable discussion on the full 'end-to-end' model for observing, highlighting the phases where problems currently exist. The data pipeline and the level of Gemini-specific software that will be provided have not been fully specified. *A clear assessment needs to be made of the areas for which Gemini will have responsibility, and those which will need to be developed by observers themselves.* The Committee was please to note that a basic Gemini Archive facility has been implemented, in collaboration with the Canadian Astronomy Data Centre. Again, the tasks that are expected of Gemini observatory staff need to be properly resourced. It is likely that the long-term solution for full data reduction is well beyond the current resources of the Observatory.

Over the past few semesters, up to 90% of applications have been for queue mode, while the initial planning for the telescope operations was 50% queue and 50% classical mode. The change of focus alters the way the observatory is staffed and operated. There is a strong request from the NGOs to retain some observing in classical mode. It was noted by some of the staff that the classical mode of operation may require as much support as the queue mode, though the staffing profile is quite different. Queue observing allows much greater flexibility in actual instruments used on a particular night. However, the preparation and post-observation data handling are greater. The possibility of an 'eavesdropping' mode is also being considered, whereby the project PI is online during the observing run, and able to participate in real-time scientific decisions. The Committee considers that a *decision on the percentage of classical and queue observing to be a key issue for the Board*. Any change of the percentage (from 50%:50%) must be studied carefully, ensuring that the staffing and resources for changes are adequate.

The engineering staff have developed an efficient system to provide support to the telescope five nights a week, with call-out support at the weekends. Systems were put in place to track all aspects of the operation, with the aim to achieve less than 10% downtime in 2003. This was essentially achieved. The target downtime will be systematically reduced over the next few years. Highlights of the year include the successful development of multi-layer Ag coatings for the mirrors and implementation of nod-and-shuffle on GMOS. The loss of many of the software group a few years ago appears to have resulted in delays in automation of the various stages of the telescope control system. The observatory staff is well aware of the aspects that require attention, but do not have the resources to implement the automated systems quickly. Strategies that enable the critical parts of the software to be implemented expeditiously would reduce the work-load on both the engineering and scientific staff. *The Committee sees completion of the OCS as an urgent matter.*

Observatory staff are engaged in R&D for the New Initiatives Office which is developing plans for an Extremely Large Telescope. Involvement in this project provides motivation for the engineering (and other) staff, but also provides a competing focus for the attention and energy of the group. The New Initiatives Office may be re-structured if the NSF funds the next phase of the R&D program. *The Board should provide a clear statement of the role of the Gemini Observatory in ELT R&D.*

C.The Distributed Model for Servicing the Gemini Community

The Gemini Observatory operates under a distributed support model, where observing proposals are competed under separate national TAC processes, and most of the user support and community outreach functions are handled by National Gemini Offices (NGOs). As part of our charge, the Committee was asked to assess whether this distributed support model is working well. In addressing this issue the Committee was aided by a document The Gemini Distributed Support Model: Perspective from the National Gemini Offices, and by interviews with Isabel Hook and Taft Armandroff from the UK and US NGOs, respectively.

A model of this kind represents a compromise by design between local availability of support and duplication of effort across the geographically dispersed NGO's and the Gemini sites. The advantages include greater accessibility of user support in some cases, coordination with support for the existing national facilities, direct support for the nine individual TACs, and some relief from day-to-day tasks (e.g. helpdesk inquiries) for the overloaded Gemini Observatory staff. The national offices also offer a means of recruiting individuals to the broader Gemini effort who might otherwise be unable or unwilling to relocate to Hawaii or Chile. There are examples of excellent coordination between individual NGO staff and offices with Gemini staff, especially in cases such as between CTIO and Gemini-South where the respective staffs are co-located.

Balancing these strengths are the challenges of making a widely distributed system function efficiently. The system has built-in inefficiencies, for example, the need for each of the 9 partners to have expertise in each of the Gemini instruments. This has led to disparity in the level of services that can be delivered between the large and small offices. Duplication also occurs between the functions of the NGO's and Gemini staff; although clear lines of responsibility have been drawn that are well understood by the respective staffs, these lines often are not well understood or respected by the user communities, resulting on NGO work falling on already overworked Gemini staff. The large range in training and expertise of the NGO staff assigned to particular instruments tends to exacerbate these stresses. And while there is considerable redundancy in function and expertise in some areas, other important user support and outreach functions fall between the cracks. Examples include the lack of any systematic system for harvesting feedback from queue users, and adequate checking of Phase 2 proposal submissions. The latter has been a particular stress point. Many proposals have been submitted late or contain fatal errors, and while the causes of the problem were not completely clear to us, the net effect has been additional load on the staff and friction between the respective offices.

The need for improved communications emerged as a common theme throughout these discussions. The operation of a dispersed network of offices imposes especially difficult challenges in communications, especially when individuals in the communications chain are overworked. All parties agree that extended visits of NGO staff to the Gemini sites have been enormously productive in terms of transferring expertise about the telescopes and instruments, providing hands-on assistance in queue observing and other Gemini

staff tasks, and building personal ties and a common sense of ownership of Gemini between members of the respective offices. The interactions between USGPO staff based in Chile and the Gemini South staff have largely succeeded for the same reasons. However the more long-distance interactions have been less successful. GPO staff struggle to remain current on new developments in their assigned areas, and often are frustrated by lack of access to information or by difficulty in communicating with their counterparts at Gemini. Viewed from the other side, Gemini staff members must struggle with maintaining communications with a network of over 40 GPO staff members, and find time on top of other functional duties to meet the many requests for information and updates. The general disparity in functional workload between staff members within and outside Gemini can be a source of frustration and friction in itself. Interestingly, both NGO leads we spoke to expressed interest in contributing some level of staff resources to help relieve this overload. This only works, however, when the managers and individuals involved have sufficient lead time to plan these activities so that they will not disrupt the on-going work of the NGO.

Despite this long list of challenges that have emerged with the distributed support model, the Committee believes that the most important root causes lie not with the structure itself but rather with its implementation, and in particular with inadequate communications and the disparity in staff workload across the organization. We believe that these problems are correctable in principle, but they are sufficiently complex that they are unlikely to correct themselves without *positive action by the Board and Gemini management at the policy level.* It would be inappropriate for this committee to provide specific recommendations in this area; however we list below some *possible* elements of a solution, many of which were suggested by Gemini and/or NGO staff members during our discussions.

- Currently the NGO support effort is comprised of approximately 15 FTEs, but this effort is spread among approximately 45 individuals. For many of these individuals Gemini support is a minor part of their workload, and occupies a lower priority than other responsibilities. The efficiency of the system would be improved if this effort were concentrated among a smaller group of individuals whose primary functional responsibility is Gemini support.
- The NGOs might consider pooling their expertise, particularly in the area of instrument support. This would eliminate duplication, provide backup expertise for the individual offices, simplify lines of communication with the Gemini staff, and provide more consistent levels of support within the partner countries. The concentration in NGO staffing effort suggested above would force such a consolidation as a matter of course. Any such redistribution in responsibility would need to be negotiated and monitored to assure fair exchange of effort across the NGOs.
- Extended visits of NGO staff to the Gemini sites should be encouraged and perhaps even required, for instrument support staff in particular. *The Board might consider a reciprocal arrangement by which Gemini Fellows would be offered an additional year of support to work at their home NGO.*

- The Gemini Observatory management should consider creating mechanisms for improved communications of information to the NGOs. These might include providing access by the relevant NGO staff to the internal web pages for given instruments, setting up email exploders for including NGO staff members in instrument group discussions, or assigning a staff member at each Observatory site as a liaison with the NGO managers and with responsibility for facilitating communications with the NGOs.
- The coordination of efforts would proceed more smoothly if it were more tightly managed. One possible mechanism would be regular planning meetings involving the liaison scientist mentioned above, the Gemini site managers, and the NGO leads. Such a group could consult on intermediate-term planning and staffing needs, and thereby facilitate sharing of tasks between the partners.
- Increased awareness in the user communities of the NGO functions would protect Observatory staff from user queries particularly for proposal preparation in Phases 1 and 2. The performance of the NGOs should be monitored and benchmarked against agreed performance criteria.

As we emphasized earlier, the Committee recommends that the Board remain steadfast in its commitment to the distributed support model, but with some modest midcourse corrections to its structure and implementation to address the interface issues that have been experienced within the organization. An essential prerequisite for the situation to improve is a firm, open commitment by the NGO's and Gemini management to making the distributed model work. We do not believe that such a universal commitment exists at this time. AURA, as the operating agency for Gemini and its largest NGO, could take the lead in this area. If the problems persist after a serious effort is made to improve the system, the Board may need to re-evaluate the efficacy of the basic model and consider alternatives.

D. The Current Instrumentation Program

The original method for the procurement of Gemini instruments resulted from an early Board decision, and was implemented by the Observatory. That procurement process has not served users well. Instrument commissioning is an undue burden on the Gemini staff and has resulted in serious delays and loss of scientific productivity. None of the instruments was delivered on time, and several, but not all, required considerable additional work to bring them into full use. These problems are common to all large telescopes where late delivery and cost over runs have a major negative impact on scientific output and user support. The instrument procurement plan which has now been introduced appears to resolve many of the past problems.

The Committee feels that at Gemini, the scientific staff spends an unacceptably large proportion of their time in support of instrument system and data preparation software. This is an inappropriate use of their skills, seriously limiting scientific productivity and the ability of Gemini to attract new scientific staff. There seems to have been insufficient incentive for most instrument builders to help fully commission instruments in a timely fashion. There are exceptions. GMOS-N and GMOS-S which basically worked as

planned on delivery have proved to be highly productive scientifically and extremely popular with users. The Committee view completion of commissioning and integration of the current instruments as a top priority both to relieve pressure on the scientific staff and serve the user community better. This priority requires both additional staff and short term 'Tiger Teams' to tackle the software problems. For example, the instrument software system, EPICS, is highly specialized and not a normal part of the background of an astronomy PhD and should be in the hands of experts. Of particular concern is the current state of instrument and telescope documentation, which must be systematically organized to ensure proper operation, maintenance, and timely repair of each instrument and telescope subsystem.

By contrast, the ESO procurement process for VLT instrumentation seems to have worked better. Successful instrument builders are awarded only costs and guaranteed telescope time (up to 80 nights) and a complete software and documentation effort is required. Groups are fined a proportion of their guaranteed time for late delivery, lack of documentation or extended commissioning. This system encouraged the development of supporting science teams who anticipated the use of the guaranteed time and may well explain the remarkably high VLT publication rate even in the first year of regular operation. In discussing instrument commissioning on the telescope, the Committee felt that every effort should be made to exploit laboratory time or daytime on the telescope to limit loss of science time on the night sky.

Gemini does not seem to retain adequate control over certain visitor instruments such as Michelle which results in loss of scientific momentum. There should be regular reviews of the rationale for the current and future deployment of instruments between the two telescopes. The Committee questioned, for example, why GNIRS is in the south rather than on the Gillett which is considered the more sensitive infrared telescope.

The sensitivity of the current suite of instruments would significantly benefit from the telescopes achieving their best possible performance, or goals, rather than simply their specified requirements in terms of image quality and emissivity (for example, reduced image ellipticity, <2% emissivity, etc.). We urge that Gemini push the performance envelope of both telescopes thereby keeping them at the forefront for the most demanding programs.

E. The Future Instrumentation Program

Benefiting from 'lessons learned' meetings, the new procurement plan for instruments being implemented by Dr Simons appears to redress the important problems with the procurement of the first round instruments. It introduces a system closer to that adopted by ESO. Among other things, instruments will be competed across the partnership, Gemini will let contracts directly and require formal management teams with regular budgeting, scheduling and full re-costing. Up to 20 nights guaranteed time would be available for successful instruments and Gemini would pay the full cost of parts, labor and overhead. In this model Gemini is clearly identified as the customer.

The Committee felt that the partners and scientific productivity will be better served under this model. There are, however, important implications in cost and staff, as the new model will require a wide range of Observatory staff expertise to monitor instrument building and may even involve the engineers who will eventually operate and maintain the instruments. In addition,, there is an impact on the partner time shares by offering generous amounts of guaranteed telescope time to the builders. *The latter requires full discussion by the partners.* There is also the possibility of a procurement model closer to that adopted by ESO in which teams are invited to bid to complete instruments for the cost of materials in return for observing time.

The Committee was very impressed by the draft document "Scientific Horizons at the Gemini Observatory: Exploring A Universe of Matter, Energy, and Life" resulting from the 'Aspen process' to provide a most positive vision and complementary wish-list of instruments and telescope modifications.

The list of instruments and modifications to the telescopes are highly ambitious and the *Gemini partners must decide just what they can afford and want to build*. The choice and rate of construction will set the whole tone and success of Gemini for the next eight to ten years. The procurement of even the two top priority instruments - extreme adaptive optics camera and high resolution near-infrared spectrograph - have significant cost and staff implications, particularly if the partners decide to fast track implementation. While the Committee offers no advice on choice of instruments, we note that, with multi-layer silver coatings, low parasitic background, and their sharper images, the Gemini telescopes will be the most sensitive in the world for mid-infrared observations from the ground. We hope that mid-infrared instrumentation will be maintained at a high priority.

F. Gemini Public Information and Outreach Program

The committee was delighted to see the progress made by Gemini's Public Information and Outreach Office over the past few years. They are to be commended for their varied programs, their willingness to experiment, and their imaginative use of a broad range of techniques, e.g., conventional meetings, portable planetaria, a newspaper tabloid, CDs, videoconferencing, etc. Given the somewhat contentious relations between some of the local citizenry and Mauna Kea astronomers, educational efforts in Hilo are particularly useful. We look forward to a broader Gemini presence in Chile, as efforts there are increased. We are also glad to see and encourage additional cooperation with other observatories and city and state entities in these efforts. We hope that these activities can be further leveraged through greater international interaction with the various NGOs.

We remind the PIO Office, however, that their clientele includes professional astronomers as well as the general public. For example, it would be useful if Gemini Newsletters were systematically distributed to all astronomy and astrophysics libraries in member countries. The "Astronomy Picture of the Day" is seen by many professional astronomers and all appropriate Gemini images should be submitted there. With much Gemini observing time now being devoted to science, we expect to see a large increase in the number of press releases. The PIO Office should also be alert to special

opportunities, for example, speakers, special exhibits, special topics sessions afforded by national and international meetings.

G. The Observatory Staff Profile

The tasks currently undertaken at Gemini can be briefly summarized as follows:

- Operation and performance optimization of two telescopes, separated by thousands of miles
- Commissioning of many instruments and instrument modes
- Streamlining the operation of currently offered instruments and associated data reduction packages.
- Queue or service observations for a large fraction of the observing time
- Development of new projects and instruments
- PIO effort

In addition, the Gemini member communities are requesting a higher fraction of queue or service observing, and an improvement in the data processing service provided by the Observatory. *A clear decision needs to be made about both the fraction of queue observing and the level of processing which will be supported by the Observatory staff.*

The committee believes that the current level of staffing is inadequate to execute all these tasks in a proper and timely fashion. The committee commends the Gemini staff for its dedication, which is supporting the current successful operation of the Observatory. If the current level of staffing is maintained, the communities and *the Board will have to prioritize the various tasks and accept that some be postponed or possibly removed,* which will affect the service and consequent science supported by the observatory staff.

If the staffing level is increased, a thorough examination should be undertaken of the overall operations of the observatory as well as the manpower and professional expertise required to maintain these operations. It may be that the current mix of staff appointments is not optimal for the tasks which are required by the Observatory in operational mode. To alleviate the problem of very heavy workloads, consideration might be given to increased use of data analysts or interns to perform the more routine types of support work. Increased use of technical consultants in certain specific areas, such as dealing with EMI problems, might be of benefit to scientists who seem to spend considerable amounts of time dealing with matters outside of their areas of expertise. In areas requiring software development, the use of 'Tiger Teams' might provide a useful approach to achieving rapid development of the required systems software, which would ensure more efficient operations.

The Committee stresses that once a commitment has been made to a project, such as MCAO, it should be supported by an appropriate level of manpower and resources. Timely completion of projects for which a commitment has been made is essential to the near-term future of the observatory. The long-term success of the Gemini Observatory will depend in a critical way on the quality and performance of both the engineering and the scientific staff. The committee recognizes that building and maintaining a staff of the highest quality is a particular challenge because of the geographic locations of the

Gemini telescopes. We were therefore pleased to see the progress which has been made in this respect by Gemini management.

It is clear from the record of accomplishments in commissioning and early operation of the telescope and scientific instruments that the scientific staff is both capable and committed to the success of Gemini. This was further confirmed by the direct contacts that were made with staff members who voluntarily met with the committee to express their view about the operation.

The scientific staff with whom we met expressed a high level of enthusiasm and excitement about the opportunity to work with this world class scientific facility. Despite working conditions that are sometimes difficult, retention does not appear to be a greater problem than at similar facilities, where most scientists expect to spend a few years as a normal and important part of their career development.

The major concern expressed by younger members of the scientific staff was that the time available to them to pursue their own scientific work was well below their expectations. This is a result of shortfalls in staffing due to difficulties in hiring, combined with a heavy workload associated with commissioning of new instruments and supporting the observing process. It also appears to the Committee that younger staff members receive little or no guidance in their career development, largely because of the heavy workload of the senior staff.

The committee recommends that some form of mentoring system be put into place to provide support and guidance for younger scientists. In addition, anything that can be done to improve the overall scientific environment would be a positive step. Assuring protected time during which these scientists can pursue their own scientific work is important for their career development. It is recognized that Gemini management is beginning to address these issues where possible.

Across the broader staff cohort, concerns were expressed about the flow of information and proper avenues for exploring a wide range of employment issues. The Observatory might consider the appointment of a member of staff with explicit responsibilities for mentoring the technical staff. This person could also act as an Ombudsman within the organization.

In addition, the burden on technical and scientific staff would be reduced if the Observatory were fully staffed at the levels required by the current mode of operation. This is clearly recognized by Gemini management, and they appear to be making every effort to deal to recruit new staff. In the long term, the demonstrated scientific success of Gemini will make it an increasingly attractive place for outstanding young scientists to spend a part of their careers.

H. The Management Role of AURA

The Gemini Management Review Committee was asked to address several questions related to the management of Gemini by AURA. In response to the questions as to the extent that AURA's management of Gemini is responsible for its present scientific and technical circumstances or for its current state with respect to education and public outreach, we can say little more than the following: AURA has provided a suite of established and well-documented management practices that provide Gemini with a clearly defined environment within which to carry out its business and human resources functions. It appeared to the committee that the financial management policies and practices, including regular audits, as established by AURA are of considerable value to Gemini management in that they remove the burden of having to establish such practices independently. Similarly the human relations policies established by AURA have been put into place at Gemini and found to be of value, although there were some limited indications that these might be adhered to more rigorously. AURA's Gemini oversight committee has also been useful. Recently, for example, it conducted a survey of the Gemini science staff concerning the reality and adequacy of the science staffing model used to date. This was found wanting and several recommendations were made to overcome the deficiencies.

As for an assessment of AURA's vision for Gemini it is not obvious to the committee that this is an appropriate AURA function. Rather, the question might be better put as to how well AURA can further the implementation of the Gemini Board's vision for the Observatory. This touches on a recurring issue, namely that Gemini is not an observatory within AURA in the same sense as NOAO or CTIO. Rather, it is an international partnership with its own Board, and is an autonomous unit embedded within AURA in order to satisfy certain financial, management and legal requirements. This difference between Gemini and the other AURA observatories sometimes results in tension and occasionally in the potential for conflicts of interest. It must be noted, however, that the committee saw no evidence of actual conflicts of interest having occurred; AURA, in fact, appears to be sensitive to the potential for such conflicts and to be making efforts to avoid them. The Committee notes that one example with potential for conflict of interest is Gemini's involvement in R&D for ELTs, and urges the *Board to provide clear advice to the Observatory and AURA on this matter.*

On several occasions during our meeting we discussed the question of a new competition for the Gemini management entity. There are several arguments pro and con for such a competition. On the one hand, re-competition might bring a new approach and fresh ideas and perhaps eliminate the intrinsic potential for conflicts of interest with respect to Gemini and the other AURA observatories. On the other hand, AURA's well established management practices and procedures appear to be useful and of value to Gemini. In addition, AURA's long experience and understanding of the operating environment in Chile, and its relationships with key people in that country, would be very difficult to replace.

Most importantly, this does not appear to be a good time for a management re-competition. While this might be said at any period, this consideration has considerable force now. The Observatory is transitioning from a long and difficult period of

construction and instrument commissioning to a phase in which the emphasis is on producing high quality scientific results. The response of the astronomical community over the next few years to the opportunities afforded by Gemini will go a long way in determining Gemini's success and importance as an astronomical facility. This is a particularly poor time to subject the Gemini staff, currently undermanned and overworked, to a long period of uncertainty. Furthermore, re-competition would impose a heavy burden on Gemini management that would be very difficult for them to support at this period in the Observatory's development. It appears to the committee that AURA has carried out its management functions in an efficient and cost effective manner, and that there is no compelling reason for re-competition at this time.

Gemini is unique among major observatories in that its partners are located on four continents and that its two telescopes are separated by several thousand miles. These conditions in themselves impose severe management problems. In addition, as noted above, Gemini is now entering a new phase in which it must deliver on the scientific promise of its telescopes and instruments. Consequently, we feel that this would be an appropriate time for *the Gemini Board to consider retaining a management consulting firm to assess in depth Gemini's management structure and practices as well as AURA's stewardship of Gemini.* Such an assessment, if conducted by a firm with appropriate management experience and background, could provide valuable independent insights and suggestions as to possible improvements in the overall management of this complex operation.

Appendix 1

CHARGE TO:
GEMINI VISITING COMMITTEE AND MIDTERM MANAGEMENT REVIEW COMMITTEE

AUTHORITY

The Gemini Board of Directors asks that the Gemini Visiting Committee and the Gemini Management Review Committee to conduct a joint review of the Gemini Observatory. Though drawing on a substantially common review process and data, the goals of the two committees are somewhat different.

MISSIONS

The **Gemini Visiting Committee** is asked to provide an evaluation of the scientific productivity, management, performance, and staff vitality of the Gemini Observatory ***as a scientific enterprise***.

In connection with that enterprise, the **Gemini Management Review Committee** is asked to evaluate ***the management role of AURA***.

QUESTIONS

In doing so, the two Committees will want to consider the following points:

Is the Gemini Observatory operating at a world-class level?

Is the Gemini Observatory responsive to the partners' astronomical community?

Does the Gemini Observatory enable scientific leadership by the Gemini community?

In the context of existing 8-meter-class observatories, please evaluate:

The Observatory's stature as a scientific and technology development organization,

The quality of the research facilities provided to scientists in the member countries,

The quality of its support for users of its facilities,

The degree that the programs and management provide the most efficient and cost-effective use of staff and resources to achieve its scientific and technical goals,

Whether the Gemini's staff size and activities at its sites are appropriate to its mission as defined by the Board, and

Its education and public outreach activities.

CONCLUSIONS

Gemini Visiting Committee (Only)

In this first independent review by the GVC, following the construction phase of the Observatory, we request that the GVC specifically provide an assessment of:

- How support for observers, from proposal planning to preparation to observing to the delivery of data, is provided by staff at Gemini and in the National Gemini Offices. Is this 'distributed support model' working well?

- How effectively the Observatory is procuring and deploying its major instrumentation and facilities?

- How well is the Observatory planning for the longer-term instrumentation future?

Gemini Management Review Committee (Only)

In view of its observations, the management committee should respond to the following questions, as well as address any other points that it deems important:

To what extent is the management of the Observatory by AURA responsible for Gemini's present scientific and technical state?

To what extent is AURA's management of the Observatory responsible for Gemini's present state with respect to education and public outreach?

Could AURA's management of Gemini be improved, and how?

Is AURA's management of Gemini organized and operated in an efficient and cost-effective manner?

Has AURA optimized its own and Gemini's ability to respond to the needs and desires of the Gemini astronomical community?

Please evaluate and comment on AURA's vision for Gemini and the implementation of that vision.

At this time does a strong case exist for seeking another awardee to manage the Gemini Observatory?

Is there a strong case to be made against engaging in such a process at this time?

Appendix 2 Membership/Attendees

Robert Bless, University of Wisconsin
Gary Connors, Kodak (retired)
Eileen Friel, NSF
Roberto Gilmozzi, ESO
Robert Kennicutt, University of Arizona, Steward Observatory
Patricia McNamara, NSF
Elizabeth Pentecost, NSF
Wayne Van Citters, NSF
Christian Veillet, Canada-France-Hawaii Corp
Gordon Walker, University of British Columbia
Rachel Webster, University of Melbourne, Chair