Table of Contents and Executive Summary
Final Report, ALTAIR Committee
Access to Large Telescopes for Astronomical Instruction and Research (ALTAIR)

For the complete report and more information about the ALTAIR committee, please see http://www.noao.edu/system/altair

The ALTAIR committee was formed in May 2008 by the National Optical Astronomy Observatory (NOAO) as part of its response to the 2006 Senior Review of NSF Astronomical Facilities report. The committee was asked to assess the current use of facilities in the 6.5- to 10-m aperture range, describe the community needs for instrumentation and other capabilities on large telescopes between now and the end of the 2010-2020 decade, and recommend guidelines for developing and expanding the US system of large telescopes.

The Table of Contents and Executive Summary of the ALTAIR final report are hereby provided as information for the deliberations of the Astro2010 State of the Profession Study Groups.

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David Silva, Ph.D.
Director

National Optical Astronomy Observatory
950 North Cherry Avenue
Tucson, AZ, 85719 USA

Office: +1 520 318 8281
Fax: +1 520 318 8170
http://www.noao.edu

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I. Executive Summary

The ALTAIR committee was convened by NOAO in partial response to the NSF Senior Review, which directed NOAO to ensure that the US community's access to astronomical facilities remains balanced across all apertures. The ALTAIR committee was charged with assessing the current use of facilities in the 6.5- to10-m aperture range, describing the community needs for instrumentation and other capabilities on large telescopes between now and the end of the 2010-2020 decade, and developing guidelines for developing and expanding the US system of large telescopes. The committee gathered input from the community of O/IR telescope users through a survey, personal interactions of committee members with individuals, on-line resources, and opinions and information solicited from the non-federal observatory directors. The committee chose to set aside consideration of LSST, as this would be a future facility with a highly directed operations mode. Here we report our findings and recommendations based on the input we collected and our committee discussions.

1. Findings

Need for Observing Resources

We find that there is a large, engaged community of large telescope users that have been productive using federal and non-federal facilities for a broad range of astrophysical investigations. Demand for observing time on large telescopes currently exceeds the available time by a factor of 3-4 for proposers both with and without institutional access to non-federal facilities. To meet its scientific aspirations, the large telescope community requires access to a broad range of instrumentation that spans a range of wavelengths (optical to mid-infrared), spectral and angular resolutions, fields-of-view, and includes both "workhorse" (e.g., single-object high resolution spectrographs, multi-object spectrographs) and "advanced" (e.g., those that make use of sophisticated AO systems and/or high multiplex factors) instruments (Secs. III-V).

Need for a Large Telescope System

Among this suite of capabilities, there is significant demand for some that are unavailable from the federal facilities (i.e., Gemini) but are available on non-federal facilities. This synergy underscores the need for a system of large telescopes comprised of federal and non-federal facilities. Instruments for large telescopes are costly and only likely to become more so as they increase in capability and complexity. It is therefore impractical, as well as operationally inefficient, for all facilities to provide access to all capabilities. Providing access to a "system" of telescopes, each with their own more restrictive instrument complement, is an attractive way to address this issue (Sec. VI).

Need for Expanded System Access

Given the unmet demand for observing time, we find that there is a need to increase the effective observing time (more total nights and/or more efficient instrumentation) available to the US community on large telescopes. Only a fraction of the demand for "missing" federal capabilities can be met by the current Telescope System Instrumentation Program (TSIP) time that is available on non-federal facilities. TSIP is highly valued by the astronomical community, both because it provides open access to observing nights (and the instrumentation available) on non-federal facilities and because it funds

instrument development on non-federal facilities. The ability to develop advanced instrumentation is critical for the US to remain at the forefront of astronomical progress (Secs. VI, VIII).

Need for Changes at Gemini

Also critical to the expansion of the large telescope system is the need for greater alignment between the Gemini Observatory and US community needs. As the primary resource available to the large fraction of the US community that does not have institutional access to (the non-federal) large telescopes, the Gemini Observatory is a critical part of the large telescope system. Although Gemini is recognized for its infrared optimization, the access it affords to both hemispheres, as well as for providing some leading capabilities, there is nevertheless broad community dissatisfaction with the current Gemini Observatory. Major concerns are (1) the lack of alignment between the Gemini instrumentation suite and the needs of the US community and (2) the time burden on proposers at all stages of the process to end up with scientifically useful data. These difficulties appear to result from the very limited role that the US community has in setting scientific goals for Gemini (Sec. VII).

2. Recommendations

Based on the above findings, we have the following major recommendations.

Develop the Large Telescope System

We endorse the need for a system of large telescopes comprised of federal and non-federal facilities (Sec. VI). We recommend that NOAO take the lead in working with the US community to establish mechanisms for planning together the development of the entire U.S. system of large telescopes. Fundamental to this recommendation is that NOAO establish and maintain a transparent roadmap for the development of the large telescope system based on regular input from the US community, and that NOAO be an active advocate for the development of the large telescope system, using tools such as TSIP funding, input to the Gemini Board, and other methods (e.g., time purchases and trades) to achieve a balance of open access capabilities that is aligned with the research goals of the US community (Sec. V).

Increase Funding for TSIP

To develop and expand the large telescope system, we recommend that NSF increase the funding, to $10M per year, for an NOAO-led TSIP or TSIP-like program in order to increase the open access time available on non-federal facilities. (The current TSIP budget is zero and has ranged between approximately $2-4M per year; Sec. VIII)

Increase the Alignment between Gemini and the US Community

We suggest NSF consult with NOAO and the US community to explore changes to (1) the current Gemini governance structure (the role of the Gemini Director, Board, and GSC in setting scientific goals for the Observatory) and (2) the selection process and composition of US representation on the Gemini Board and the GSC, and (3) create pathways by which US community input be provided effectively to the Board in order to achieve closer alignment between Gemini and the needs of the US community as

soon as is feasible. The committee believes that changes of this kind will significantly increase the value to the US community from its current $17M/yr investment in Gemini (Sec VII).

Consider a Larger Share in Gemini in the Post 2012 Partnership

The Gemini partnership is being renegotiated, with a new agreement taking effect in 2012. We therefore also recommend that the NSF take advantage of this opportunity to increase US participation in the Gemini Observatory, but *only if* the above recommendation is effectively implemented, i.e., that Gemini becomes more responsive to the US community and evolves to a suite of instrumentation, operations modes, and other services that are well aligned with the needs of the US community (Sec. VII).