

Report of the AURA Consolidation Working Group

A study of various options for consolidation of US ground-based optical/infrared astronomical facilities

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Prefatory Note.....	i
Executive Summary.....	1
Background.....	1
Decadal Recommendation.....	1
AURA Consolidation Working Group Charge.....	2
Possible Consolidation Models.....	2
Full Consolidation Model.....	3
Hybrid Model.....	4
Findings and Assessment of Options.....	6
Further Considerations.....	7
Summary.....	9
APPENDIX.....	9
Pure Corporate Model.....	9

PREFATORY NOTE:

This report was requested by the AURA Board to address the recommendation of the New Worlds, New Horizons decadal survey to consider the consolidation of Gemini and NOAO under a single operational structure. The report also addresses a growing concern of many, including the AURA Board, that the current trajectories of Gemini and NOAO are likely not sustainable over the long term. In the following document, the AURA Consolidation Working Group reports on various options for the consolidation of Gemini and NOAO that were studied in the Spring and Summer of 2011. Two models were considered in some detail and one, in particular, is recommended as the most suitable option for the consolidation of the two observatories. Although the report outlines two models for consolidation, it does not consider all aspects of governance in these models. In particular, how best to incorporate the scientific interests and detailed governance roles of international partners is not yet fully addressed. The working group identified a number of possible governance structures ranging from direct purchase of telescope time on Gemini to proportionate voting membership and fiscal oversight via a governance council. However, the working group recognized that input from the international partners and the wider community is needed to identify the most viable governance structures. This would best be accomplished via discussions among the partners prior to implementation of a consolidated model.

Executive Summary

The charge to the AURA Consolidation Working Group (a subcommittee of the AURA Board of Directors; hereafter ACWG) was to identify the notional consolidation model that would best satisfy the recommendation made by the decadal survey, *New Worlds, New Horizons* (NWNH) for consolidating the facilities of NOAO and Gemini into a single operational structure. The ACWG studied a number of different consolidation models and identified two viable options for the merging of NOAO with Gemini into a new joint facility. The first option is the full consolidation model in which NOAO and Gemini are merged into a new national observatory under a single Director. The second option, the hybrid model, represents a partial merger in which the Gemini facilities maintain an independent legal status as a corporate entity which can act in an autonomous manner and which is governed by a board on which NOAO would have representation. In this hybrid model NOAO would largely retain its present status within the US OIR observatory system. Each model was found to be best applicable for a specific set of (differing) circumstances. Taking into account the needs and desires of all parties, the size of the U.S. share in Gemini and the requirement to be more responsive to the needs of the U.S. astronomical community, the ACWG concluded that the full consolidation model would be the most appropriate solution for merging the two observatories at this time.

Background

Decadal Recommendation

The U.S. astronomical community's seminal document for outlining its priorities is its decadal survey. The most recent decadal survey, *New Worlds New Horizons in Astronomy and Astrophysics* (NWNH), articulated frustration with the current governance of some of the major ground-based optical astronomical facilities, concluding as follows.

NWNH CONCLUSION: "Optimizing the long-term scientific return from the whole of the U.S. optical and infrared system requires a readjusting of the balance of the NSF-Astronomy program of support in three areas: (1) publicly operated national observatories—the combined National Optical Astronomy Observatory and Gemini facilities that currently dominate spending; (2) private-public partnerships—such as support for instrumentation at and upgrades of privately operated observatories; and (3) investment in future facilities." (page 177)

NWNH RECOMMENDATION: "To exploit the opportunity for improved partnership between federal, private, and international components of the optical and infrared system, NSF should explore the feasibility of restructuring the management and operations of

Gemini and acquiring an increased share of the observing time. *It should consider consolidating the National Optical Astronomy Observatory and Gemini under a single operational structure, both to maximize cost-effectiveness and to be more responsive to the needs of the U.S. astronomical community.*" (page 179)

AURA Consolidation Working Group Charge

At its April 2011 meeting the AURA Board of Directors tasked a subcommittee of the Board to evaluate several of the options that might address the concerns outlined in NWNH. The specific charge to this Working Group was as follows:

In view of the U.S. Decadal Survey's recommendation that the NSF consider "consolidating NOAO and Gemini under a single operational structure, both to maximize cost-effectiveness and to be more responsive to the needs of the U.S. astronomical community", and in recognition of AURA's managing role in both observatories, the Board charges a working group to study how such a consolidation might best be accomplished, considering the needs of all partners in the direction of the Gemini Observatory. The working group should report to the full Board at the September 2011 meeting.

Working Group Meetings

The ACWG conducted weekly teleconferences between 2011 April and July, including two telecons which included the Directors of NOAO and Gemini. During the telecons, many governance and consolidation ideas and models were discussed, refined, and considered. From these discussions two distinct governance/consolidation models emerged as the most viable for combining the two observatories. These are discussed below.

Possible Consolidation Models

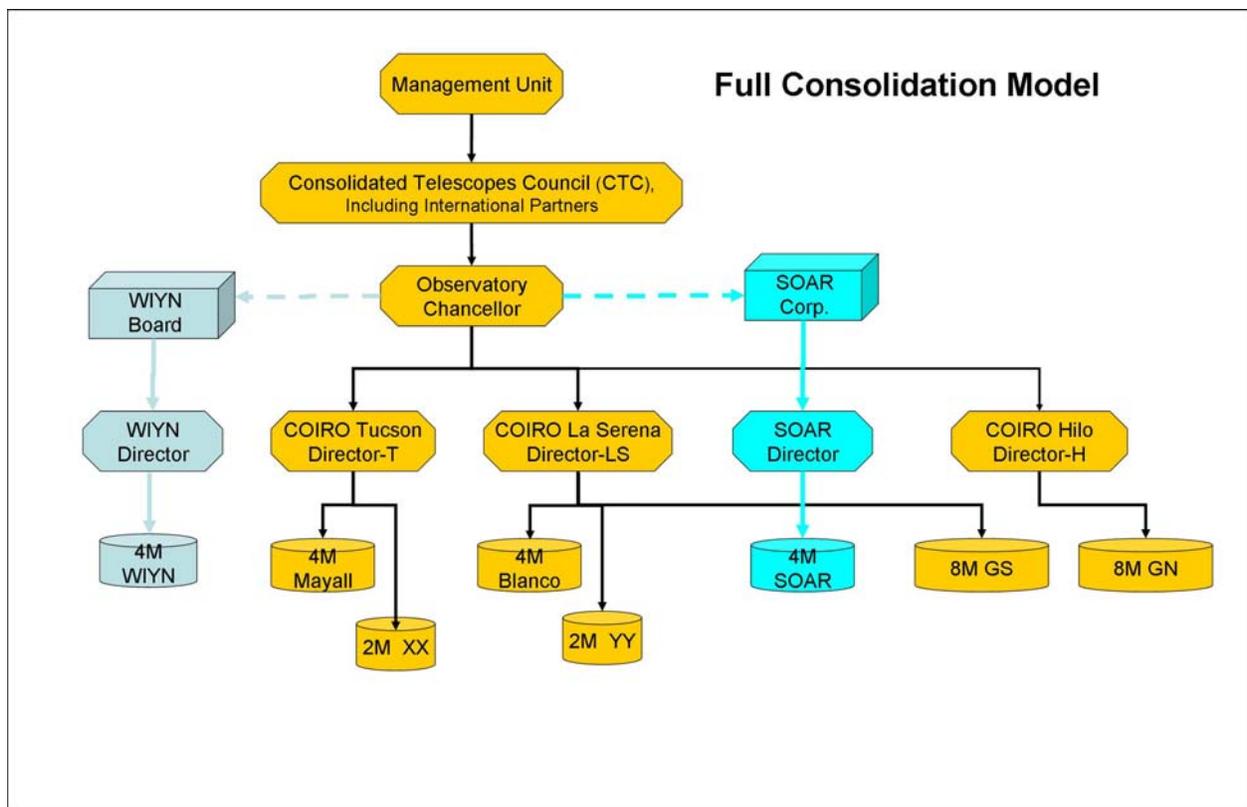
The ACWG considered various ideas and suggestions for the consolidation of NOAO and Gemini and converged onto three conceptual models as being the most relevant. A synopsis of each model is presented in this report along with associated pros and cons. For each model a flow (organization) chart is also shown. Two of these models (fully consolidated and hybrid) are consolidation models for NOAO and Gemini and are discussed immediately below. The third describes a corporate model for Gemini that is favored in the recent report of the Tiger Team convened by the Gemini Board. This latter model does not allow for any form of merger with NOAO and is considered here primarily to provide context and enable informed discussion. This model is discussed in the Appendix.

Full Consolidation Model

Synopsis

This model combines the facilities of NOAO and Gemini into a single new organizational structure (that for the time being we designate the Consolidated Optical and Infrared Observatories, hereafter COIRO) with a single cooperative agreement and under a single upper-level director called the Chancellor. The flagship or highest priority facilities of this new observatory are the two 8-m Gemini North and South telescopes. In this model the observing facilities are organized by site (La Serena, Hilo and Tucson) with directors for each site. The two Gemini telescopes are thus managed and operated as individual units as part of one of these sites (either La Serena or Hilo). Federal funding for all facilities, including Gemini, flows through COIRO. This model provides the U.S. national community with a fully integrated system of ground-based optical/infrared telescopes spanning apertures from 4m to 8m in size.

Figure 1. Organization Chart for the Full Consolidation Model.



Primary Pros

- 1- Fully satisfies decadal survey recommendation for merger of Gemini and NOAO.
- 2- Provides a governance structure with a clear chain of command.
- 3- Establishes a clear line of oversight and reporting that will be apparent to COIRO staff.

- 4- Holds the promise of cost savings in overall operations and efficiencies, especially in Chile.
- 5- Provides one budget for consolidated facilities that should lead to more flexibility in meeting overall priorities of the user communities and result in a more flexible coordination of resources.
- 6- Could optimize telescope productivity through sharing of technical support and resources.
- 7- Demonstrates to U.S. community significant intellectual ownership in the Gemini facilities.
- 8- May simplify and promote more efficient operation of each 8 m telescope through management of Gemini telescopes as separate facilities.
- 9- Produces a fully integrated system of US telescopes.
- 10- Removes the NSF cooperative agreement for Gemini.
- 11- Provides a direct and clear management authority for AURA, as a representative of U.S national astronomy, with NSF removed from management structure of Gemini.
- 12- Creates a unified observatory with strong ties, improved communication and one culture among staff.
- 13- Implements a single Time Allocation Committee (TAC) that should lead to selection of the best scientific proposals at all consolidated facilities.
- 14- Offers international (Gemini) partners access to other components of the NOAO system of telescopes as well as access to data products from surveys such as DES and BigBoss.
- 15- Is stable under international partner withdrawal.

Primary Cons

- 1- International (Gemini) partners' voice may be diluted by inclusion in larger observatory system and they may perceive a loss of some measure of existing influence and control in both financial and scientific decisions regarding Gemini.
- 2- International partners may not be interested in participating in the governance of entire consolidated observatory.
- 3- International partners could decide to withdraw from participating in Gemini.
- 4- Support of 4m telescopes and other activities presently conducted by NOAO may be reduced compared to present situation in order to get the most from the 8m facilities.
- 5- Gemini is not a line item in NSF budget (and may not receive the guaranteed funding ramp that is presently the case.)

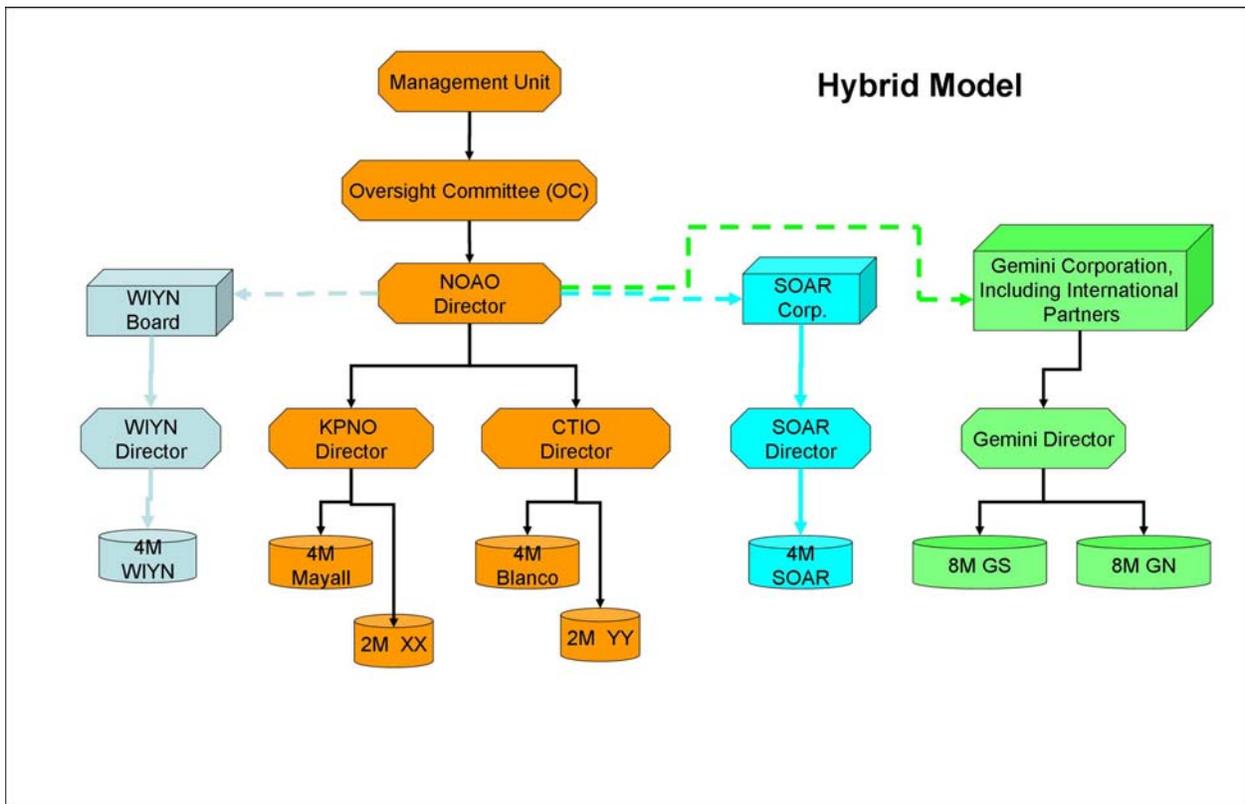
Hybrid Model

Synopsis

This model attempts to combine the facilities of NOAO with those of Gemini into a new observatory structure in what may be thought of as a partial or compromise consolidation model. In this model the basic NOAO governance remains unchanged while the Gemini 8 m telescopes at the two sites remain part of a single, largely independent, observatory under

the Gemini Corporation. This corporation is integrated with NOAO in a manner similar to the SOAR and WIYN corporations and is loosely connected with NOAO through the mechanism of having the NOAO Director sit on the Gemini Corporation Board. AURA manages the employees at both facilities. The degree of consolidation is similar to that of SOAR and WIYN. A critical element of this model is that US funding for Gemini would flow through NOAO and then to Gemini similar to the existing situations with SOAR and WIYN in the current NOAO.

Figure 2. Organization Chart for the Hybrid Model



Primary Pros

- 1- Preserves the two Gemini telescopes as a single observatory with a director whose primary responsibility is the operation of the two 8-m telescopes.
- 2- Maintains clear distinction between NOAO and Gemini providing relatively direct and unencumbered participation of international partners in the Gemini facility.
- 3- Provides clear line of command from Gemini Board to Gemini Director
- 4- Simplifies and improves current Gemini governance structure.
- 5- Provides a governance structure for a consolidated US observatory that is parallel to that of SOAR and WIYN as they now exist.
- 6- Preserves present role of the international partners in the decision making process and financial oversight for the Gemini telescopes.

- 7- Removes the NSF from management lines.
- 8- Removes separate NSF cooperative agreement for Gemini.
- 9- Establishes the Gemini Corporation as an independent legal entity.
- 10- May enable savings in operations costs in Chile as a result of consolidated operation with CTIO.
- 11- Could strengthen ties and improves culture between staff of Gemini and NOAO.
- 12- Provides the possibility of a more direct representation of US astronomical aspirations in Gemini governance through NOAO's participation on governing board.

Primary Cons

- 1- Does not fully consolidate NOAO and Gemini governance and falls short of decadal recommendation compared to the full consolidation model.
- 2- Degree of cost savings may be less than in the full consolidation model.
- 3- Does not produce fully integrated system of US telescopes.
- 4- Does not facilitate a high degree of flexibility for coordination of resources across consolidated observatory.
- 6- Not stable to partner withdrawal.
- 7- Does not allow for coordination of 4m and 8m science and technology.
- 8- Gemini is not a line item in NSF budget (and may not receive the guaranteed funding ramp that is presently the case.)

Findings and Assessment of Options

The charge to the ACWG was to identify the consolidation model for merging the facilities of NOAO and Gemini that would best satisfy the recommendation of the most recent decadal survey (NWNH). The ACWG studied a number of different consolidation models and identified two viable options for the merging of NOAO with Gemini, into a new joint organization. Each model was found to be best applicable in a specific set of (differing) circumstances.

Taking into account the needs and desires of all relevant parties (national and international) it appears that the primary factor for choosing among the models is the size of the U.S. share in the facility being merged (Gemini) with the existing national observatory (NOAO).

The two models, the full consolidation model (FCM) and the hybrid model (HM) have existing successful analogs in the HST (NASA + ESA) partnership and the SOAR + WIYN + NOAO partnerships, respectively.

The hybrid model is most appropriate when the U.S. share in the facility being merged is not a majority share. For example in the cases of SOAR and WIYN the U.S. (NOAO) shares

are 30% and 40% respectively. In these situations the governance structure appears to function well when it consists of a governing or corporate board on which the US (NOAO) sits as a peer member and when there is a good working relationship characterized by full trust and cooperation among partners.

The full consolidation model is most appropriate when the US share in the facility is the clearly dominant share. This is the case for the HST, where the US (NASA) share is 85%. In this case the establishment of a governing board of peer-partners is inappropriate.

After the departure of the UK from the Gemini partnership, the US will effectively have a 65-67% share in the facility. The critical issue is whether for a share level of this size the FCM or HM model is most appropriate. The ACWG concludes that the FCM is most appropriate for this situation.

Further Considerations

In its recommendation to consolidate the operations of NOAO and Gemini "...to both maximize cost-effectiveness and to be more responsive to the needs of the U.S. astronomical community", the NWNH decadal survey recognized a long-standing dissatisfaction with the Gemini Observatory within the U.S. community. A measure of the depth of this dissatisfaction can be found in the most recent NOAO Users Committee (UC) report which states: "...the UC continues to be deeply concerned about the scientific productivity of the U.S. investment in the Gemini Observatory and the degree to which it meets the U.S. community needs for 8-m class telescope access", and "...the Gemini Observatory may need to implement profound and radical changes in its operation in order to engage the U.S. user community."

The full consolidation model is the only option that fully satisfies the decadal survey recommendation of merging NOAO and Gemini into a single operational structure. By producing a fully integrated system of US national telescopes, it optimizes scientific productivity through sharing of technical support and resources. The product of a full consolidation model would be a stronger national observatory for the US community, one that can compete head-to-head with ESO. Neither the corporate nor the hybrid models offer such an advantage. For these reasons and the fact that the US share in Gemini will increase to 65-67% with the departure of the UK, the ACWG favors the adoption of this model for the consolidation of NOAO and Gemini.

Although the hybrid model fails to meet the decadal survey recommendation, it does more straightforwardly retain the governance role, scientific energy and fiducial oversight currently provided by the Gemini international partners and recognizes their importance through incorporation. This model improves the overall scientific governance of Gemini while reducing the existing governance layers and offices. This model also brings Gemini closer to NOAO through adopting the governance structure already demonstrated to work for WIYN and SOAR, wherein NOAO is fully represented on their governing boards. For

these reasons the hybrid model could be a more straightforward next step for the evolution of both NOAO and Gemini.

However, even if the hybrid model were initially adopted, governance in the post-2015 years would still depend on the status and stability of the Gemini partners and the US share level in Gemini. Clearly, if the US share in Gemini were to increase much beyond 65-67%, either through increases in contributions or the additional loss of partners, then moving to the full consolidation model would be indicated.

Although there is a risk that some of the international Gemini partners may not want to participate in a full consolidation observatory model, a counterpoint is that participating in such a consolidated observatory might be *more* attractive to these partners. In particular, an arrangement that provided equal access to the various components of the US OIR System, including access to the DEC and BigBOSS projects and eventually LSST data, might be appealing to the astronomical communities of at least some of the international partners. In a consolidated observatory the 8m telescopes still provide attractive platforms for instrument development by the international partners. Moreover, there is every reason to expect that full consolidation will lead to the development of a suite of instruments for the Gemini telescopes that better meets the needs of all user communities. This coupled with improvements in operations should make it easier to obtain scientifically useful data with these telescopes and result in an observatory that is more productive and thereby attractive to both the U.S. and international partners.

The ACWG is aware that as part of this assessment process it is important to be cognizant of what is best *both* for the future of the Gemini observatory and for the future health of the U.S. National Observatory. There is some concern that in a full consolidation observatory support for 4m telescopes could be significantly reduced in order to maintain adequate support for the 8m facilities in an era of constrained or declining NSF budgets. However, it must be recognized that the current situation, wherein the U.S. National Observatory is solely responsible for the operations of only of two 4m telescopes plus holds only 30-40% shares of two other 4m telescopes, is unlikely to be viable or competitive in the long term. A fully consolidated National Observatory affords a better chance of keeping one or more of the 4m telescopes running since it is the only model that offers the possibility of both optimizing and coordinating NSF funds for the facilities presently operated by both NOAO and Gemini. In a full consolidation model, Gemini's direction will more directly align with that of the U.S. astronomical community thereby strengthening the U.S. National Observatory and enabling it to both better respond to the needs of the U.S. optical and infrared communities and better manage vital astronomical resources in an era of difficult budgetary and scientific challenges.

Summary

The ACWG has investigated governance models for the merged operations of Gemini and NOAO with the goal of identifying a model that would best satisfy the recommendation made by the New Worlds New Horizons decadal survey regarding the consolidation of these two facilities. After considering various ideas and suggestions the ACWG converged on two viable models as being the most appropriate. The first was a full consolidation model (FCM) in which both observatories are merged into a single new organizational structure headed by a single director, called the Chancellor. The second option was a hybrid model (HM) that can be considered as a partial consolidation model. In this latter model the Gemini facilities maintain an independent status as a corporate entity that is governed by a board on which NOAO would have representation. In this situation NOAO would maintain its present organizational status within the US OIR observatory system.

The ACWG concluded that the primary criterion for consideration in merging a facility, such as Gemini, with the National Observatory (NOAO) is the size of the U.S. national share in the facility (e.g., Gemini) being merged. A full consolidation model is most appropriate for the case in which the US national share is the dominant share in the facility being merged, while the hybrid model is most appropriate in the case where the US national share is either not the dominant share or a minority share (e.g., WIYN, SOAR). In the case of Gemini, the departure of the UK from the Gemini partnership will effectively leave the U.S. with a 65-67% share in the facility. The ACWG concludes that this U.S. share is sufficiently large to justify the adoption of the full consolidation model for the merger of NOAO and Gemini.

APPENDIX

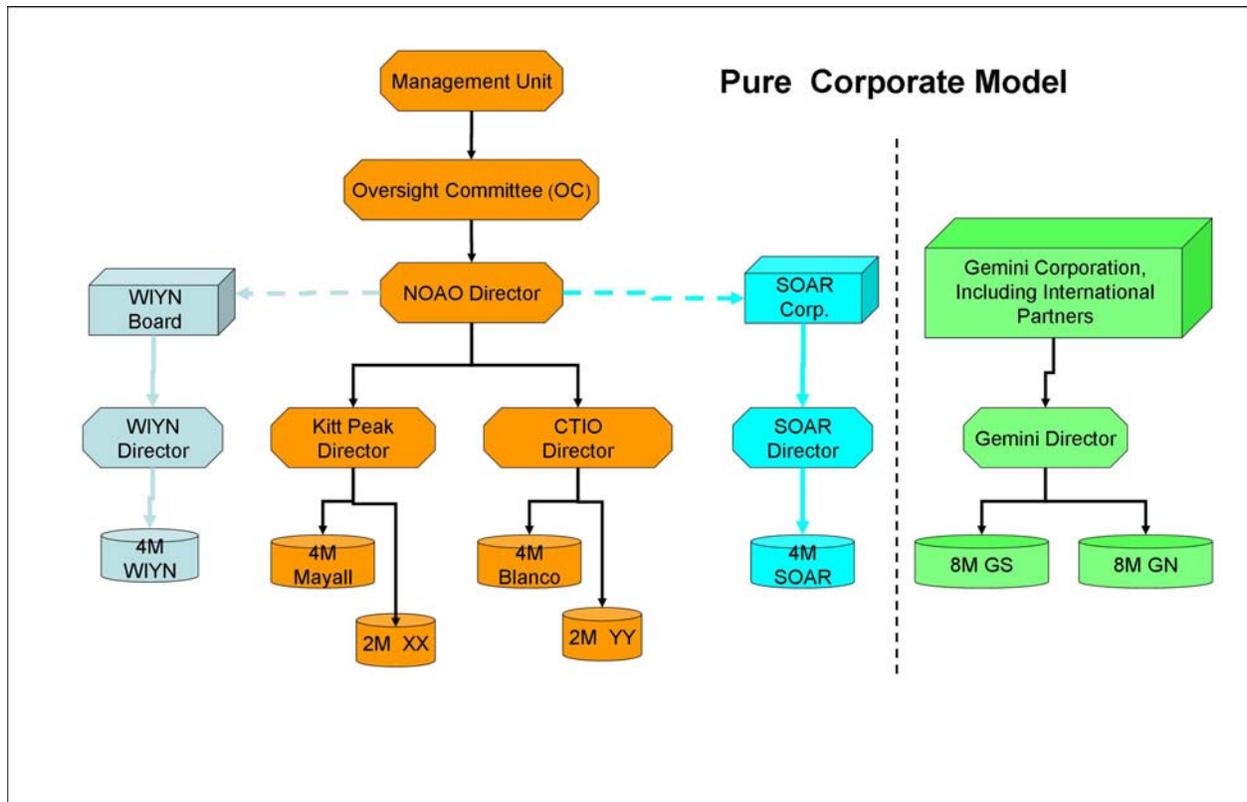
Pure Corporate Model

Synopsis

In this model Gemini becomes a facility/organization that remains separate from the rest of the federally supported US facilities. The corporation would have an executive director (Gemini Director) and a Board. The Board would be a legal entity capable of conducting business, making financial commitments, etc. The Board members would be appointed by the partner countries. The number of Board members remains to be determined but it is expected that it would reflect some concept of proportional representation depending on partner contributions and that the US would have more than one member. The NOAO

Director would be a Board member to represent the US community. Board members would be designated with fiduciary responsibility for their respective contributions. Gemini staff would likely be AURA employees and directed by the Gemini Director.

Figure A1. Organization Chart for Pure Corporate Model



Primary Pros

- 1- Corporate model allows foreign agencies to provide finance for joint facilities, which will help those facilities to be scientifically competitive with other 8-10 meter telescopes such as the ESO's VLT.
- 2- Potentially simplifies and improves governance for Gemini.
- 3- Possibility of a more direct representation of US astronomical aspirations in Gemini governance through NOAO's participation on governing board.
- 4- Provides (international) partners with a route to maintain elements of control of their taxpayer's money, which for some foreign funding agencies could be a legal requirement.
- 5- Removes the NSF from the management lines.
- 6- Provides clear channel between Corporation and Gemini Director.

- 7- Some international partners may perceive it as an advantage to keep Gemini independent from NOAO.
- 8- The corporate model speeds up arrival at a new governance model by removing the US State Department from the international agreement approval process.
- 9- Removes NSF cooperative agreement for Gemini

Primary Cons

- 1- Corporate model does not meet consolidation recommendation of decadal survey report.
- 2- Corporate model continues the separation of the 8m federally funded telescopes from the rest of the national observatory system, reducing the potential for cost savings while also potentially continuing the perceived isolation of Gemini from US community.
- 3- Not stable to partner departure.
- 4- Isolated Gemini observatory in a corporate model is more vulnerable to changes in funding streams (e.g., UK departure) than it would be under a consolidated model.
- 5- If for legal or other reasons the NOAO director or NOAO employees cannot serve on the Board, the corporate model would not provide sufficient representation for the general US community introducing a serious disadvantage to US interests.