WIYN Strategic Plan

1. Summary

The WIYN 3.5m telescope provides superb images over a 1-degree field of view. The opportunities for forefront research by WIYN consortium astronomers are many during the current decade. The purpose of this strategic plan is to ensure high productivity of forefront scientific discoveries from the WIYN Observatory, with strategic emphases based on excellent wide-field imaging.

Wide-field imaging can address several of the keystone problems in modern astrophysics. The equation of state of the dark energy that dominates the mass-energy budget of the Universe can be measured through gravitational lensing census of galaxy clusters and systematic measures of distance through supernovae. The assembly of the Galaxy can be traced through precise proper motions of stars, while the remnant disk of the Solar System is fossilized in the Kuiper Belt of Trans-Neptunian objects.

Wide-field spectroscopy enables decisive measurements of the dynamics of clusters of galaxies for their dark matter content, and clusters of stars for their dynamical evolution. It allows the monitoring of cluster stars for unseen binary companions, including planets, and determination of chemical abundances that hold the key to formation and evolution. Integral field spectroscopy disentangles the dynamical state of individual galaxies and the distribution of stars and gas within the systems.

These investigations represent a rich array of opportunities for graduate and undergraduate research. In its first decade the WIYN 3.5m telescope has provided the data for a remarkable number of graduate dissertations and undergraduate theses throughout the nation. The prospects for even greater student research are bright.

The scientific productivity of the WIYN observatory depends upon forefront instrumentation. The consortium seeks to establish a vital instrumentation program that provides both major instruments of a scale similar to the first-generation Hydra Multi-Object Spectrograph and innovative moderate-cost instruments originating at the universities such as the present SparsePak integrated field unit.

To maximize WIYN's role in scientific discovery and education, consortium astronomers have developed a set of strategic directions to guide the operation and development of the observatory. They are

Focus actions on core capabilities and performance of facilities.

This Strategic Plan envisions two new major capabilities before 2010, including the One-Degree Imager and, for example, enhanced wide-field spectroscopy. Excellent imaging performance and high telescope reliability are priorities to maintain competitiveness.

Enhance the impact and visibility of WIYN science.

The observatory will implement strategies for fostering research programs with high scientific impact, including strengthening collaborative efforts within the consortium, demonstrating advanced technology, and promoting outreach.

Encourage partners to develop instrumentation and technical capabilities.

A broader distribution of technical and software development expertise among the WIYN partners will strengthen the observatory. Continued support of University instrument projects is an essential component.

Explore WIYN Consortium access to larger telescope facilities, both existing and planned.

This direction recognizes the importance of gaining access in the short-term to sufficient 8-meter spectroscopic time for full exploitation of the scientific content of WIYN datasets, as well as the longer term interest in becoming a participant in a next-generation 20-m class telescope project.

Specific goals to enable these strategic directions have been developed and prioritized to guide allocation of resources. The two highest priority goals of this Strategic Plan are (1) enhancing WIYN's scientific impact, by building on the unique strengths of the observatory and the consortium, for example through innovative scheduling, cross-consortium collaborations, and vital university instrumentation programs;, and (2) proceeding to the successful deployment of the One-Degree Imager.

Four additional high-priority goals are: maintaining observatory performance to deliver excellent images over a wide field of view; implementing observing modes to exploit the time domain or other scientific capabilities uniquely well suited to WIYN; defining and planning for the next major instrument to follow the One-Degree Imager; and exploring access to a next generation large-aperture telescope.

2. Introduction

This Strategic Plan lays out a set of directions, goals, and actions intended to maintain the capability of the WIYN Consortium to produce world-competitive scientific research and to educate the next generation of scientists. The primary focus of the Strategic Plan is the operation and instrumentation of the WIYN Observatory 3.5m telescope during the last 7 years of the initial operating agreement (1995 – 2010). The Strategic Plan also addresses actions that must be taken during this period to lay the foundation for WIYN Consortium facilities beyond the initial agreement.

The WIYN Observatory went through an External Review in 2001 that sets the context for this Strategic Plan. The review found that the 3.5m telescope delivers the best images over wide field of any continental US facility and that operations have achieved an outstanding level of

reliability and efficiency. The review noted that WIYN has had a major impact on the university research opportunities, with a broad base of users and an especially impressive number of Ph.D. dissertations. WIYN has also served NOAO well in diverse ways, including providing wide-field spectroscopy to the US community. The spirit of institutional cooperation is high and the quality of staff and management is excellent. The specific recommendations of the review did not extend over the timescale of this Strategic Plan. Nonetheless the review encouraged WIYN to formulate an aggressive path for future scientific and educational opportunities, supported by the greater engagement of university staff and enhancement of the instrument development capabilities at the universities.

This Strategic Plan builds on initiatives underway to construct the One-Degree Imager (ODI) and to upgrade the performance of the Multi-Object Spectrograph. These projects promise important competitive advantages for the WIYN Observatory in high-resolution wide-field imaging and high-resolution multi-object spectroscopy. They also set the broader context within which WIYN will stand during the implementation of this Strategic Plan. Thus, for example, the ODI project has the potential to be an important precursor program for the national Large Synoptic Survey Telescope (LSST) planned for the end of the decade. At the same time, CFHT+Megaprime, Subaru+SUPRIME, MMT+Hectospec, and VST will all be providing capabilities directly competitive with those of WIYN.

WIYN astronomers and Board members developed this Strategic Plan during two facilitated meetings in Chicago, the first on September 13-14, 2002, and the second on February 21-22, 2003. The charge to the participants prior to the first meeting is given in Appendix 1. The priorities of the partner institutions for their investment in WIYN are presented in Appendix 3. The September 2002 meeting proceeded to strategic directions and initial discussions of their implementations. The WIYN Board then reviewed and approved these strategic directions, permitting the development of goals and actions at the February 2003 meeting. The WIYN Board then reviewed, modified, and approved this document on on [TBD].

3. Mission Statement

The mission of WIYN is founded on forefront astronomical research and the education of superb future scientists. Specifically:

WIYN is a consortium of public and private educational and research institutions that seeks to:

- **Learn about the Universe through forefront research programs in observational astronomy.**
- **Operate, maintain and enhance the WIYN Observatory, including the development of innovative operational modes and instruments to support the research and educational needs of the WIYN users.**
- **Communicate the excitement of scientific research and the exploration of the Universe to wider communities.**
- **Develop new capabilities for astronomical research.**

This Mission Statement builds upon and updates that presented in the 1998 Strategic Plan.

4. Strategic Directions

The foundation of this Strategic Plan comprises four strategic directions:

Focus actions on core capabilities and performance of facilities.

This Strategic Plan envisions two new major capabilities before 2010, including ODI and, for example, enhanced wide-field spectroscopy. Importantly, this strategic direction recognizes that maximizing the yield of these capabilities requires maintaining telescope performance, with a particular emphasis on world-class image quality over a wide field of view.

Enhance the impact and visibility of WIYN science.

This direction includes enabling major research programs that build on the unique strengths of the observatory, strengthening collaborative efforts within the consortium, demonstrating advanced technology, and promoting outreach.

Encourage partners to develop instrumentation and technical capabilities.

A broader distribution of technical and software development among the WIYN partners will strengthen the observatory. Continued support of University instrument projects is included within this goal as an essential component of developing partner capabilities.

Explore WIYN Consortium access to larger telescope facilities, both existing and planned.

The superb wide-field capabilities of WIYN place it in an important complementary position with the numerous 8-meter facilities, particularly in terms of laying the foundation for targeted deep spectroscopic observations. Thus this goal recognizes the importance of gaining access in the short-term to sufficient 8-meter spectroscopic time for full exploitation of the scientific content of WIYN datasets, as well as the longer term strategic goal of becoming a participant in the next generation 20-m class telescope projects.

5. Strategic Goals

Strategic Direction: Core Capabilities - Instrumentation and Facility

Goals:

1. Proceed with funding, development, and deployment of the One Degree Imager as the highest continuing priority for major instrumentation, including the information technology that will enable ODI to be scientifically productive.

2. Identify, construct, and commission the next major instrument aligned with Consortium scientific interests and opportunities, the competitive advantages of 3.5m telescope performance, and complementarity to ODI (e.g. bright time usage).

3. Identify, develop, and implement operations that maximize the productivity of these core instrumental capabilities.

4. Develop and maintain the performance of telescope core systems at state of the art.

5. Design, construct, and commission a bent Cassegrain port for University instruments.

Strategic Direction: Enhance the Impact and Visibility of WIYN Science

Goals:

1. Develop a process that enables major research programs requiring allocations of observing time larger than typical for single investigators or assignment of high priority at a multi-partner level. Such programs are designated as WIYN High-Impact Projects.

2. Define and implement observing modes to exploit the time domain and other scientific capabilities uniquely well suited to WIYN. Here "WIYN" is intended to include both the observatory and the consortium.

3. Maintain and enhance WIYN’s reputation for the forefront application of new technology in astronomy.

4. Maintain and enhance the high productivity of dissertations and student research.

5. Improve public visibility of WIYN through outreach and educational activities.

6. Promote collaborations among WIYN scientists.

7. Promote extended visits and fellowships for external scientists - at all career stages - to use the WIYN Observatory.

Strategic Direction: Encourage Partners to Develop Instrumentation and Technical Capabilities

Goals:

1. Develop leadership in those key technologies required to develop core capabilities and maintain facility performance, for example technologies for General Use instruments.

2. Provide a platform to educate instrumentalists and support innovative moderate-scale instrumentation, for example through support of University instruments.

3. Develop linkages within partner institutions to other disciplines that can bring knowledge and technologies to bear on behalf of WIYN technical development.

Strategic Direction: Explore Access to Larger Telescope Facilities.

Goals:

1. Gain access to sufficient 8-meter spectroscopic time for full exploitation of the scientific content of ODI datasets.

2. Generate options for participation in 30-m class telescope projects in time to include such options for consideration in the renewal of the WIYN agreement.

6. Prioritization of Strategic Goals

The set of goals in the prior section is extensive and cannot be achieved simultaneously. Therefore the participants at the strategic planning meetings prioritized these goals via a facilitated voting procedure in which participants were given 4 votes in each of three priority tiers.

The results are shown in Figure 1. Green represents first-tier (or highest) priority, yellow second-tier priority, and red third-tier priority. The two highest priority goals are immediately evident. A range of reasonable weighting schemes for the three priority tiers yields four additional high priority strategic goals.

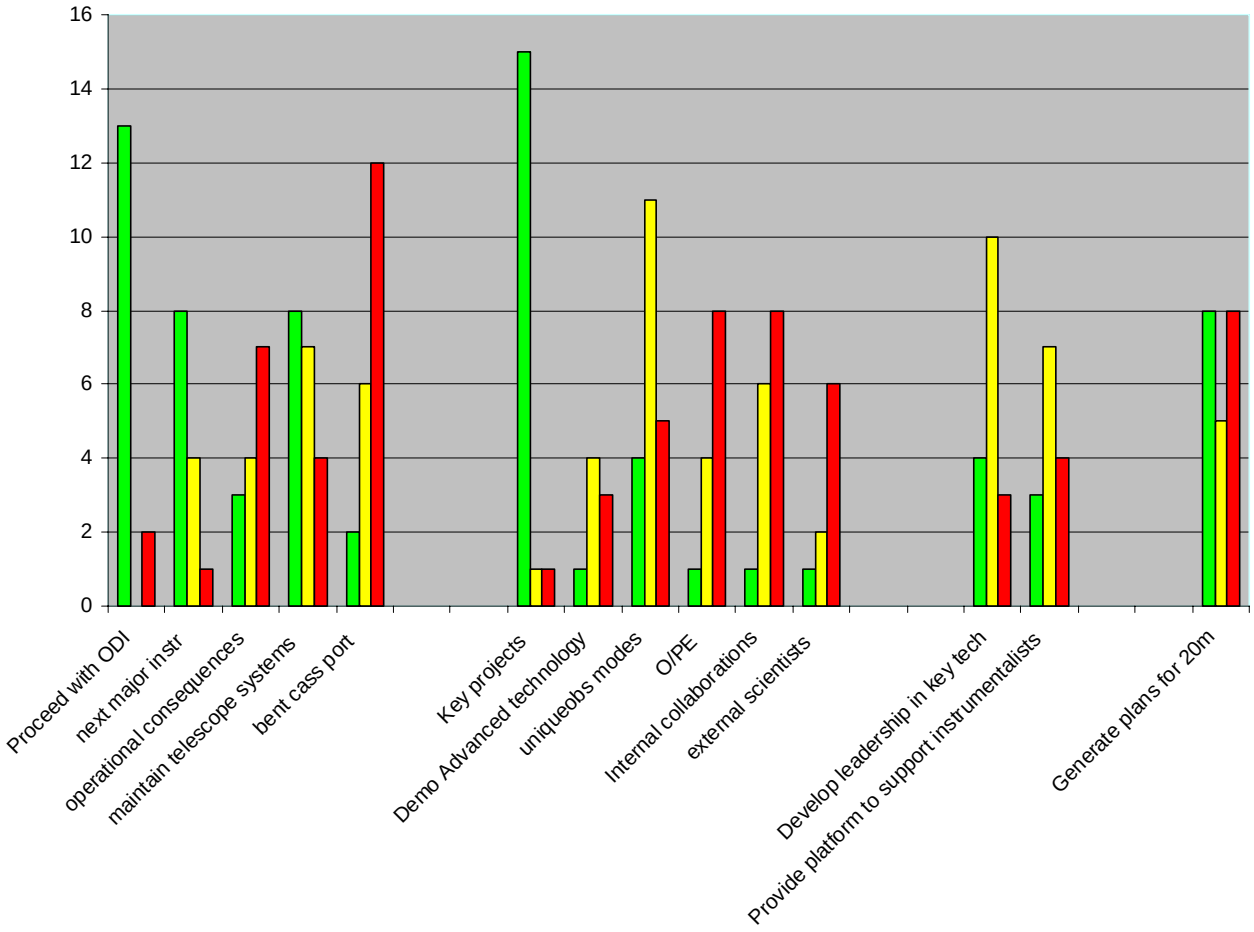
Highest Priority Goals:

- Successful deployment of ODI
- Enable High-Impact Projects

High Priority Goals:

- Maintaining observatory performance to deliver excellent images over wide field of view
- Implementing observing modes to exploit the time domain or other scientific capabilities uniquely well suited to WIYN
- Defining and planning for the next major instrument to follow the One-Degree Imager
- Exploring access to a next generation 20m-class telescope

(Note that High-Impact Projects are labeled “Key Projects” in the figure, from the nomenclature adopted during the Strategic Planning discussions.)



7. Actions to Achieve Strategic Goals

An essential component of this Strategic Plan is the suite of actions recommended for achieving the Strategic Goals. These actions are presented in Appendix 2, along with the success measures for each Strategic Direction by which these actions should be considered. These actions are intended to guide – but not constrain - the WIYN Director, Board, and astronomers as they proceed to implement this Strategic Plan.

Because of the importance of the two highest priority goals, the actions to achieve them are summarized here:

Successful Deployment of ODI

The Consortium must develop a Project Team that includes a project scientist and an ODI Working Group as soon as possible. The Working Group should consist of a member from each of the institutions. These members should be willing to commit to actively playing a role in developing ODI. The ODI Working Group should coordinate a series of workshops on ODI to address ODI science project and issues of scheduling and data products.

The Project Team should prepare a requirements and costs document for review by the SAC leading to a recommendation to the Board on a 6-month timescale. The entire Consortium must continue to pursue existing fundraising activities aggressively. The technical team is urged to explore synergies between ODI and LSST development in such areas as detector development; large-format filter production; and data handling, storage, and pipeline reduction, the latter particularly through NOAO's Data Products Program.

Enable High-Impact Projects

The allocation of WIYN observing time has clearly been successful in supporting excellent thesis investigations and an array of individual investigator programs. The WIYN Open Cluster Study is an example of a multi-partner investigation with broad goals. The participants felt that the Consortium could use the advantage of complete control over its time allocation process to enhance further the scientific impact of WIYN-based research. Options to be explored include enabling multi-partner large programs or projects that require high priority for specific scheduling needs. The WIYN Board should charge the SAC to develop a process for High-Impact Projects for Board consideration, including time allocation policies and scheduling mechanisms. The SAC is encouraged to promote the rapid initiation of High-Impact Projects. For maximum impact, proposal teams are strongly encouraged to identify, generate and disseminate data products from their programs.

The SAC should establish norms and periodically review the outcome of the WIYN scheduling process to assure that an appropriate balance is maintained between major programs and single-investigator programs on the WIYN telescope. Allocation of time to High-Impact Projects should not distort the balanced distribution of time by lunar phase and seasonal distribution among the partners, as prescribed in the WIYN agreement.

Accomplishing these two highest priority goals will require success in reaching the high priority goals as well. Excellent observatory performance is a prerequisite for forefront science. Observing modes to exploit the time domain and other unique capabilities of WIYN will enhance scientific impact. The diversity of scientific goals within the Consortium will require progress on another major instrumental capability within the decade, such as wide-field spectroscopy. Finally, the consortium must look to the future through access to a maximum aperture telescope.

8. Conclusion

The setting of these goals represents a major achievement for the WIYN Consortium. This vision integrates a broad set of ideas for placing scientific achievement with WIYN at the forefront. The vision is ambitious, and likely will not be entirely accomplished within the projected resources available to the Consortium in both funding and personnel. Prioritization was therefore a critical part of the planning process. The two highest priority and four high priority goals comprise a representative mix of approaches critical for a vital observatory. Two are aimed at strategic allocation of observing resources: high-Impact projects and unique observing modes. Three are targeted at investment of technical resources: development of ODI and the following major instrument, along with maintaining high performance of the telescope and facility. The last is the future look: identifying options for participation in a partnership to build a next generation large-aperture telescope. Accomplishing these six goals sets out an achievable challenge to the Consortium to build a future of scientific excellence. That achievement will put WIYN in the forefront of scientific optimization of telescope time and of exploitation of the superb image quality over wide field of view that distinguishes this 4-m facility.

Appendix 1

Charge to WIYN Partners: Strategic Planning for WIYN

MOTIVATION: The WIYN Consortium must regularly examine its strategy for operations and development in order to continue to produce world-competitive science. The planned One-Degree Imager and performance upgrades for multi-fiber spectroscopy represent major advances in the intermediate term. ODI in particular provides the potential for important precursor programs to the Large Synoptic Survey Telescope planned for the end of the decade. At the same time, CFHT+Megaprime, Subaru+SUPRIME, MMT+Hectospec, and VISTA will all be providing capabilities directly competitive with those of WIYN.

GOAL: To define a competitive scientific strategy for WIYN in the medium and longer term. Aspects of that goal include identification of specific science products of ODI, optimizing the strategy for deploying moderate-scale instruments and upgrades over the next five years, and setting the goals for WIYN Observatory operations and instrument complement during the last 5 years of the present operating agreement. Aspirations must be matched to a specific strategy for funding and personnel commitment.

CHARGE TO WIYN PARTNERS: In advance of the Strategic Planning Meeting, address the following questions in order to meet the above goal:

I. What scientific problems that can be addressed by WIYN observations will be the highest priority for Consortium partners and NOAO proposers through this decade?

- What scientific products will provide the biggest impact from ODI?
- What minor (< $1M) new instrumental capabilities should be implemented to achieve consortium scientific goals?
- What changes in operations should be implemented to yield new competitive capabilities (e.g., synoptic scheduling across institutional boundaries)?
- What one major (> $2M) new instrumental capability should be implemented after ODI?

II. What is the priority of WIYN within each partner's department now, and what is it likely to be at the end of the current agreement period?

- To what level of additional funding beyond the present annual budget are the Consortium partners willing to commit? What is the partner plan to raise these funds? Does it include adding partners to the current Consortium?
- To what level will the partner astronomers commit to accomplishing these goals?

Appendix 2

Actions for Achievement of Strategic Goals

Discussion Notes from the Strategic Planning Sessions

Strategic Direction: Core Capabilities - Instrumentation and Facility

Success measures:

a) Scientifically verified performance within specification for two new General Use instruments by 2010.
b) Levels of telescope performance are maintained or improved, and are consistent with being a world leader in wide-field, high-DIQ performance.

Goal 1: Proceed with funding, development, and deployment of the One Degree Imager as the highest priority for major instrumentation, including the information technology that will enable ODI to be scientifically productive. (HIGHEST PRIORITY)

Actions:

a) As soon as possible develop project definition, plan, and team, including a project scientist and an ODI Working Group. The Working Group should consist of a member from each of the institutions. These members should commit to playing an active role in developing ODI.
b) The ODI Working Group should:
    i) Coordinate a series of workshops on ODI to address:
        - ODI science projects
        - Scheduling issues
        - Technical issues
        - Data product issues
    ii) Prepare a requirements document for review by the SAC and a recommendation to the Director (6 months).
    iii) Identify total project costs for presentation to the Consortium (6 months).
    iv) Pursue existing fundraising activities aggressively (ongoing) .
c) Explore synergies between ODI and LSST development, including:
    i) Detector development
    ii) Large format filter production
    iii) Data handling, storage, and pipeline reduction (with emphasis on the NOAO Data Products Program efforts)

Goal 2: Identify, explore, and implement the next major instrument aligned with Consortium scientific interests and opportunities, the competitive advantages of 3.5m telescope performance, and complementarity to ODI (e.g. bright time usage). (HIGH PRIORITY)

Actions:

a) Devise a process by which WIYN, building on its distinctive competencies, identifies the major core instrument to follow ODI, and develops a Consortium-wide consensus.
b) Initiate the process for identifying the next major instrument as soon as possible, with the aim of completing the selection process within a year.
c) Determine the appropriate timing for completion of the instrument in light of the upcoming renegotiation of the WIYN agreement.
d) Proceed with the development and commissioning of the instrument on the timescale identified in Action c.

Goal 3: Identify, explore and implement operational consequences of core capability choices.

Actions:

a) Increase staff to support new core instruments and to maintain the more demanding data stream (between 1-3 FTE).
b) Evaluate facility readiness to accommodate new core instruments.
c) Develop rapid data quality evaluation tools for new core instruments .
d) Support observing/scheduling modes to support new core instruments.
e) Enhance remote observing capability to support new core instruments.
f) Develop data management tools to distribute and archive data.

Goal 4: Develop and maintain the performance of telescope core systems at state of the art. (HIGH PRIORITY)

Actions:

a) Identify potential catastrophic failure modes, develop emergency response plan, and prioritize investment to mitigate failure risks.
b) Develop ongoing process to assess telescope performance and identify areas requiring functional assessment and potential action.
c) Continually evaluate the need to upgrade telescope performance to recognize areas where improvement might enhance scientific productivity.

Goal 5: Design, implement, and commission a bent Cassegrain port for University instruments.

Actions:

a) Determine the scope of the project, including necessary funding, personnel, and timing.
b) Prepare an interface requirements document for the bent Cass port.
c) Prepare specifications for the bent Cass port
d) Identify funding, resources, and operational impact .
e) Implement the bent Cass focus for University instruments and/or WTTM to be ready when ODI is ready, since at that time the WIYN port will no longer be accessible.

Strategic Direction: Enhance the Impact and Visibility of WIYN Science

Success measures:

a) WIYN High-Impact Projectss are successfully completed with high publication and citation rates consistent with the amount of time allocated.
b) Publications with author lists that cross WIYN partners become more frequent.
c) Science programs requiring innovative scheduling modes have been scheduled on WIYN in a manner consistent with their scientific goals.
d) New technologies developed at WIYN have been tested or incorporated into the facility, telescope, or instrumentation, with associated scientific or technical publications and transfer to other facilities.
e) Favorable coverage of WIYN appears in the public press regularly, and WIYN data are used in educational venues within the WIYN consortium and more broadly. Recognition for the WIYN Observatory within professional venues.

Goal 1: Develop a process that enables scientific programs of significant scope to be carried out. Such programs are designated as WIYN High-Impact Projects. (HIGHEST PRIORITY)

Actions:

a) WIYN astronomers and their colleagues interested in developing and carrying out High-Impact Projects should organize workshops to build consensus and to encourage broad participation within WIYN. These workshops should be facilitated by WIYN.
b) For maximum impact, High-Impact Project teams should be strongly encouraged to identify, generate and disseminate data products from their programs. Finding the necessary resources to do so is the responsibility of the team.
c) The WIYN Board should charge the SAC to define policies for enabling High-Impact Projects for Board consideration, including time allocation policies and scheduling mechanisms. For the latter the SAC should take as a starting point the procedures suggested in Section 7 of the Strategic Plan in order to promote initiating High-Impact

Projects on a short timescale consistent with their highest priority. The SAC should continue to explore other means to facilitate High-Impact Projects.

d) The SAC should establish norms and periodically review the outcome of the WIYN scheduling process to assure that an appropriate balance is maintained between High-Impact Projects and single-investigator programs on the WIYN telescope. Allocation of time to High-Impact Projects should not distort the balanced distribution of time by lunar phase and seasonal distribution among the partners, as prescribed in the WIYN agreement.

Goal 2: Adopt and exploit a broader range of observing modes to enable science programs that require cadenced or time critical observations or which take advantage of unusual instrumental or telescope setups. (HIGH PRIORITY)

Actions:

a) Continue to develop and assess the effectiveness of monolithic and other modes of scheduling.
b) Develop time accounting procedures to assure that an appropriate balance of time across the institutions is maintained as scheduling procedures become more complex.
c) Enable target-of-opportunity and synoptic monitoring observations that can be scheduled as partial nights.

Goal 3: As one of the most advanced 4-m class telescopes, WIYN should be known for being at the forefront of the application of new technology in astronomy.

Actions:

a) WIYN staff and instrumentalists should continue to monitor and investigate advanced technologies that may be appropriate for implementation at WIYN. Examples of such technology actions might include:
    i. Implement Volume-Phase Holographic gratings in WIYN instruments
    ii. Collaborate to develop Orthogonal Transfer Arrays for ODI
    iii. Develop/test technologies for high A-ω-multiplexed spectroscopy
b) Incorporate advanced technology at WIYN as appropriate.
c) WIYN staff should continue to publish technical papers on the implementation of advanced technology at WIYN.
d) WIYN institutions should collaborate with Information Technology departments to develop and demonstrate data management systems (such as innovative data reduction and analysis techniques and data archiving).

Goal 4: Improve WIYN public visibility through outreach and educational activities, possibly including the 0.9m.

Actions:

a) Devise and improve capabilities for wider dissemination of results from WIYN to general public. The Wisconsin, Indiana, and Yale media relations offices should work more closely with the NOAO E/PO office to suggest approaches that would be more effective at getting public attention on WIYN.
b) SAC members should work with their colleagues to identify science results, particularly images, appropriate for broader dissemination and bring these to the attention of the institutions' media relations offices.
c) WIYN scientists who develop classroom activities incorporating WIYN data may consider sharing these materials through the Consortium and/or disseminating these materials through publication or presentation at meetings. These activities might include preset lab projects, remote observing, or collaboration with other observatories to incorporate real-time observing experiences in classrooms.
d) Create a public outreach web site for WIYN.

Goal 5: Promote internal collaborations among WIYN scientists.

Actions:

a) Hold more Consortium-wide workshops on scientific topics.
b) Promote individual contacts between astronomers in the consortium with common interests.
c) Arrange visits and colloquia among partner institutions
d) Create a WIY visitor's office, including accommodations, computers, etc.

Goal 6: Promote extended visits and fellowships for external scientists - at all career stages - to use the WIYN Observatory.

Actions:

a) Establish a WIYN pre-doctoral program.
b) Establish a WIYN post-doctoral program .
c) Establish a visiting scientist program.

Strategic Direction: Encourage Partners to Develop Instrumentation and Technical Capabilities.

Success measures:

a) Partners are delivering effective technical products that enable WIYN to achieve its goals in a cost-effective manner.

b) The participants in WIYN technical development initiatives become more collaborative and diverse within and between partners, resulting in useful deliverables produced by partner students, staff, and faculty.
c) WIY scientists are effective instrument scientists, including documenting and maintaining performance and facilitating upgrade initiatives.
d) Partners are developing and using University instruments, and participating and leading in the development of General Use instruments.
e) A Bent Cass port is available for University instruments at the completion of ODI.

Goal 1: Develop leadership in those key technologies required by the WIYN Observatory, for example technologies for General Use instruments.

Actions:

a) Define a dynamic list of projects of all scales for subcontracting to the partner institutions, and coordinate/oversee project management. Partner here is envisioned to include departments/units/disciplines beyond the astronomy departments and industry, and especially to include capitalization on the rapid rate of advancement in information technology.
b) Define and implement policies/guidelines for subcontracting work to the partner institutions.
c) Create an inter-institutional working group of WIYN staff and partner members that promotes the advance of WIYN instrumentation and technology.
d) Facilitate participation by partner students, staff, and faculty in WIYN development activities.
e) Promote WIY staff and faculty as instrument scientists.
f) Develop incentive structures to promote PIs for General Use instruments from WIYN.

Goal 2: Provide a platform to educate and support instrumentalists, for example through support of University instruments.

Actions:

a) Develop an infrastructure to facilitate and lower barriers to the development of University instruments.
b) Create a graduate fellowship program to encourage independent instrumentation and technical projects involving WIYN.
c) Develop the Bent Cass port on a timescale of ODI commissioning (aligned with action from previous strategic direction)

Goal 3: Develop linkages within partner institutions to other disciplines that can bring knowledge and technologies to bear on behalf of WIYN technical development.

a) Leverage the access to multiple disciplines at partner universities towards participation in WIYN by making contacts that are relevant to the needs of WIYN. Examples include:
    - Inviting colleagues to departments and consortium for technical presentations.
    - Engaging student participation from other departments like engineering or computer science.
b) Investigate commonality and portability in data techniques with other disciplines as they relate to current and future needs for WIYN astronomy.

Strategic Direction: Explore gaining access to larger telescope facilities.

Success measures:

a) WIYN science programs include or lead to an increasing number of 8m-class spectroscopic and other follow-up observations.
b) The consortium produced a document by 2008 setting out the achievable options for WIYN participation in a large-aperture telescope project.

Goal 1: Gain access to sufficient 8-meter spectroscopic time for full exploitation of the scientific content of ODI datasets.

Actions:

a) Explore, compare, select and implement at least one option for obtaining 8-meter time, including as examples:
    - Key Project proposals for 8-m observing time
    - Instrument construction as in-kind contribution
    - Cash contribution to instrument development or operations

b) High-Impact Projects may include an 8-m component of the observational program, for example follow-up spectroscopic observations. To promote success of WIYN proposals for the highly competitive 8-m observing time, the new policies for scheduling and operations related to High-Impact Projects should assure that WIYN time is allocated and scheduled so as to facilitate the 8-m proposals.

c) The resources for 8-m follow-up observing should be included as a stretch goal in total ODI project funding.

Goal 2: Generate options for participation in 20-m class telescope projects in time to include this option in consideration for renewal of the WIYN agreement.

Actions:

a) Create a small annual funding pool (~$10K/yr) to support Consortium scientist participation in large telescope planning meetings. The intent is for the participants to disseminate information to all the Consortium partner institutions. Minimize undesired on impact on WIYN staff.
b) Identify the scientific aspirations of Consortium astronomers that require large aperture and compare to the capabilities of planned projects.
c) Explore the potential costs and plausibility of funding.

Appendix 3

Partner Institution Perspectives on WIYN

Wisconsin

The institutional strategic plan is to invest in complementary astronomical laboratories, WIYN and SALT. Two-hemisphere access allows coverage of the full Local Group, while the longitude difference can enable time monitoring of variables with reduced aliasing. The capabilities of WIYN of importance are the large field of view and good image quality. The greatest collective scientific interest is in high A-Ω spectroscopy. The telescope provides a platform for instrument development and a highly successful means to train graduate students in observational programs. The perception is that the level of annual funding commitment to WIYN is about right; SALT will take precedence for targeted fundraising, but WIYN remains a high priority. It is important to leave room for instrument development and higher risk projects on this facility.

Indiana

IU astronomers hold a diversity of opinions on the best future for the facility. WIYN is offering the right level of support for users. Instrumentation priority is the upgrade of Hydra + the bench spectrograph and support of existing instruments. In general, WIYN needs improvement in bright time instrumentation. For Indiana observers there is not enough telescope time – they wish to preserve the nights available to them. The most powerful combination would be access to a range of facilities and apertures – 0.9m + 3.5m + larger aperture (20m-30m). There is strong faculty support for fundraising for ODI, but concern about adding new partners to the Consortium and about High-Impact Projects leaving adequate time for personal projects. Their astronomers plan to participate in both individual and collaborative scientific efforts.

Yale

Yale Astronomy is developing a potential "Grand Unified Plan". They have gained valuable experience with the QUEST wide-field imager for the Palomar 48-inch Schmidt telescope and in leading the SMARTS Consortium in operating the small aperture telescopes at CTIO. They are cultivating new instrumentation infrastructure and adding new computing capabilities. They will build on these three bases to contribute strongly to ODI development and to institute an LSST precursor survey with ODI. Their entire staff is working through an integrated observing plan for studies of high-redshift galaxies and AGN, nearby galaxies and stellar populations, time domain measures of variables and transients, and determination of parallaxes and proper motions. The plan includes follow-up spectroscopy with 6-10m telescopes. Vigorous fundraising is planned; the crystal ball's reply about success was hazy at the first planning meeting.

NOAO

The National Observatory must justify investment in its facilities based on highly competitive, unique capabilities. With WIYN's wide field and excellent image quality, ODI will be a world-beating facility, and staff and users are eager to see a timely deployment. It is motivated by a powerful set of science drivers addressable through time-domain surveys: dark energy/dark matter through supernovae and weak lensing; planetary transits, stellar populations and Galactic structure through mapping of the distribution of variable stars. Multi-object spectroscopy to support stellar seismology, exoplanet searches, and prompt ToO follow-up is an additional powerful capability. Innovations in operations to enhance time-domain coverage through monolithic scheduling will serve the science and the budget. NOAO sees WIYN + ODI as a key facility well into the era of LSST. It is complementary by supporting better DIQ, narrow-band filters, alternate cadences; most importantly, it should be deployed much sooner. ODI data in the NOAO science archive would be an additional valuable resource to the community. With that instrument available, NOAO would be interested in renewing its partnership in the WIYN agreement in 2010, although would like consideration of 5-year terms and the possibility of other partners. Provision of community access to a 20-meter telescope is a priority for NOAO.

WIYN Staff

The staff recognized a growing demand for support in most realizations of the long-term plan for the Observatory. The partners expect stable, reliable operations. The telescope must be re-engineered as it matures, just to maintain high performance at current levels. The Consortium is working toward an upgraded Hydra/bench spectrograph; ODI at the WIYN port, the Cass port supporting IFU's and the high-throughput spectrograph, and a folded Cass port for high-resolution IR imaging and PI instruments. To support this level of increased instrumentation, the staff projects a need for an addition of 1.6 FTE scientists from the partners and 2 FTE technical staff. The strategic plan should contain a consideration of the impact on operations of any development choices.

Discussion by Meeting Participants

Those in attendance found several similarities among the presentations –

- Long-term inclusion of (continuously improved) WIYN in core plan
- Desire for big telescope access for full exploitation of scientific program
- ODI plays a central role in planning.
- Continuing instrument development is critical.
- All institutions are funding-challenged for adequate reinvestment.

That commonality should lead to convergence in prioritizing directions and goals.