



## Keck Adaptive Optics Note 760

# Keck Next Generation Adaptive Optics: Preliminary Design Review Charge and Design Review Process May 12, 2010

### REVIEW PANEL CHARGE

The Director of the Keck Observatory has established a panel of experts to assess the current state of the project to construct a Next Generation Adaptive Optics (NGAO) system for the W. M. Keck Observatory. The review panel will be provided with documentation describing the science cases, requirements, preliminary design for the system, technical risk assessment, and the project plan and budget to completion. Using this material the panel is asked to do the following:

1. Assess the impact of the science cases in terms of the competitive scientific landscape in which the system will be deployed.
2. Assess the completeness and consistency of the technical requirements, including whether they appropriately flow from the science cases.
3. Evaluate the preliminary design for technical feasibility and risk, and assess how well it meets the scientific and technical requirements.
4. Assess whether the design can be implemented within the proposed schedule and budget.
5. Evaluate the suitability and effectiveness of the project management, organization, decision making and risk mitigation approaches, with an emphasis on the next project phase (detailed design) and also with respect to the entire project.
6. Provide feedback on whether the overall strategy will optimize the delivery of new science.
7. Gauge the readiness of the project to proceed to the detailed design phase.

Issues related to the availability of funding for the project are outside the scope of the review. The panel should assume for the purposes of this review that the necessary funding can be obtained in a timely fashion.

The reviewers should be aware that a build-to-cost redesign was performed part way through the preliminary design. As a result the design has changed in some ways from what was presented at the system design review. In addition, as a result of the build-to-cost guidelines, the scope of the NGAO review has been increased to include the NGAO science instrumentation.

At the conclusion of the review, the panel is requested to provide the Observatory a verbal briefing of high priority concerns and recommendations. A draft written report of findings, recommendations and comments is requested within 1 week of the review for presentation at the July 7, 2010 Science Steering Committee meeting. The final report is requested within 1 month of the review. These written reports should be made directly to the Director of the Keck Observatory.

## **DESIGN REVIEW PANEL CHARGE**

### **Introduction**

The W. M. Keck Observatory (WMKO) is collaborating with the California Institute of Technology (CIT) and the University of California, Santa Cruz (UCSC) in the development of the Next-Generation Adaptive Optics (NGAO) system for WMKO.

The NGAO project is currently completing the preliminary design phase with the exception of the science instrument which will not be at a preliminary design level for the PDR. This document describes the Preliminary Design Review (PDR) objectives, success criteria, and process.

The preliminary design phase is the second phase in the WMKO development process. The preliminary design phase has two major objectives. The first objective is to deliver documented designs for each system, sub-system and component, hardware or software, of sufficient detail to establish through inspection and analysis the feasibility of the proposed design, and the likelihood that the design will meet the requirements. The second objective is to present the project plan to completion, including a detailed schedule and budget. The preliminary design deliverables include: requirements documents for key subsystems, an operations concept document, preliminary technical specifications, interface control documents and a preliminary design report.

### **Success Criteria**

Success for the NGAO system design is judged by the whether the following have been accomplished:

- The science cases developed for the system are compelling and competitive.
- The scientific and technical requirements established for the system are sufficiently complete to guide the development of the system.
- A preliminary-level design solution that meets the scientific and technical requirements has been developed.
- The risks associated with the design concept have been adequately assessed and addressed.
- A plan to complete the project in a timely manner within a well defined cost estimate has been produced.

### **Documentation**

The documentation for the PDR will be made available in .pdf file format from a web site. The URL for this website will be provided when the documentation is ready for release.

### **Review Panel**

The PDR panel will use the PDR documentation as the basis for its evaluation. The PDR review panel members are:

- Elizabeth Barton (UCI)
- Corinne Boyer (TMT)

- Jay Elias (NOAO)
- Brent Ellerbroek (TMT)
- Andrea Ghez (UCLA)
- Matt Johns (GMT)
- Norbert Hubin (ESO)

The panel chair is Brent Ellerbroek.

### **Purpose and Objectives**

The purpose of the PDR is to provide an external peer review of the work done in the preliminary design phase and to provide findings, recommendations and comments to the Observatory and the NGAO project team on the designs for the project, the predicted performance of those designs and the plans for completion of the project. The panel report is to be delivered to the Director of the Keck Observatory.

In order to assist the panel in addressing the points in the review panel charge we have identified a number of supplementary questions related to the points in the review panel charge. We anticipate that the panel will have additional questions of their own. We request that where possible the review panel's report provide explicit answers to these questions:

1. Assess the impact of the science cases in terms of the competitive scientific landscape in which the system will be deployed.
  - Are the science cases complete and compelling?
  
2. Assess the maturity of the science cases and science requirements and the completeness and consistency of the technical requirements.
  - Are the science requirements clear, complete and well documented?
  - Is a clear flow down established from the science requirements to the technical requirements?
  - Are the performance and error budgets complete and consistent with the science requirements?
  - Are the technical requirements clear, complete and well documented?
  
3. Evaluate the preliminary design for technical feasibility and risk, and assess how well it meets the scientific and technical requirements.
  - Does the performance predicted for the design meet the scientific and technical requirements given in the System Requirements document?
  - If the predicted performance of the design does not meet the scientific or technical requirements are there adequate plans for addressing these deficiencies as the project continues?
  - Does the design appear feasible?
  - Is the risk identification complete, and if not, what additional risks should be considered?
  - Are the risk mitigation efforts and future plans for risk mitigation likely to result in retirement of all critical risks?

4. Assess whether the design can be implemented within the proposed schedule and budget.
  - Are the plans for completion of the project, including the cost estimate, schedule and budget to completion, sufficiently detailed?
  - Is the methodology used to develop the cost estimates sound?
  - Is the proposed schedule to completion realistic?
  - Is the proposed budget to completion realistic?
  - Is there sufficient management reserve (contingency) allocated in the proposed budget to completion?
5. Evaluate the suitability and effectiveness of the project management, organization, decision making and risk mitigation approaches, with an emphasis on the next project phase (preliminary design) and also with respect to the entire project.
  - Does the performance of the project to date support the project's approach to management and decision making?
  - Is the project's proposed future approach to management and decision making likely to succeed? What modifications would be advantageous to assure the success of the entire project?
6. Provide feedback on whether the overall strategy will optimize the delivery of new science.
  - Are there possibilities for staged implementation or descopes that are viable in terms of the science requirements?
7. Gauge the readiness of the project to proceed to the detailed design phase.
  - Has the project adequately defined the objectives, work breakdown structure and task plan for the next design phase?
  - Is the technical design sound?
  - Is the design concept and architecture adequately documented?
  - Are the resources identified for the next design phase sufficient to address the scope of work?

### **Review Process Guidelines**

In order to make the NGAO PDR as effective as possible we have established the following guidelines for the review process:

1. The review will be made on the basis of written materials. These materials will include all of the materials that the NGAO team believe are appropriate to address the questions in the charter for the review panel. No additional materials will be presented at the review except for those needed to answer questions raised by the review panel prior to the review meeting.
2. The review agenda will include time for a presentation that summarizes the report, but it will be assumed that all of the attendees have reviewed the report in detail prior to the meeting.

## Schedule

The following timetable is proposed for this review process:

Date	Description
May 24, 2010	PDR documentation (part I) available to the review panel
May 31, 2010	PDR documentation (part II) available to the review panel
June 1, 2010	Review panel members requested to submit advance questions on part I materials
June 7, 2010	Review panel members requested to submit advance questions on part II materials
June 8, 2010	NGAO project team responses to part I advance questions available
June 10, 2010	NGAO project team responses to part II advance questions available
June 14-15, 2010	PDR meeting (2 full days)
June 24, 2010	Draft PDR report submitted
July 22, 2010	Final PDR report submitted

## Review Panel Deliberative Process

1. Each member of the review panel should read the PDR documentation prior to the review meeting.
2. Each member of the review panel should submit questions as necessary to the NGAO project team prior to the review meeting to obtain clarification or further information about the PDR documentation and the NGAO project. Leslie Kissner ([lkissner@keck.hawaii.edu](mailto:lkissner@keck.hawaii.edu)) will serve as the point of contact for the submission of questions and all logistical queries. Early submittal of questions, particularly those that may require more extensive answers, is appreciated.
3. Each member of the review panel should consider the answers submitted to the panel for all questions asked in item 2.
4. The project lead (Wizinowich) and the panel chair (Ellerbroek) will determine the agenda for the review, taking into account the questions and concerns raised by the reviewers.
5. The panel will hold a two day PDR meeting with the NGAO project team to discuss the PDR documentation and the specific areas covered by the questions listed in the purpose and objectives section of this document.
6. The panel will hold one or more executive sessions during the PDR meeting to develop the panel's report and recommendations. The report should be organized to address the main points in the charge.
7. At the conclusion of the PDR meeting the panel will provide an oral summary of the review outcomes to the Observatory Directorate, the NGAO Executive Committee and the NGAO project team.
8. The chairperson of the review panel will lead the drafting of a written report. A draft report should be issued within 7 days of the meeting and the final report should be issued within 1 month of the review meeting. This report should summarize the important issues discussed at the review meeting and present the panel's findings, recommendations and comments.
9. The draft and final reports of the review panel are to be delivered to the Observatory Director.