Gemini Design Review Guidelines
Version 1.0
4/1/94

1.0 Introduction:
The Gemini Project is building two, complex telescope system using contractors and partners spread over many countries. Consequently Gemini has to undertake a lot of reviews. In addition it is important that the integration of all these systems, which is the direct responsibility of the International Project Office, is extensively reviewed both internally and externally to ensure that the Science Requirements will be met by the fully integrated Gemini Telescopes.

This document describes the Gemini Projects approach to handling these reviews. We basically define two classes of reviews, System Reviews and Detailed Reviews.

The first are anticipated to be fully open reviews which tackle how Gemini will operate as a system, looking at the detailed performance of the overall system and interaction of the various components and sub-systems. These Systems Reviews will be tasked with taking a top-down examination of whether the Gemini Telescopes will meet the Science Requirements. As progress is made, emphasis will focus on (in addition to performance updates) various other system engineering concerns such as interface definition and tracking, integration and test plans, safety, reliability/maintainability, etc.

The second level of reviews, we have termed Detailed Reviews. The task of these reviews is to examine individual component or sub-systems being produced by our partners or contractors. By their very nature there will be very many of these types of reviews through the lifetime of the Project.

2.0 System Reviews:
System Reviews in general would be large reviews involving major aspects of the Gemini project. They would typically involve support from more than group and the emphasis of these reviews should address system level performance and interactions between the various subsystems. The review teams would usually be made up of both scientists and engineers including some representatives external of the project. Where possible, people who have participated in reviewing various aspects of Gemini in the past will be used to have some continuity. It is desirable to have a fair amount of overlap through each system review, so we would attempt to enlist the help of people who can take a long term interest in this process. We expect to have about two such reviews per year.

The following is a brief list of the currently planned systems reviews with examples of the expected content or emphasis of each:

System Review #1 July 1994

Overall system review:

- Operational Concept Definition
- Implementation
- Performance
- Interfaces
- Preliminary Integration and Test Plan

System Review #2 January 1995

Primary mirror cell assembly plus related areas

- Primary mirror cell assembly
- Mirror Handling, cleaning, coating
- Interfaces: Telescope, Cassegrain rotator, controls, etc.
- Acquisition and Guiding -- wavefront sensing for control of primary

System Review #3 August 1995

Overall system review:

- Operational Concept & Implementation update
  - Controls interactions with hardware
  - Cass rotator / A&G
  - Secondary mirror assembly
- Design & Fabrication status, other areas
- Performance update
- Interface update
- Integration and Test Plan Update
  - Commissioning Instrument status

System Review #4 February 1996

Emphasis in the following:

- Adaptive Optics Design
- Controls interactions (update)
- System performance predictions
- Fabrication progress
- Integration and test plans/progress
- Commissioning plans/progress
- Operations hand over plans

System Review #5 August 1996

Overall Review

- Integration and Test plans
- Commissioning plans
  - Verification of performance
  - Instrumentation
- System Controls status
- Fabrication status, other areas
- Interface update

2.1 Organization:

Organization and planning of these reviews would be the responsibility of:

Project Director
Project Manager
Project Scientist
Systems Engineer

In consultation with:
Group managers, Chief Engineer

2.2 Charge:
Each review may have a different emphasis depending upon the current status of the project. As a general guideline though, the following should be emphasized in system levels reviews:

Early reviews: Operational scenarios
Description of design to date

Later reviews: Fabrication progress
Integration and test plans/progress
Commissioning plans/progress
Operations hand over plans

All reviews: Controls concepts/interactions
System performance predictions
Major interfaces
System safety

Advice is sought in finding potential problems in the interactions of the various subsystems which may limit the telescopes ability to reliably meet the scientific objectives. Constructive suggestions for changes, problems to look out for, and general improvements to enhance the capabilities and minimize risk in a cost effective manner as the project progresses through the various stages of design, manufacture, integration and test are sought and greatly appreciated.

Details of project costs estimates or budgets are not for review in this forum. Cost and schedule will be reviewed independently, but possibly in conjunction time-wise with these reviews.

2.3 Committees:
Committees should be made up of scientists and engineers which are somewhat familiar with the Gemini project, but not typically involved on a day to day basis. In some cases, there may be separate science working groups appointed by the project scientist to review the science aspects prior to a separate engineering review. Possible sources of such people would include:

Project scientists from the partner countries
Scientists from the Gemini Science Committee
Other scientists from institutions in partner countries
Engineers from institutions in partner countries
Engineers from industry

In all cases, care should be taken to select people with appropriate expertise in areas being reviewed and not having any conflict of interest which may be of concern.

2.4 Documentation:

A review package will be available to committee members a minimum of 2 weeks in advance of these reviews. It will contain complete information on the subjects to be discussed and any relevant reference material. A package of presentation material is to be handed out at the review.

The committee will give an oral report to the Project Director and Manager at the end of the review. This is to be followed by a draft written report within one week and a final report within one month of the review.

The project shall prepare a written response to all questions and recommendations within one month from receipt of the final report which highlights answers with questions and recommendations where possible and plans for addressing all of the other issues raised.

2.5 Current Schedule of Systems Reviews

The following is the current list of system reviews planned with a brief description of the emphasis for each:

System Review #1	July 1994
System Review #2	January 1995
System Review #3	August 1995
System Review #4	February 1996
System Review #5	August 1996

3.0 Detailed reviews:
Detailed reviews will vary greatly depending upon the levels of work being covered. Some which cover a very substantial amount of work should be large, in person, reviews. Other cases may be a periodic review of work in progress of a small work package and as such may involve as little as a conference call. Planning of the appropriate level should be suggested by the responsible group manager. Many of the reviews will be of work in progress at institutions responsible for works packages and at contractors.

3.1 Organization:
Organization and planning of these reviews would be the responsibility of:

Project Manager
Group Manager

In consultation with: Project Scientist
Systems Engineer
Chief Engineer

3.2 Charge:
Each review would be appropriately planned. As a general guideline though, the following should be emphasized in the detailed reviews:

Design details
Manufacturing plans
Controls Interactions
Subsystem Performance /relation to Error Budget
Interfaces to other subsystems

Details of costs will be discussed/reviewed only with appropriate project staff and reviewers with the appropriate nondisclosure agreements in place. This may be subject to separate management reviews/sessions. For contractor type reviews, emphasis is placed upon whether the institution or contractor is performing to the agreed contract or work package description statement of work and specifications. Verification of interfaces and progress against schedule will also be of prime concern.

3.3 Committees:
Committees should be made up of scientists and engineers which are very familiar with the Gemini project. No formal (separate) science working group would in general be set up. If the subject under review has been primarily worked on by one of the project groups in Tucson, the committee should include some level of members external to that group. For contractor or work package reviews, the committees would be mostly project people. This would be handled on a case by case basis.

Possible sources people for detailed reviews reviewing work done primarily by one of the groups in Tucson would include:

Project scientist or his designee/ systems engineer/chief engineer
Project scientists from the partner countries
Project engineers from other groups
Experts in relevant disciplines from institutions in partner countries

Possible sources people for detailed reviews reviewing work done primarily by contractors or done within work packages would include:

Responsible Group Manager and his staff
Project scientist or his designee/ systems engineer/chief engineer
Project engineers from other groups
Other project scientists

3.4 Documentation:
There are no formal advance documentation requirements. Some of the larger reviews may require advance documentation and reference material as requested by the appropriate group manager responsible. Packages of presentation material will be distributed at the review.

As a minimum, meeting minutes will be generated with a list of actions / recommendations to be considered. Written reports and/or an oral report from the committee may be requested by the Project Manager or Group Manager (in advance).

The organization being reviewed shall prepare a plan to respond to all questions and recommendations within one month from the review which highlights answers to questions and recommendations where possible and plans for addressing all of the other issues raised.

3.5 Current Schedule of Detailed Reviews:
The current schedule of detailed reviews planned is attached for reference in appendix B.

4.0 Interactions between detailed and system reviews:
The major emphasis of any of the systems reviews should be correlated with the work in progress at the time. This will often be evidenced by the areas under detailed review. These systems reviews, however, should cover broad areas of the project detailing interactions between subsystem that have evolved and presenting any changes in major interfaces.

Once a year, this review might be considered an overall project review. An example might be the first systems review (to be held in the summer of '94). This will cover the project as a whole. It will have a major emphasis on how the telescope will be used, the controls interactions, all major interfaces, and a preliminary integration and test plan.

The systems reviews in between these overall reviews may have more of a concentration in a particular area. An example may be the second systems review (currently scheduled for early '95). This may have an emphasis on the primary mirror assembly. Since a detailed review of the mirror cell assembly, preliminary reviews of the coating plant, mirror cleaning, coating stripping will have recently occurred, this review may concentrate on this assembly and the interactions with these other areas and the required mirror handling involved. The appropriate level should be decided on a case by case basis.

A brief list of areas to be covered in each system review is given below. It was generated by comparison of our current schedule of detailed reviews given earlier and the overall expected project progress at each review:

System Review #1 July 1994

- Overall system review:
  - Operational Concept Definition
  - Implementation
  - Performance
  - Interfaces
  - Preliminary Integration and Test Plan

System Review #2 January 1995

- Primary mirror cell assembly plus related areas
  - Primary mirror cell assembly
  - Mirror Handling, cleaning, coating
  - Interfaces: Telescope, Cassegrain rotator, controls, etc.
  - Acquisition and Guiding -- wavefront sensing for control of primary

System Review #3 August 1995

- Overall system review:
  - Operational Concept & Implementation update
    - Controls interactions with hardware
    - Cass rotator / A&G
    - Secondary mirror assembly
  - Design & Fabrication status, other areas
  - Performance update
  - Interface update
  - Integration and Test Plan Update
    - Commissioning Instrument status

System Review #4 February 1996

Emphasis in the following:
- Adaptive Optics Design
- Controls interactions (update)
- System performance predictions
- Fabrication progress
- Integration and test plans/progress
- Commissioning plans/progress
- Operations hand over plans

System Review #5 August 1996

Overall Review
- Integration and Test plans
- Commissioning plans
  - Verification of performance
  - Instrumentation
- System Controls status
- Fabrication status, other areas
- Interface update

Further reviews to update integration and test progress, commissioning, etc. may be scheduled at a later date.

Appendix A contains the agendas for each of these reviews (as they are generated) for reference.

Appendix A
System Review Agenda

Systems review #1 Agenda (Draft)
3/20/94

The following summarizes a draft 'agenda' for the systems review in July.
Possible agenda topics/areas to be covered:

1). Top look at overall system
    - SRD version 2.0 plus?
    - Description of overall telescope
    - Results from previous reviews
2). How we use Gemini
    - Operational Concept Definition
        - Observation Scenarios
        - Software Design
        - Implementation
            - Tip/tilt
            - Auto focus
            - WFS
            - Computers, networks, etc.
3). Interfaces
    - Descriptions of all major interfaces
    - Interface Control
4). Performance
    - Error Budget (note assumptions used)
    - Performance predictions
    - contingency planning?
5). Integrated Schedule
    - Operations ramp up
    - Contingency planning
6). Facility Integration
    - System Integration and Test
    - Operations support
    - up to First Light
    - through Hand over

7). Specialty Engineering
    - Safety
    - Maintainability / reliability
        - Cleaning / coating / handling

Appendix B
Gemini Reviews