ANNUAL OBSERVATORY PLANNING GUIDE: PROCESS & REQUIREMENTS

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INTRODUCTION

The purpose of this document is to define the process, guidelines and requirements for the annual exercise of setting the detailed priorities of projects the Observatory commits to complete, consistent with our long range strategic plans. Factored into these plans are the typical project management constraints like budget, labor, and time available.[1] The final product of this annual project definition and prioritization process is then fed into a separate detailed planning process in which specific projects are scheduled, resource validation occurs, and project links are defined.

All of this activity leads to the generation of a new 5-year plan annually at Gemini Observatory. The first year in that plan is defined in detail and executed starting each January while years 2-5 of the plan primarily serve to link near term activity with long-range projects and strategically important goals.

Some of the key considerations factored into the Observatory plan include –

- Develop the Observatory as a forefront facility for astrophysical research
- Enable the scientific productivity of Gemini and its international astronomical user communities
- Achieve a fully-optimized operational model that realizes maximum efficiency of both telescopes
- Develop and sustain a corporate approach to engineering and operations support for increased operational reliability and achieve long-term sustainability within the staff
- Enable outstanding "end-to-end" science support by maintaining a high quality science staff that is able to execute the queue, optimize instrument performance at world-class levels, and effectively managing the distributed model in partnership with the NGOs
- Develop state-of-the art instrumentation to provide our community with the most advanced research tools possible
- Maintain and further optimize instrument and telescope performance, particularly image quality and emissivity
- Provide quality-assured data, with the means to remove the telescope and instrument signatures, for all observing modes
- Explore and implement new modes of astronomical observations that enable novel discoveries
- Share the excitement and discovery with the general public through effective news, public information, and education programs
- Employ and develop a diverse workforce
- Develop and sustain an exemplary safety program and culture
- Further improve the transparency and cost effectiveness of Gemini's information and administrative services and procedures
- Initiate and continually strengthen scientific and technical partnerships with other 8-10 m observatories to share development and operating costs and avoid the wasteful

[1] In the future, risk will also be assessed for projects as part of an overall risk mitigation strategy used at the Observatory

duplication of instrumentation and capabilities
- Lead the Observatory's cultural, managerial, and institutional evolution for further improvement

Core principles behind Gemini's internal operations are defined in the document "*Our Working Culture/Nuestra cultura de trabajo*" and include –

- Treating others as we would like to be treated
- Striving for personal and institutional growth over status quo
- Taking responsibility and accountability for our actions
- Acting with integrity in all we do
- Having mutual trust in all relationships
- Nurturing safety of people and equipment in all our actions

These are foundational elements of Gemini's working culture and the Observatory plan must remain consistent with these principles in order to preserve the integrity of the organization, as a whole.

WHY

The purpose of the annual planning exercise is to ensure that the Observatory fulfills its mission to the satisfaction of its customers, the Agencies and the thousands of astronomers that together comprise the Gemini scientific partnership, in a sustainable way. The Observatory plan provides the staff with a unified set of priorities and a tangible set of metrics and milestones by which progress can be gauged. It motivates discipline in the choice of what the Observatory pursues and provides a planning framework to ensure that the strategic interests of the Observatory are preserved.

The planning exercise yields more than a rank ordered "*to-do*" list – it also generates "*don't-do yet*" and "*don't do at all*" lists, which are equally important. The process also forces close examination of the suitability and demand for unplanned resources when new urgent projects arise.

WHO

The Gemini Deputy Director leads the annual planning exercise on behalf of the Gemini Director, who has final decision-making authority. The preparatory phases of the annual planning exercise are conducted by the Associate Directors, working together and working in close collaboration with the Heads of Gemini North and Gemini South Science operations, and with all appropriate high-level managers.

All Gemini organizational divisions prepare their priority project lists in "parallel". The four primary groups involved in the process are Science, Engineering, Development, and Administration. While each group develops their respective projects, they are expected to consult with other groups both horizontally and vertically in Gemini's organizational structure. The Public Information and Outreach (PIO) group, which is accountable to the Deputy Director, also

participates in this annual exercise since its activities and resource requirements impact other groups (e.g., Science and Administration). Likewise the safety program group, which is accountable to the Director, participates in the planning exercise. During the retreat and for the purposes of cross-group ranking of projects, the PIO and Safety program managers function as an extension of the Administrative group.

The Associate Directors select the appropriate managers to attend and participate in the annual planning retreat as members of the Gemini Planning Committee (GPC) where projects and priorities are merged, discussed, reviewed and finalized. There will also be representatives of Gemini's "customers" during the annual planning retreat, i.e., a selected member from the Gemini Board will participate as an observer and members of the Gemini Science Committee and the National Gemini Offices (nominally the GSC Chair and Chair of the Operations Working Group) will be involved. The latter will be full participants in the annual planning process and participate as members of the science staff during all pre-retreat meetings (nominally via video or telecom) as well as the retreat itself.

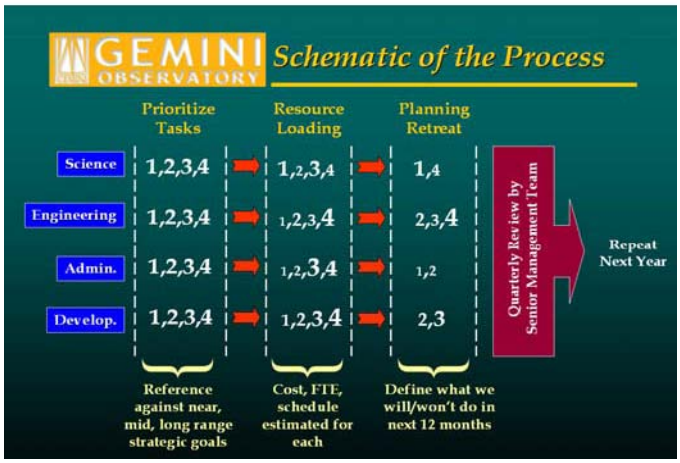


Figure 1 - A schematic of the Observatory planning process is shown. Projects are defined and resources assigned by each division. In this example projects which require more resources are shown with larger fonts.

HOW & WHEN

The overall sequence of events, which together comprise the Observatory planning process, is shown in Figure 1. Explained in detail below is the sequence of steps behind this process.

Step 1) The annual planning exercise begins in mid-July of each year through a manager's meeting so that representatives can speak for all functional groups in the Observatory. The executive core of the planning group is comprised of the Director and his/her Deputy and Associate Directors which will together form the Change Control Board (CCB). During the July kick-off meeting they state the top-level goals feeding into that year's planning exercise by defining the mission critical projects that must be fully resourced as part of the planning process. These mission critical projects may be multi-year in duration or multi-discipline in nature. Leaders for each project will be defined as well to help ensure clarity about roles and responsibilities during the planning phase.

In addition, the annual prioritization process draws from the following –

- Internal drivers
    - Balancing commissioning projects and science time on the sky

    - Enabling an equal level of productivity and scientific achievements at Gemini North and South
    - Deploying operational support for approximately equal staffing at both Gemini North and South
    - Balancing the attraction of new initiatives with the need to repair, maintain, and upgrade existing systems
- External drivers
    - Priorities in Observatory capabilities recommended by the GSC (and resulting from the Users' Meetings)
    - Gemini-N & Gemini-S science time fraction as approved by the Gemini Board each semester
    - Annual budgetary requirements and cash flow which in turn impact level-of-effort within Gemini
    - Contractual obligations
    - Board directives set each semester

Step 2) The next steps in the process broadly fall into two categories, namely ranking and prioritizing projects.

Ranking and Resource Loading Projects

After the kick-off meeting, the functional division heads (i.e., those leading the administrative, development, engineering, and science groups) begin a series of meetings within each of their respective groups designed to –

1. Determine and develop with reasonable detail all projects related to the Observatory's day-to-day operation. These projects by definition and nature have the highest priority to develop and execute and fall into the category of "Mission Critical Projects"[2]. More details on how to plan these projects are provided in Appendix B.
2. Assess the status of the projects within the context of the current plan
    a. This in turn feeds into discussions regarding which projects should "roll over" into the next plan and which should no longer be pursued.
    b. A "roll over" project is subject to the planning process under the same conditions of any new project. Automatic approval to continue executing a "roll over" project into the next year is not allowed.[3]
3. Define within the current 5 year plan which out-year (Band 2 or Band 3) projects should be brought forward or remain out-year projects
4. Define, develop and resource load any new projects, driven by factors including current

[2] Mission Critical Projects are those required to sustain Gemini's core mission and current capabilities. Examples would be baseline nightly science operations, payroll, essential engineering maintenance projects, etc. Some projects may be defined mission critical by the Gemini director because of their essential strategic nature.

[3] For easy reporting and analysis of these projects a "Roll Over Project" check box has been added to the Project Custom Field Tab project information.

science drivers, problems with the facilities (buildings, telescopes, vehicles, network, instruments, etc.), overdue maintenance (to the domes, base facilities, etc.), or new initiatives (recruiting, accounting, instilling a corporate culture, etc.)

5. Rank order projects proposed for the new Observatory plan, including nominating projects that should no longer be considered in the Observatory plan (i.e. Band 4 projects that will not be scheduled for at least 5 years).

Factoring in both internal and external drivers, initial ranking of the proposed projects is performed independently by each functional group by prioritizing projects into 4 Bands, namely–

- Band 1 - Worked on and completed during year 1
- Band 2 - Start during year 2 – only consider performing during year 1 if enough Band 1 projects are completed first
- Band 3 – Start in the year 3-5 range
- Band 4 - Not be done at all in the current 5-yr plan

It is an important part of the planning exercise to be able to identify projects in Band 4.

Prioritizing Projects

Given the effort required and probability of Band 2 or 3 projects making their way into year 1 plans, only Band 1 projects are prioritized at this point in the overall process. The only exception to this rule is that all Transition Projects should be fully resources since they will eventually all become Band 1 projects. Furthermore the Gemini Planning Score Card should be used to assess the merits of proposed projects and qualify them for Band 1 ranking. From the score card goals Project Observatory Benefits and Project Plan Risks feed into a two dimensional Priority Evaluation Matrix which numerically estimates the institutional value of the proposed project.

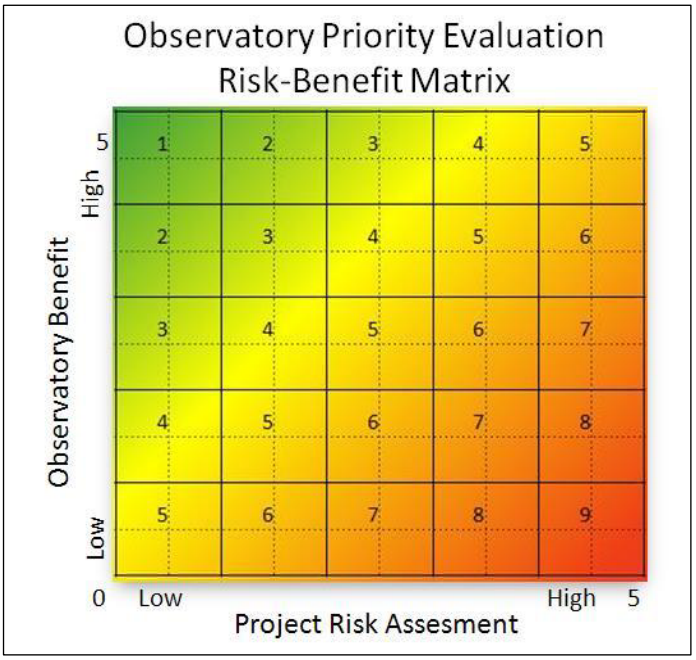
Project Score Card

The intent of using this score card is to motivate those proposing projects to carefully consider key parameters describing projects from a broader organizational perspective and to help ensure that projects are sufficiently well understood that subsequently ranking them against other projects is viable. Weights are assigned to each question in the score card. Then an individual score of 0= Low, 5=Med or a 10=High will be given to each of the questions listed in the scorecard. Adding those scores separately to each goal and combining them in a Cartesian coordinate system (X, Y) provides the data to the Priority Evaluation Matrix for the proposed project and its priority.

Project Observatory Benefits. (Y axis of the Evaluation Matrix)	***Weight = 50%***	***Max Score = 5***
Does the proposed project support the Observatory's mission?	0.2	(L=0,M=5,H=10)
Does the project improve the quality of Gemini's scientific product?	0.2	(L=0,M=5,H=10)
Does the project improve significantly the Observatory's efficiency?	0.2	(L=0,M=5,H=10)
Is the project consistent with priorities recommended by the Community/GSC?	0.2	(L=0,M=5,H=10)
Is the project consistent with priorities established by the Gemini Board?	0.2	(L=0,M=5,H=10)
Project Plan Risk Assessment (X axis of the Evaluation Matrix)	***Weight = 50%***	***Max Score = 5***
How much does the project cost? (higher cost = higher score)*	0.15	(L=0,M=5,H=10)
How many FTEs or other non-budget resources does the project use? (higher FTEs and/or non-budget resources = higher score)*	0.15	(L=0,M=5,H=10)
Will this take longer than 1 year to complete? (longer time = higher score)*	0.15	(L=0,M=5,H=10)
Are the project goals, costs, FTEs, schedules, and resource requirements fully defined and available? (uncertain = higher score)*	0.35	(L=0,M= 5,H=10)
Is there any significant technical or other risk that could affect the project? (more risk = higher score)	0.2	(L=0,M=5,H=10)

*Referenced to the resources (budget, effort, etc.) available within your group

In the figure below, nine levels of priorities are assigned. Level 1 (0, 5) means that a project is ranked as Low Risk, High Observatory benefit so the priority is the highest =1. In the opposite, level 9 (5, 0) means that a project is ranked as High Risk, Low Observatory benefit so the priority is the lowest = 9. In general, Band 1 projects will tend to be clustered in the top left part of this matrix. Particular justification needs to be given for proposed Band 1 rankings that do not fall in this region of the Priority Evaluation Matrix.[4]



Cross-disciplinary conversations are held during this phase to ensure that (1) multi-group projects are accurately resource loaded and; (2) the purpose/scope of such projects are well understood across relevant groups. These conversations may address projects that are either multi-disciplinary in nature or projects that are initiated by one group but are the responsibility of another group. For example, science operations will likely develop projects that relate to

[4] The planning tool now provides a real-time plot of a project's risk vs. benefit.

improvement of the telescope or instruments but are the responsibility of the engineering group. Also, many IS group projects will likely be initiated by other groups. These cross-disciplinary meetings should be held early in the process with the following outcomes –

- A clear purpose, definition, scope, and mutual understanding of the project by all of the groups involved.
- If it qualifies as a Band 1 project, accurate resource loading of the project that will be fed into the planning process.
- Transfer of the responsibility for the project to the group taking ownership of completing the project.

Meetings associated with step 2 should be completed no later than 10 business days before the annual retreat. Likewise proposed projects, which incorporate the results of these meetings, should be loaded into the central database by this time.

Step 3) The Deputy Director then works with the group leaders to identify and eliminate any duplicated projects before generating the final project list that feeds into the retreat. To be clear, meetings held prior to this milestone should have eliminated such duplications but this step is used as a "backstop" to ensure that no duplications make it to the ranking process (step 4), which would waste time during the retreat. No less than 7 business days before the annual retreat the duplication-reconciled project list is distributed to the GPC which then ranks all projects by all groups. ***If anyone on the GPC feels they do not have the expertise to rank a project they are free to leave it unranked.*** This part of the process is called the Division Ranking.

Step 4) No less than 3 business days before the annual retreat each group leader on the GPC loads their rankings in the database. A simple algorithm is applied to identify projects that have ranks in contention. These projects are flagged for consideration by the GPC during the retreat and, if possible, before the retreat. The algorithm used to flag projects in contention does so by flagging –

- Two or more groups rank a project differently, indicating disagreement across groups.
- Any other group ranks a project differently from the originator by at least 2 Bands, indicating strong disagreement from some other group.

Step 5) The retreat takes place in mid-October so that it naturally interfaces into the fall AOC-G, GSC, and Gemini Board meetings. During the first day of the retreat only contentious projects are discussed in order to resolve their ranks. There is no need (or time) during the retreat to discuss projects that are similarly ranked by the various groups. If consensus is not reached on ranking the projects in contention during the first day of the retreat, the Director will assign a rank to those projects.

Step 6) Once all project ranks have been resolved with input from the entire GPC each groups' projects are sorted by rank. If what were originally defined to be Band 2 projects (prior to the retreat) now have Band 1 ranking, resource estimates are applied then during the retreat. With all Band 1 projects resource loaded, the cumulative Band 1 resources are evaluated down the rank ordered list. When the resources required to complete a groups' Band 1 projects exceed the

resources available, all lower priority Band 1 projects are moved to Band 2.

General Information

The product of the annual planning retreat as summarized above is a list of Band 1, 2, 3, and 4 projects, with resource estimates applied to all Band 1 projects. *This constitutes a project list, not the Observatory plan.* The Plan is formed after the retreat by each group as it represents a detailed process of scheduling, checking for doubly booked staff, etc.

Cross-discipline projects (e.g., those requiring a blend of science, engineering, and development FTEs) represent special challenges in a matrix managed organization like Gemini. Historically such projects have been split into components within each branch and "stitched" together as they are executed. In practice, during planning retreats, they are clustered together and prioritized as a group since typically it isn't worth investing in only a portion of a major cross-discipline project without committing to complete the entire project. Beyond these logistical complications in the definition and execution of such projects, this approach tends to dilute ownership of the project, reduce the practical benefits of assigning a single team with all of the necessary skills to complete a particular project, complicate resource planning, and promotes a sense of staff working in relative isolation within "silos" on Gemini's org-chart. To address these complications, cross-discipline projects should be defined as a single project with a single person responsible for the overall management of the project. They should allocate all of the resources necessary to complete the project regardless of where they exist within Gemini's organizational structure.

The location of the annual planning retreat alternates between Chile and Hawaii at a location relatively close to, but not at, the respective base site. This way only half the GPC needs to travel (significantly) in support of any given retreat. Furthermore, isolating the GPC from the base facilities during the retreat facilitates the complex exploration of trade space intrinsic to such a planning process by reducing the number of distractions that would otherwise arise if the meeting were held at a Gemini facility.

The GPC will meet at the beginning of each year to launch the execution of the plan. As mentioned before, the AD team serves as the Change Control Board and will be responsible for approving proposed additions, deletions, or schedule changes in the plan. These could be triggered by changing circumstances ranging from a major technical fault to the unexpected loss of key personnel. New (i.e., previously unplanned) projects will be started only if the appropriate resources can be identified and/or if existing projects can be cut, postponed or eliminated. The plan will be reviewed weekly by the Director and respective division heads. The Project Initiation Protocol (PIP) process will be in place to submit changes to the plan to the Change Control Board for its consideration.[5]

Finally, reports are provided continuously as the Observatory Plan is updated by each manager responsible for a group's projects. These reports are derived from a single database

[5] The PIP will ultimately include all cases of new, cancelled, or re-prioritized projects.

which will be updated weekly and used to track progress (or lack thereof) to ensure that the "loop is closed" on the various projects, the plan is responsive to changing circumstances, and to provide a convenient mechanism for the entire staff to monitor progress about all projects within the Observatory Plan. Once the Observatory Plan has been completed it will be announced to the entire staff so they can track progress on projects of particular interest. Associate Directors, Heads, and managers are asked to make sure that the plan's contents are communicated and explained to their staffs.

The Observatory planning process is a long-term investment in Gemini and, as such, the tools needed to support this process in an optimal manner are provided to everyone on the staff through Project Insight (PI). The associated document "*Gemini Planning Tool Policy for Project Creation and Management*" explains how PI will be used to support the annual planning process. Appendix A lists the timeline for milestones associated with the planning process while Appendix B lists essential steps for a successful process.

HOW DO WE MEASURE OUR SUCCESS?

Although our "customers" will be the final judges, mechanisms and metrics must be in place to measure the success of this entire process. Success of the development and execution of the Observatory plan is ultimately linked to 2 products, one being the output of the annual retreat (essentially a comprehensive to-do list) and the other is the output of the subsequent detailed plan generation (a detailed program plan). A number of metrics are possible which quantify the success of the Observatory plan, including –

- Percent completion of projects at the end of year 1 compared to the forecast completion level at the beginning of year 1
  - Percent of Band 1 projects that had to be dropped from the list via the Change Control Board
  - Of these, the percent dropped due to unforeseen events vs. due simply to overly-optimistic planning.
- Number of projects brought forward from Band 2.
- Comparison of the budget used at the end of year 1 vs. the budget forecast at the beginning of year 1.
- Various telescope performance metrics which are presumably being affected by the plan
  - Down time
  - Open shutter efficiency
  - Image quality
  - Etc.
- Annual scientific publications by Gemini's staff and the community
  - Number of high impact scientific results achieved annually
- Staff morale as gauged by annual interviews, surveys, and turnover rates

These and other metrics sense the Observatory's "pulse" from many directions. The fact that the Observatory plan impacts such a diverse range of metrics signifies the importance of this plan and process to the entire Gemini partnership.

APPENDIX A – Summary of Process and Timeline

WHEN	WHAT	WHO
July	Annual kick-off meeting	GPC
September	Draft lists of priorities	Functional groups
October	Annual Planning Retreat	GPC + GSC rep + Board rep
	AOC-G Meeting	AOC-G (process/viability)
	GSC Meeting	GSC (content)
November	Gemini Board Meeting	Board
December	Detailed plan generation	All project-accountable managers
January	Execute plan	All Staff
	Semi-annual meeting #1	GPC
July	Semi-annual meeting #2 (Annual kick-off meeting)	GPC

APPENDIX B – Essential Steps for a Successful Process

Integrity: Extreme attention should be given to realistic scheduling and monitoring progress in the completion of projects. This involves proper distribution and delegation of responsibility, authority and accountability.

Band 1 projects: Focus on things we must do to "survive". Next choose activities with the highest chance of success. Do not try to do everything or attempt all pathways.

Criteria: To establish whether a project is valid and what priority it should get, reference it against near, mid, and long range strategic goals.

Resources and assignments: Cost and FTE constraints should be estimated for each project. Resources should be well defined and projects assigned to clearly identify the roles of individuals and/or groups. It is important that the cognizant group for each project consult with the other groups when the other group's resources are required. **As a guideline a contingency of 30% should be used for budget and labor estimates** though each Associate Director has authority to assign whatever level of contingency they feel is necessary to ensure the integrity of the resource estimates.

Detailed definition: Make sure each project is clearly understood in your group(s) and any related groups that provide additional resources and support. The larger projects should be backed up by more detailed documents and lists of sub-projects that have been agreed by the various groups involved. These details do not need to be presented at the annual planning retreat, unless the "secondary" group asks for clarification.

Factoring in Regular Operations: Each division head should include in the planning process the projects associated with day-to-day operations. Proper resource allocation needs to be estimated for these projects to discuss them during the pre-retreat group and cross division meetings, and finally during the retreat as a summary of the resources involved in Operations. These resources should be discounted from the total division FTE available and the remaining FTEs should be resourced for non-operation projects. The operation projects, as mentioned before, are by nature high priority and consequently Band 1 without major discussion during the retreat. In fact, most of them are "mission critical".[6]

[6] Projects of this type will be coded as: SCIO for SCI -Operations, ADMO, ENGO and DEVO respectively from the Project Type point of view.