

Gemini Observatory Queue Operations - an example of efficient use of on-sky time

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Gemini Observatory's two 8m telescopes operate mainly in queue mode. Queue operation is a natural evolution from the traditional observing mode given the trend towards more complex and sophisticated instruments, tighter research funding to individual researchers, and increased cost of telescope time. TMT plans to operate in 50/50 combination of "Service Queue" and "Classical operation" mode. In this poster, I present Gemini's queue operation model in hope that it can help develop TMT's own queue operations model.

Time Allocation: Fill the queue correctly

Prepare ready-to-execute Observations

Strategic Planning

Queue Planning,

Observing, PI eavesdropping,
Data Quality Checks

Gemini Science Archive

PI downloads, reduce data
& Publish!

Time allocation - Filling the queue adequately :Time allocation committee ensures not only that interesting scientific programs are approved, but also they cover various sky conditions(weather and moon phases). Failing to do this adequately can result in having many PIs expecting data but not getting any (e.g. too many observations requiring excellent seeing and photometric sky will result in many unexecuted observations and disappointed PIs).

Phase 2 - Defining ready-to-execute observations. When this phase is completed, our observing database are filled with (typically hundreds per telescope) ready-to-execute observations which contains target, guide star, observing sequence(number/types of science/calibration exposures, size of the offset for sky exposure and such) etc.

Strategic Planning - Core Queue Coordinators (core QCs) takes into account the overall queue filling, instrument availabilities, time critical nature of observations etc. to come up with a strategic queue plan for the semester. This is vital to achieve high completion rate of programs.

Queue Planning - Staff astronomers on queue coordination duties (QCs) manually create nightly observing plans using software tools. The tool shown on the right communicates with the observing database and calculates visibility, inform us about timing windows if any, expected background brightness due to moon/sun etc. We create plans for different weather conditions and the observer will execute observations appropriate for the weather condition of the night. Quite often, the seeing or cloud coverage varies through the night and the observer will jump from one plan to another. We typically have three instruments + AO system available every night and overhead of switching instruments are negligible.

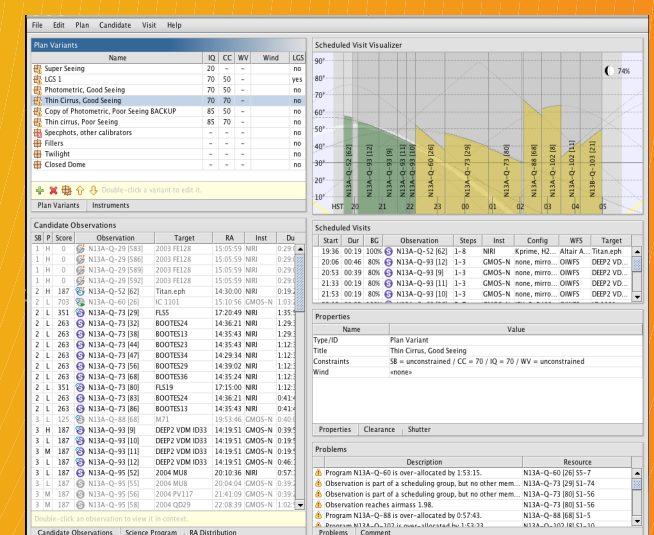


Figure 1: Queue Planning Tool (aka QPT)

Data Quality Checks - The data must meet certain criteria to be considered "pass". If not, the database will be updated with new observations to replace those already executed and will be rescheduled.

Involving PIs - Keeping PIs involved is important. We learned that the ownership of the data is stronger when PIs feel they were involved in the observations. Recently we have added auto email notification feature to PIs whose programs' observations were executed during the previous night. **Eavesdropping by skype** is also offered. The observer will contact the PI shortly before their observation is to be executed. The PI will connect to the control room via skype to monitor the progress and give real time feedback.

Archive - The data are transferred to Gemini Science Archive in minutes, allowing easy/fast access to the PIs. The PIs of rapid target of opportunities programs will often look at their data in real time to plan further observations.

Future - Base Facility Operations, Remote Operations,

We plan to bring night time operations to Base Facilities to save cost and improve the night time work environment (oxygen, humidity etc.). The plan is to transfer to night time base facilities operations by first quarter of 2016. We also are discussing possibilities of observing from non-Gemini sites -i.e. Operator at Gemini, and a PI-observer at home institution (remote site) take data. This will allow further involvement of the PIs to night time operations. Queue operations is still evolving at Gemini!

Gemini Staff at this mtg can answer further questions: **Atsuko Nitta (core QC, QC for over 600+ nights), Marie Lemoine-Busserolle, Kristin Chiboucas** are all experienced QCs. **Paul Hirst** is an expert on our data archive system. **Kathy Roth** is our Target of Opportunity expert. Please ask us any question.