

# Telescope Time Allocation Tools Lexicon



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# 1 | Lexicon

- **Acquisition Time** is the time an antenna spends taking data in a Subscan.
- **Allocation Constraints:** Constraints associated with an Allocation Request or Allocation Disposition. For example, scheduling constraints such as fixed time observations.
- **Allocation Disposition:** The disposition of a given Allocation Request to use observatory resources. An Allocation Disposition consists of one or more Observation Specification Dispositions together with internal comments.
- **Allocation Request:** The part of a Proposal that specifies the details of the requested observatory resources. An Allocation Request consists of one or more Observation Specifications.
- **antenna slew time:** the time it takes for an antenna to move on the sky between two positions.
- **Available Time Model:** For each Solicitation, there is a model, called the Available Time Model, that specifies for a given Facility the time available for this Solicitation.
- **Back End:** The instruments that exist on a telescope that usually reside at the end of the signal path. Primarily this refers to the detector, often a correlator.
- **Calibration Strategy:** Instructions on how best to calibrate the Science Targets. A Capability specific factory that produces the instructions for the Observation Planner.
- **Call Period:** The time period during which a user can create, edit, and submit proposals for a given Solicitation.
- **Capability:** The different ways a Facility may be operated. Examples are OBSERVING TYPES and sub-arrays. OBSERVING TYPES consist of Continuum, Spectral Line, Pulsar, and Radar. Each Capability is associated with one Facility.
- **Capability Parameter Specifications:** Information provided by a TTA Group member that specifies the parameters that make up a Capability for a Solicitation. There can be different types of parameters, such as FIELD SOURCES, SPECTRAL SPECS, PERFORMANCE PARAMETERS, and CALIBRATION PARAMETERS.
- **Capability Request:** Information supplied by the proposer that specifies the observations being proposed. The Capability Request is composed of the Capability Request Parameters.
- **Capability Request Parameters:** The proposer's response to the Capability Parameter Specification.
- **Conflict State:** The state of the conflict for each reviewer/proposal (e.g., Unknown, Available, or Conflict).
- **Consensus Science Review:** A scientific evaluation of a proposal based on a consensus of the SRP formed during a discussion of the proposal by all reviewers using information from the individual science review. This includes internal (e.g., TAC) and external (P.I.) comments, plus an SRP SCORE.
- **Directors' Review Report:** A report written by the TTA Group for the NRAO/GBT Director that summarizes the recommendations made by the TAC for semester Solicitations.
- **Disposition Letter:** A letter (or email) sent to the authors of a submitted proposal that summarizes the results of the review process.
- **DSS Session:** Information to schedule a continuous block of time on the GBT.
- **Duration** has different contextual definitions.

- Generally, a duration is the total time of a Subscan, Scan, all Subscans, or all Scans. It includes overhead.
  - Specifically, it is the total time of all Scans, and  $\text{Duration} = \text{Setup Time} + \text{Time on Observing Targets}$ .
- **Execution Blocks:** The results of Scheduling Blocks.
  - **Execution Periods:** The nominal time period during which a proposal will be observed for a given Solicitation.
  - **Facility:** One or more antennas that coordinate to perform observations. For example, the VLA consists of 27 antennas but is typically one Facility. The HSA may consist of all 10 VLBA antennas and all 27 VLA antennas but is considered one Facility since the signals from all telescopes are correlated together. A Facility may also be a computing cluster to reprocess data.
  - **Facility Report:** A report created by a TTA Group member for each Facility that provides a narrative for the TAC and identifies any technical, resource, or scheduling issues. The report includes an LST (or GST) pressure plot.
  - **Feasibility Justification:** A justification of the feasibility (technical or data management) of a given Allocation Request.
  - **Feasibility Review:** A review of the feasibility (technical or data management) of a given Allocation Request.
  - **Feasibility Review Group (FRG):** An alias to allow more than one feasibility reviewer to be assigned to a given Allocation Request.
  - **Field Source:** Coordinate information for an observation that includes position, field size, velocity, and time (when ephemerides are required).
  - **Front End:** The instruments that exist on a telescope that usually reside at the beginning of the signal path. Primarily this refers to the receiver.
  - **Hardware Configuration:** The specific details of the FRONT-END, BACK-END, and Facility configurations. An example of a Facility HARDWARE CONFIGURATION is the VLA configuration.
  - **Hardware Configuration Overhead:** the time needed for hardware changes (e.g., changing receivers).
  - **Individual Data Management Review:** An assessment of the data management plan of the Allocation Requests that includes internal (e.g., TAC) and external (e.g., PI) comments.
  - **Individual Science Review:** A scientific evaluation of a proposal that includes internal comments and an INDIVIDUAL SCORE.
  - **Individual Technical Review:** A technical assessment of an Allocation Request that includes internal (e.g., TAC) and external (e.g., PI) comments.
  - **Joint Proposal:** A proposal that requests time on multiple Facilities. This is handled by having different Allocation Requests for each Facility and therefore the term joint will no longer be used here. However, this nomenclature is well established in the astronomical community (e.g., joint HST-NRAO proposals) and will continue to be used in the documentation (e.g., the call for proposals).
  - **LST (or GST) Pressure Plot:** A plot of the allocated hours as a function of LST (or GST) for a given Facility, broken down by scheduling priority and weather.
  - **Maximum duration** has different contextual definitions. It is
    - the maximum length for any single *Scan* including all associated **Setup Times** on an Observing Target;

- the maximum length of time allowed for a Subscan, Scan, all *Subscans*, or all *Scans*.
- **Maximum Acquisition Time:** the maximum time of any single *Scan* on an Observing Target.
- **Observation Planner:** The algorithm or heuristic that converts the Science Target List into the Observation Specification. To do this the Observation Planner uses the selected Calibration Strategy and Scheduling Strategy.
- **Observation Specification:** A Scan List, and Facility-specific information (e.g., OBSERVING CONDITION, VLA array configuration, etc.). Note—we probably want to include a repeat counter here. This is currently a concept in the clustering algorithms. That is, we do not want multiple, identical Observation Specifications.
- **Observation Specification Disposition:** Associated with Observation Specifications but include scheduling priorities, approved time, proprietary period, and disposition constraints.
- **Observing Condition:** Indicates whether the proposed observing is standard or has some shared risk. For example, general observing (GO), shared risk observing (RSO), or resident shared risk observing (RSRO).
- **Observing Strategy:** The algorithm or heuristic that translates the Capability Request into a Science Target List. To do this, the Observing Strategy needs to decide how to observe the FIELD SOURCE (e.g., pointed map instead of OTF), and to select the appropriate Calibration Strategy and Scheduling Strategy.
- **Observing Target:** a generalization of a Science Target to include calibrators, such that all Science Targets are Observing Targets, but not all Observing Targets are Science Targets. Observing Targets have
  - a Hardware Configuration,
  - a Source.
- **Observing Type:** High-level concept to distinguish different Capabilities. For example, Continuum, Spectral Line, Pulsar, etc.
- **Open-skies Proposals:** Proposals that are submitted under a Solicitation that is open to the overall community.
- **Overhead** has different contextual definitions.
  - Generally, the overhead is any time an antenna is not collecting data on a Science Target.
  - Specifically,  $\text{Overhead} = \text{Duration} - \text{Science Target Integration Times}$
- **Pointing Pattern:** Describes the trajectory of the antenna over the course of an observation of a FIELD SOURCE. For example, single pointing, OTF, etc.
- **Program:** Information provided in the Proposal that specifies the knowledge of how/when to combine Execution Blocks to produce Science Ready Data Products.
- **Project:** A project is a facility specific structure that stores data from Allocation Dispositions that contain a positive disposition (e.g., Scheduling Priority A, B, C, or D) for that facility, along with the relevant proposal metadata. A project is created for each proposal per facility when at least one Allocation Disposition for that facility has a positive disposition.
- **Proposal:** A request to use observatory resources that includes a scientific and technical justification. Here, observatory resources are typically telescope time but may also include other types of resources (e.g., correlator or computing cluster time). The information contained within a Proposal is sufficient for evaluating the request and for scheduling, executing, and processing any approved requests.

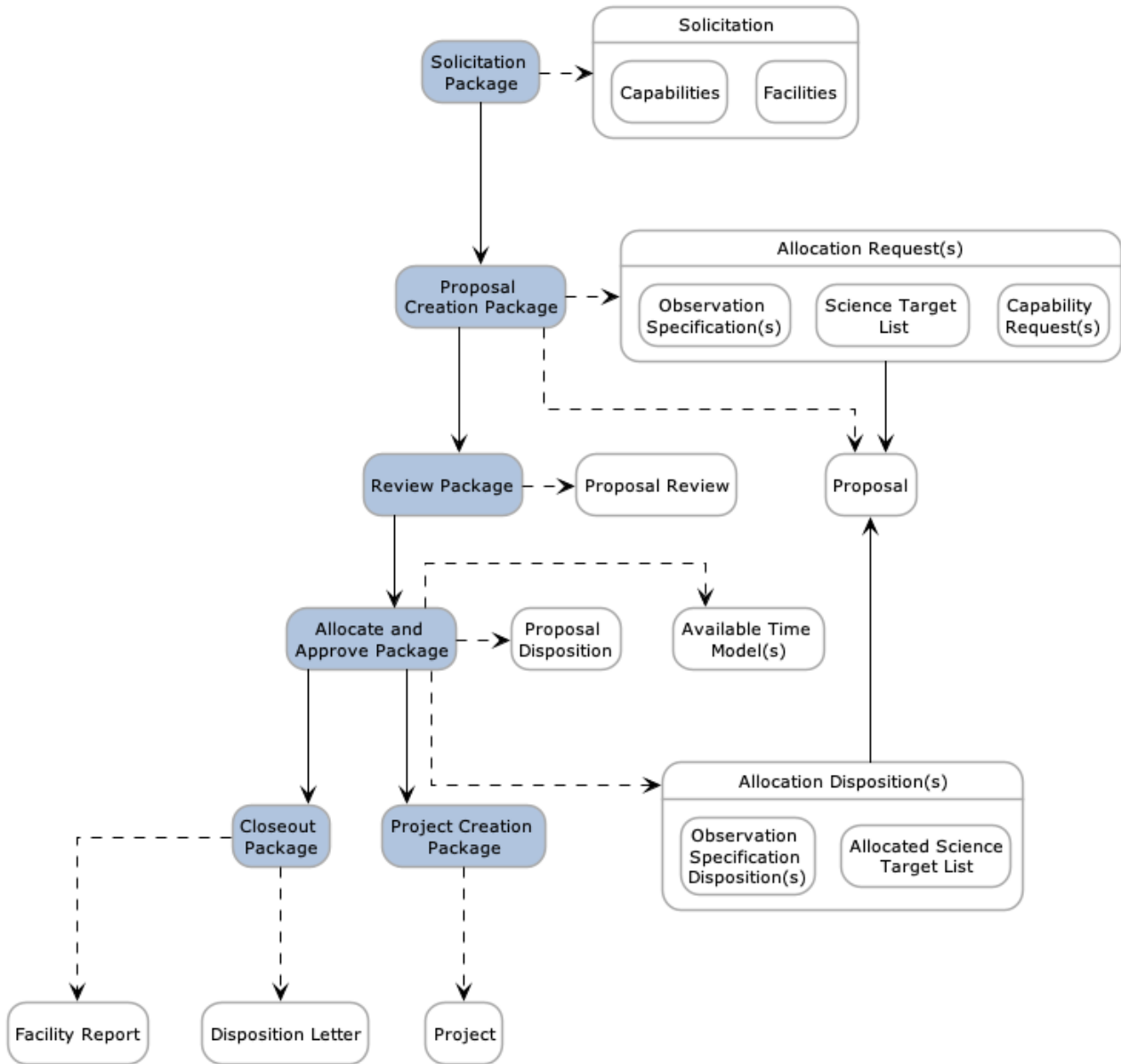
- **Proposal Class:** Provides a set of different validation rules within a Solicitation. For example, Regular versus Large proposals.
- **Proposal Disposition:** Disposition comments that are connected to the Proposal. These consist of TAC, Super TAC, OSC, and External. Similar to review comments, each type of disposition comments is composed of COMMENTS FOR THE PI and INTERNAL COMMENTS.
- **Proposal ID:** An ID that is associated with the proposal Solicitation. The PROPOSAL ID is created once the proposal is submitted.
- **Proposal Information:** The part of a Proposal that includes identifying information, title, abstract, and the scientific justification. The Proposal Information is independent of the resources that are being requested.
- **Proposal Process:** How a proposal is processed through the system.
- **Proposal Review:** An evaluation of the scientific merit and feasibility of the proposal. A proposal review consists of comments for the PI, internal comments, and a scientific merit metric.
- **Proposal Serial Number:** A unique global number that is associated with a proposal when it is created.
- **Request Specification:** Specifies the resources that are being requested in the Allocation Request. There are different types of Request Specification. For example, Observation Specification is the common type of Request Specification where the Facility involves telescope. But the Request Specification could be a Data Processing Specification, where the Facility is a computing cluster.
- **Requested Time:** The time spent on the SOURCE to account for the requested rms sensitivity, POINTING PATTERN, and additional considerations.
- **Proposal Summary:** A summary of each proposal that provides an abridged view of the proposal that aids in the discussion during the TAC meeting. Specifically, the PROPOSAL ID, NORMALIZED LINEAR-RANK SCORE, SRP NAME, TELESCOPES, PRINCIPAL INVESTIGATOR, CO-INVESTIGATORS, TITLE, ABSTRACT, PRELIMINARY PRIORITIES, COMMENTS FOR THE PI, and INTERNAL COMMENTS.
- **Resource:** Equipment and/or staff. Effectively the dictionary definition.
- **Review State:** For individual reviews, this corresponds to the state of the review (e.g., Blank, Saved, Completed, Closed, or Finalized). For consensus science reviews, this also corresponds to the state of the review except there is no Closed state.
- **Review Type:** For individual science reviews, this corresponds to the type of review that is assigned (e.g., Primary, Secondary, Tertiary, or None).
- **Settle time:** the time an antenna needs to settle after it has moved.
- **Setup Time:** the sum of the antenna slew time + settle time + Hardware Configuration Overhead.
- **Scan:** A group of Subscans that share scan intent. All Scans have at least one Subscan.
- **Scan Intent:** A tag that describes the scientific purpose of a set of Subscans (e.g., a flux, phase, or bandpass calibration, a pointing, or an observation of a Science Target). A single scan can have multiple Scan Intents.
- **Scan List:** An ordered list of Scans.
- **Subscan Prototype:** a Subscan that has a Source, a Hardware Configuration, and Subscan Intents but does not include an Acquisition Time or a Setup Time.
- **Scheduling Block:** Information to schedule a continuous block of time on the VLA.

- **Scheduling Priorities:** A grade that is assigned to each Allocation Request that sets the priority at which the observations will be scheduled. This may also be to schedule a computing cluster to reprocess data.
- **Scheduling Strategy:** Instructions on how best to sequence Scans given a set of Science Targets. A Capability specific factory that produces the instructions for the Observation Planner.
- **Science Category:** The astronomical sub-field of the science related to a Proposal.
- **Science Ready Data Products:** Processed data that, in principle, can be used for scientific analysis.
- **Science Review Panel (SRP):** A group of people who are tasked to review the scientific merit of a Proposal. Each SRP has a chair and, potentially, a chair pro tem.
- **Science Target:** One SOURCE, one HARDWARE CONFIGURATION, the REQUESTED TIME, Calibration Strategy, Scheduling Strategy, and a repeat counter. Note—we probably do not need a repeat counter. This information should be included in the Calibration/Scheduling Strategies. For example, pulsar monitoring or dynamic range.
- **Science Target Integration Time(s)** is
  - the sum of the Acquisition Times for all Subscans on a Science Target with Subscan Intent ON\_SOURCE and associated with a Scan Intent of OBSERVE\_TARGET. This is greater than or equal to the Requested Time when all these Subscans are complete.
  - the sum of all Acquisition Times for all Subscans for all Science Targets with Subscan Intent ON\_SOURCE and associated with a Scan Intent of OBSERVE\_TARGET (Scan List level).
- **Science Target List:** A data structure that contains the fundamental user request. Consists of a list of Science Targets.
- **Scientific Merit Metric:** A quantitative assessment of the scientific merit of the proposal. For a Panel-based review, this is the NORMALIZED LINEAR-RANK SCORE. For an observatory site review, this is binary.
- **Segment:** Information to schedule a continuous block of time on the VLBA.
- **Solicitation:** An announcement from the observatory to the community to submit a request to use observatory resources. Each Solicitation is composed of Capabilities and a Proposal Process. A Solicitation has attributes (e.g., call period).
- **Solicitation Capability:** The Capability for a specific Solicitation.
- **Source:** A normalized data structure that contains a name, POINTING PATTERN, and a nominal position for the POINTING PATTERN. A SOURCE is derived from a FIELD SOURCE or created for a calibrator.
- **Specification Constraints:** The restrictions on the available resources within a Capability for a Solicitation.
- **Sponsored Proposals:** Proposals that are submitted under a special Solicitation that is sponsored by a particular organization and is therefore not open to the community at large.
- **Subscan:** Specification of the shortest unit of observation considered in the TTA Tools. Each Subscan consists of
  - a Source;
  - a Hardware Configuration;
  - an Acquisition Time;

- a Setup Time;
  - an antenna trajectory, as derived upstream by the Pointing Pattern;
  - a scientific intent, which is called a Subscan Intent.
- **TAC Report:** A report written by the TTA Group for the public that summarizes the results of the TAC meeting for semester Solicitations.
  - **Telescope:** An instrument used to gather light from distant objects. The dictionary definition.
  - **Time on Observing Target(s)** has different contextual definitions. It is
    - the sum of the Acquisition Times for all Subscans of this Observing Target. This can be greater than or equal to the Requested Time for Science Targets; it can be greater than or equal to the Science Target Integration Time.
    - the sum of all Acquisition Times for all Subscans for all Observing Targets (Scan List level).
  - **Triggered:** An observation that is observed at an unknown time based on a precipitating event. A type of Allocation Constraint.
  - **TTA Group:** Authorized observatory TTA staff who are responsible for administering the TTA process.
  - **Validation Constraints:** The information necessary to check that the inputs to a Proposal are valid (e.g., the frequency range of a receiver).



## 2 | Selected Diagrams



**Figure 1:** Overview of entities by work package. This diagram does not depict the relationships between entities, as the full diagram is too large for effective reproduction here.

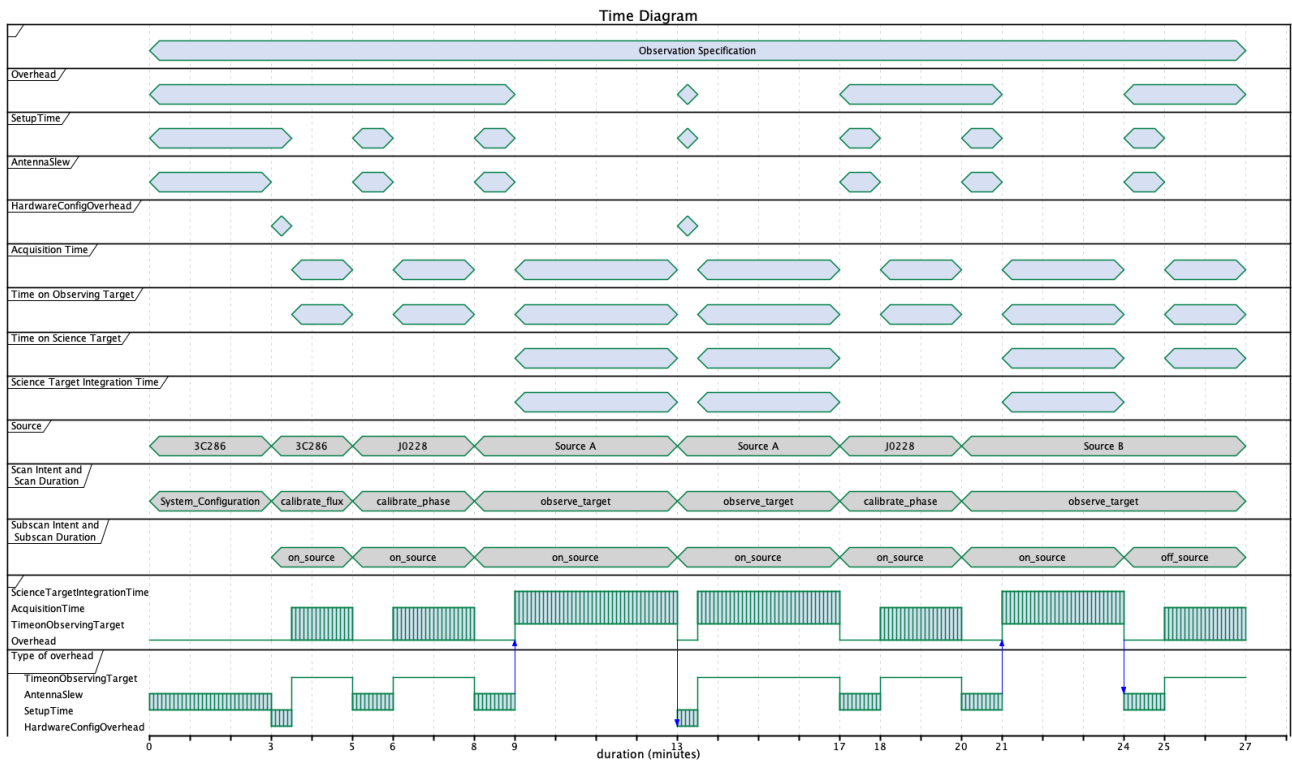


Figure 2: Diagram of Time. See Algorithm Document or definitions above.