

# Feature List for GUIs

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27 June 2000

The GUIs can be separated into Tools and Components, with Components usually embedded inside of Tools. Components can be wrapped so that they can stand alone for testing or use by experts, but normally they perform better with the context of a higher level tool.

The Tools should encourage investigation of alternative scenarios and partial completion of tasks by allowing the state of the Tool and intermediate output to be saved and restored at any time. Different saved outputs will be distinguished by name, allowing their easy use as templates. Output can go either to local storage or over the network to an ALMA database area specific to the user. The ALMA database gives persistence that is not dependent on the users machine or location.

## Archive Search Tool

Use: Search ALMA database to see if observations have been previously done. Also used as a front end component for the Archive Data Extractor Tool. The output is a list of projects (and project attributes) that matches the search criteria.

Features:

- Search criteria
  - Object name
  - Region of sky
  - Molecular transition
- Filters
  - Frequency
  - Time
  - Configuration
  - Resolution

## Correlator Setup Component

Use: Specify frequency of observations and the setup of the correlator and all oscillators

Features: This Component has two distinct interfaces, Spectral View and Hardware View. The Spectral View is oriented toward the observations and allows selection of spectral windows based on molecular transitions. The Hardware View gives the details of the actual hardware setup. This component serves as a translator between these two views, and both can be visible at the same time with a split screen if desired, and the setup can be done on either View. The BIMA and SMA correlator setup programs are good prototypes of the Spectral View. It should be possible to ignore date specific aspects so that the tool can just be used to aid in rough sensitivity calculations. Pre-configured setups are very important for ease of use (e.g. “Galactic12CO(2-1)”, “Continuum at 345GHz”). Additional features:

- Integrated line catalog (with references to literature)

- Graphical placement of spectral windows, reflecting hardware constraints
- Pre-configured setups to use for easy investigation of experiment feasibility (embedded in other tools)

## Observation Setup Component

Use: Describe an Observing Program, which is a sequence of Observing Blocks, which is a sequence of Observations. Each Observation corresponds to a unique Observation Descriptor. The details of the Observation Description define much of the functionality of this component. Used by the Observation Simulation Tool, Proposal Preparation Tool, and the Observation Tool. This component also integrates the Correlator Setup Component to setup the correlator and oscillators. This component should have many simple pre-configured setups when it is used for simulation or proposal preparation (see below), that only require *specification of science goals as input*. More detail will be available so that the component can be used to prepare the actual observations, but sensible defaults will make it unnecessary to manipulate these when used in the tools associated with the early phases of the observing process. Previous setups and system standard recipes can be selected with drag and drop from a palette of choices. This component can also construct a Source List that is an ordered list of source positions, with a pointer to the current position in the list that can be used for survey work. An Observation will support the construct of `nextSource(list, minElevation)` where `minElevation` is a minimum elevation.

Features:

- Access to standard astronomical catalogs (NED, CDS) for source selection
- Containers of temporally ordered observations are called “Sequences” that can be named and reused. An Observing Block is a special Sequence that represents the smallest schedulable unit on the telescope.
- Sequences can contain other Sequences ad infinitum
- Sequences contain loop and other conditional execution constructs
- Construct for getting sources positions from a list (for survey work)
- Calibration specifications
  - Project
  - Gain (phase & amplitude)
  - Bandpass
  - Pointing
  - Flux
- Pre-configured setups based on science goals
  - Single field, local calibrator
  - Single field, self-calibrated
  - Mosaic
  - Single-dish position switched
  - Single-dish OTF
- This component uses the Correlator Setup Component

## Observation Simulation Tool

Use: Optionally used during the Phase I proposal preparation to investigate technical feasibility of a project. Uses Observing Setup Component to select source and the Correlator Setup Component to select frequency and spectral capabilities.

Features:

- Full computation of noise and beam for the proposed observations. Includes weather/phase model based on site statistics.
- Select noise computations for different percentile of weather/phase conditions; also time of year.
- Simulate source image and noise from simple models of disks, Gaussians, tori, etc
- Simulate source image and noise from images in the ALMA database

## Proposal Preparation Tool (Phase I)

Use: Prepares a Phase I observing proposal and optionally submits it to the ALMA proposal system. This tool has available the Observation Simulation Tool that can be used if desired. It also integrates the Correlator and Observation Setup Components. Both of these components have many pre-configured setups to choose from, to make preparation easy for the novice user.

Features:

- Final proposal is machine readable except for scientific justification, which is printable (postscript, PDF?)

## Observing Tool (Phase II)

Use: This prepares the final observing program for submission to the observing system and is done in Phase II of the proposal process. This tool integrates the Correlator and Observation Setup Components. Checking options will insure that the final program will run and will also give a summary of important expected parameters, such as sensitivity and image size. This Tool also requires input of data reduction parameters to guide the pipeline.

Features:

- Observing program setup
- Data reduction parameter input

## Archive Data Extraction Tool

Use: Extract data from the ALMA data archive. The Archive Search Tool is the front end of this tool.

Features:

- Searches for selected data and returns a data file
- Uses login to verify access to proprietary data