Atacama
Large
Millimeter
Array

Project Tracker Operations Manual

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Prepared By:		
Name(s) and Signature(s)	**Organization**	**Date**
Francesc Julbe Lopez Eelco van Kampen	ESO ESO	2009-12-01 2010-09-17
Approved By:		
Name and Signature	**Organization**	**Date**
Released By:		
Name and Signature	**Organization**	**Date**

Change Record

Version	Date	Affected Section(s)	Change Request #	Reason/Initiation/Remarks
A	2009-12-01			Creation
B	2010-05-06			Extensions overall Added sections for specific actors
C	2010-09-17			Version for the second integrated test

Table of Contents

1. Overview

The aim of the Project Tracker is to track the status of an ALMA observing project and its constituent parts (eg. scheduling blocks) after the project is accepted and scheduled for observing. This tracking can be done by various users, including the Principal Investigator and Observatory Staff, who play different roles during the lifetime of the project (from acceptance to completion). The following table shows the list of intended users:

User	***Description***
PI	*Principal Investigator* of an observational project
AoD	*Astronomer on Duty*, performing observations at the OSF
ArcA	*ARC Astronomer*, dedicated to user support at an ALMA Regional Center
QAA	*Quality Assurance Astronomer,* performing QA activities at the OSC
SU	*'Super user',* experts with access to all areas of the project

The Project Tracker allows control and monitoring of the *life-cycle* of an observing project. As projects and schedule blocks (SBs) flow through the ALMA system, they change state and gather additional information. All this information can be seen and managed using the Project Tracker, but not all parts can be seen by all users.

The first part of this User Manual is contains information for all users. The second part is split into four sections (6 to 9 inclusive), focusing on the specific roles of the various users, except for the SU as he/she has all roles.

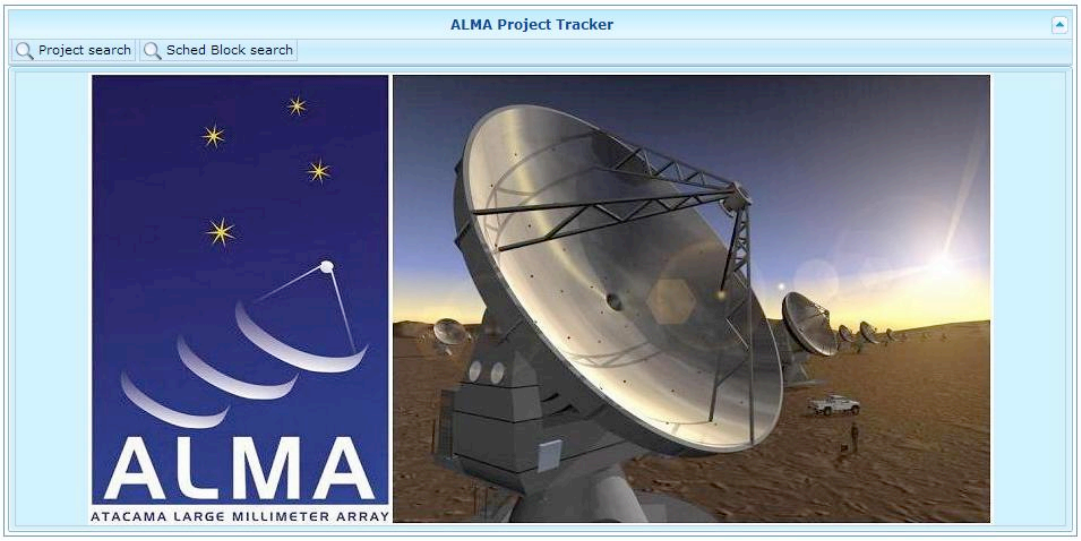
2. Using the Project Tracker

The Project Tracker is a Web application, currently accessible at http://www.eso.org/protrack/ (it will be part of the User Portal later on). But before you start, an important aspect of this application: it uses a JavaScript framework technology so all events occur in the same "page". It is not convenient to use the "Back" and "Forth" buttons of your browser because this would reload the page prior to the Project Tracker and you'll lose all information you may have already loaded into the tool. Refreshing the page would also remove any content you may have loaded in and it would reload the main page, having a fresh start again.

Keeping this in mind, Project Tracker is compatible with these Internet browsers:
- Mozilla Firefox
- Internet Explorer
- Safari.

(specifics on versions ?)

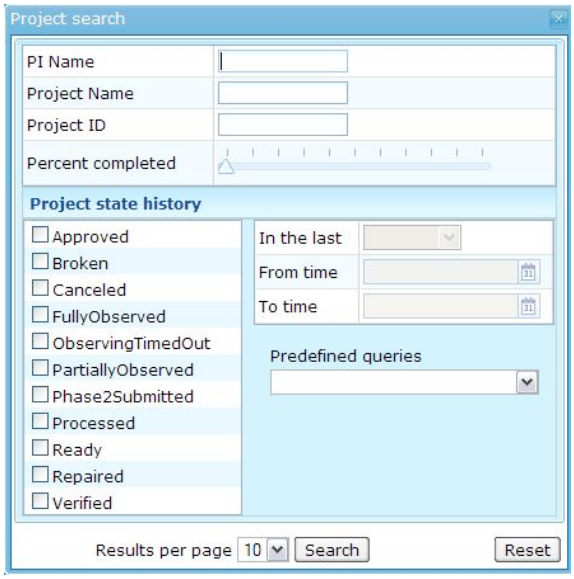
Once the Project Tracker Web application is loaded, the user is presented with the following page:



From here the user has two options: search for projects or search for schedule blocks to track. A PI will typically search for his project and inspect the status of the schedule blocks therein, whereas an Astronomer on Duty is more likely to track specific sets of schedule blocks, irrespective of the project they belong to.

3. Project search

To search for projects we must click on the **Project search** button (at the top left of the main window) and the following panel pops up shadowing the rest of the window.



In this panel we have several search parameters divided into two groups: Basic project search parameters (top part) and "Project state history" parameters (bottom part).

3.1. Basic Project query parameters

These are the most basic and general details of the Project. This search mode will mostly be used by Principle Investigators (PIs), and users who are collecting statistics on the progress of projects during a specific period, or for certain categories of PIs (eg. executives).

PI Name: The tool searches for any PI name containing the string provided. It uses standard search wildcards:

'*' to represent any substring
'?' to represent any single character

Project Name: Same behavior as the "PI Name" but applied to the "Project Name" field.
Project ID: Same behavior as the "PI Name" but applied to the "Project Code" field.
Percent completed: Queries for all project with the completed percentage equal or bigger to the specified.

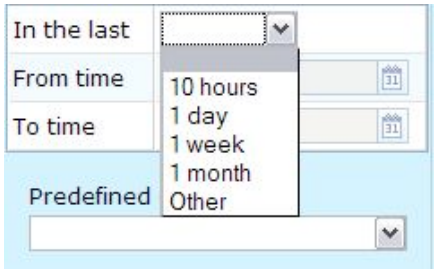
3.2. Project state history fields

3.2.1. States:

A specific state can be given to the query choosing among all possible states (Approved, Broken, Canceled…). It is a multi selection list so several states can selected. The multi selection has an OR logical operation so when choosing more than one state, we are asking for states with state="state1" or state="state2" or…

3.2.2. Time intervals

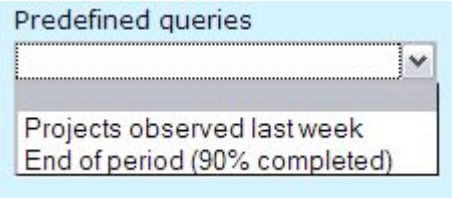
Time intervals can be also be specified to the query. They are associated to the states so if no state is selected, the time interval fields are not enabled:
"In the Last" field is a drop down list box with a set of predefined values: "10 hours", "1 day", "1 week", "1 month", "Other".



The first four options specify a time interval from the selected value (10 hours ago, 1 day ago, 1 week ago…) to the current time.
The last option ("Other") enables the two date fields below ("From time", "To time") where the user can specify two custom dates.

3.3. Predefined Queries

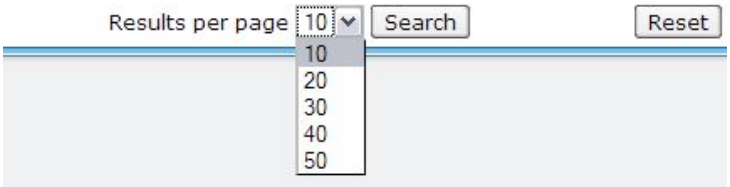
Predefined queries are shortcuts to those commonly used queries. These queries fill some fields by default but still more fields can be added afterwards to narrow the search.



- **Projects observed last week**: Selects "Fully Observed" state and "Last week" option in the "In The last" field.
- **End of Period**: Selects all those "not finished" ObsProjects with more than 90% completed. This means it searches for projects in *Broken*, *PartiallyObserved*, *Phase2Submitted*, *Ready* or *Repaired* state and 90% percent completed.

3.4. Query actions

Once all values are set, the query is ready to be performed. Still one extra parameter can be set, the number of returned ObsProjects per page:



This number can be selected in the "results per page" drop down list (from 10 to 50 in 10 records steps). The default value is 10.

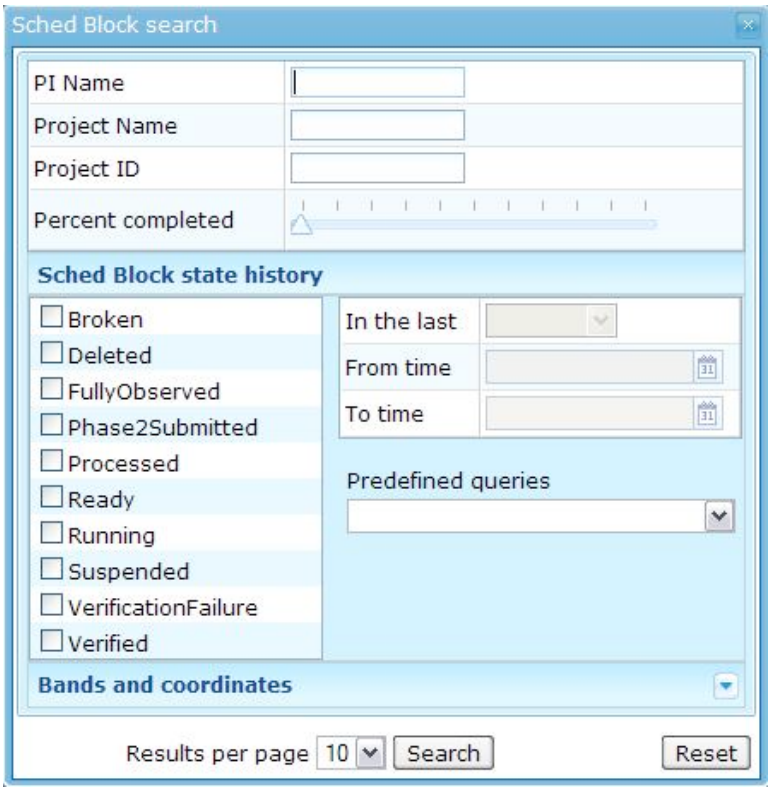
The **Search** button submits the query. There is a maximum value of 10000 records returned. Beyond that value an error message is displayed warning the user to narrow the search and try again. This limit is set for performance issues. Large result sets can cause the system to take long time for each query reducing usability and increasing the load on the server.

The **Reset** button clears all fields of the query panel.

NOTE: As more fields you select, more restrictive the query will be. Each search parameter is AND-ing to the next one (the states select list is a single criteria although multiple states can be selected). So the query would have the following form:
...criteria1 AND criteria2 AND (state="states1"OR state="states2" or...) AND criteria 3...

4. SchedBlock search

Project Tracker can search for individual SchedBlocks. To perform a SchedBlock search we must click on the **SchedBlock search** button (at the top left of the main window). The panel displayed is similar to the project one but it has an extra panel (collapsed by default) labeled with a '*Bands and coordinates*" title header.



4.1. Basic query parameters

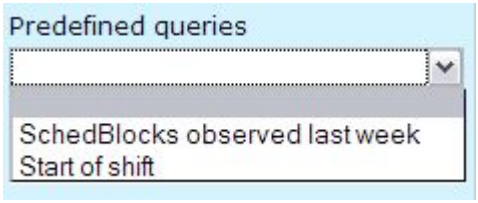
SchedBlock can be searched by ObsProject parameters, so the upper side of the panel offers the same search capabilities than the Project query panel: Search by *PI Name*, *Project Name*, *Project ID* and *Percent completed* (see 3.1).

4.2. SchedBlock state history parameters

SchedBlock state history parameters allow the user to search for SchedBlocks depending on their state and for certain time intervals. These two criteria work in the same way the Project query panel ones do (see 3.2).

4.3. Predefined queries

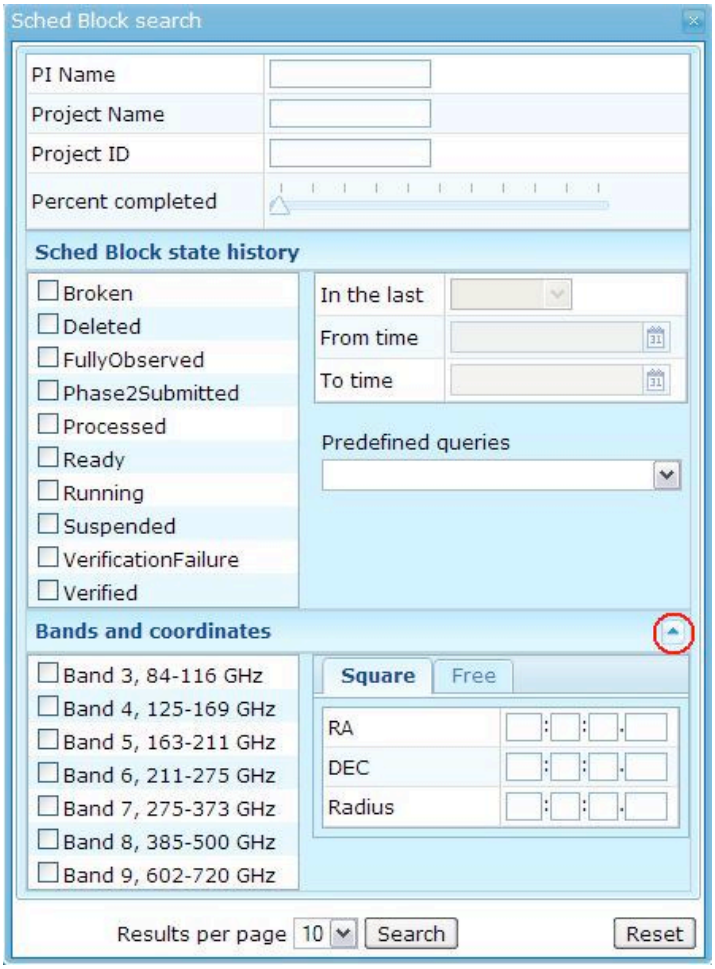
Similarly to the ObsProject query panel, some predefined and commonly used queries are defined for the SchedBlock search.



- **SchedBlocks observed last week**: Those are the completed SchedBlock during the last week. Selects FullyObserved state in the states list and fills the “In the last” field with “1 week”.
- **Start of Shift**: Selects FullyObserved, Running and Verified states in the states list and fills the “In the last” field with “10 hours”.

4.4. Bands and Coordinates search

This panel is collapsed by default. It can be expanded or collapsed using the small button in the header of the panel (red circle in the screenshot below).



When expanded, the SchedBlock panel offers two more search criteria: Search by bands and search by coordinates.

4.4.1. Bands

Several receiver bands can be selected, from Band 3 to Band 9. It is a multi-select list so more than one can be picked and they are added with a logical OR operation (band=”band3” OR band=”band4” OR…).

4.4.2. Coordinate search

SchedBlock can also be returned to the user according to their position in the sky. A equatorial coordinate search can be done in two different ways:

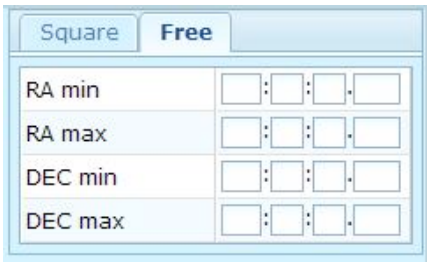
Square search:

The "Square" search coordinates returns the SchedBlock within a virtual box in the sky delimited by a central point (Declination and Right Ascension coordinates) and a "Radius" in degrees. Coordinate bounds are calculated as follows:

RA max = RA + Radius;
RA min = RA - Radius;
DEC max = DEC + Radius;
DEC min = DEC - Radius;

Free coordinates search:

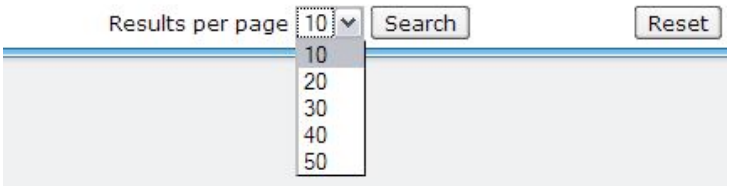
Coordinate bounds can explicitly be set using the "Free" coordinates search panel.



NOTE: Coordinates format is ***HH:MM:Sec*** for Right Ascension; ***DD:MM:Sec*** for Declination; and ***DD:MM:Sec*** for Radius.

4.5. Query actions

Once all values are set, the query is ready to be submitted. Identically to the ObsProject query panel, the number of SchedBlock per page can be set using the "Results per page" drop down list.

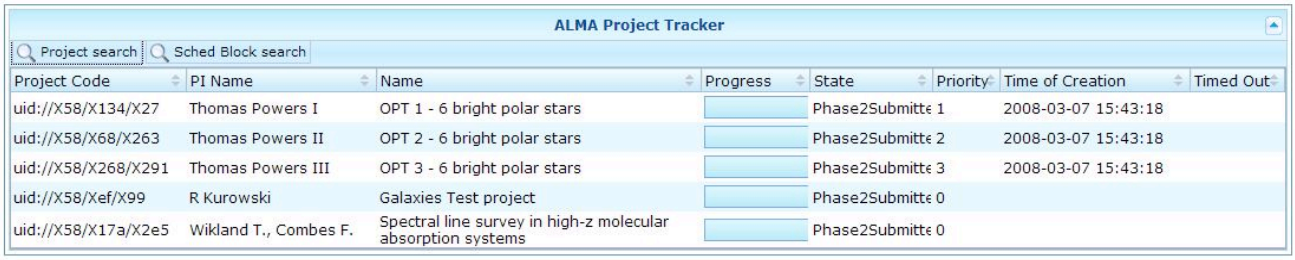


The **Search** button performs the query. There is a maximum value of 10000 records returned (see 3.4)

The **Reset** button clears all fields of the query panel.
Also, each criteria narrows the search as they are ANDing the query (see NOTE in 3.4).

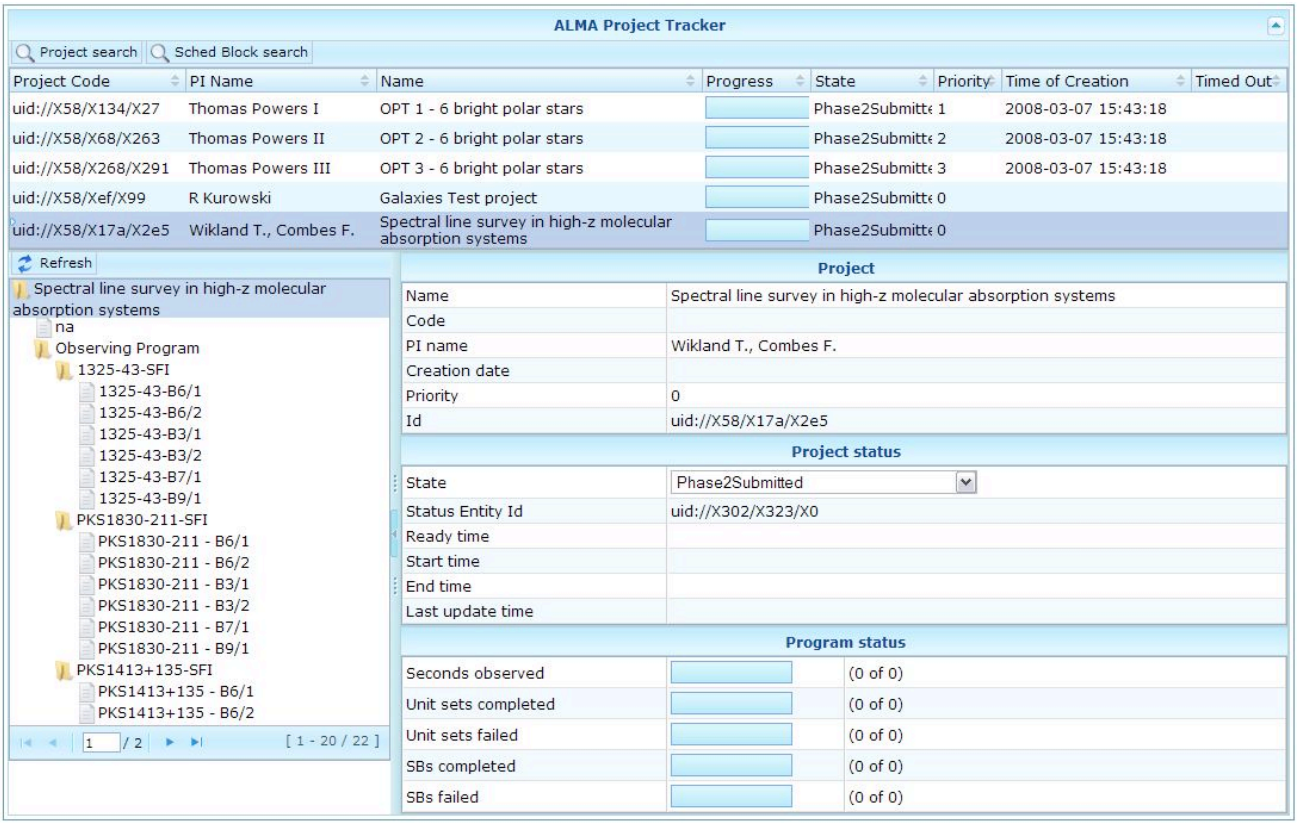
5. Results page

Once the query is submitted the results window displays a list of the returned records as follows:



5.1. Project results

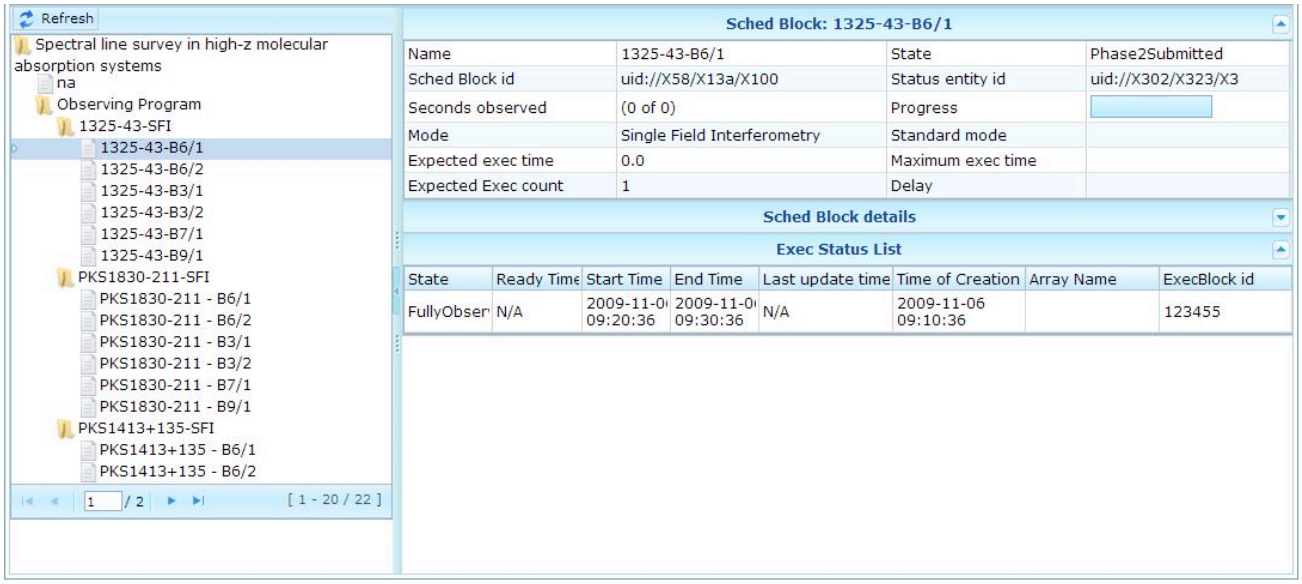
If an ObsProject is selected in the list, two extra panels are displayed below the results list: To the left there is a panel with a navigation tree. To the right there are some extra panels ("Project", "Project status" and Program status"), with detailed information of the selected item in the tree.



Due to the amount of information displayed, the results list panel can be collapsed to free some space (Arrow button at the right top of the window).

The root element of the navigation tree is the ObsProject itself and it is selected. Below that element, we find the Programs Node ("Observing Program" element) . Inside the Programs Node there are the Obs Unit Set Nodes *("1325-43-SFI", "PKS1830-211-SFI", "PKS1413+135-SFI"* in the example above). And inside each ObsUnitSet there is a list of the SchedBlock child nodes.

The panel on the right shows a detailed summary of each selected item in the navigation tree. If another element in the tree is selected, the summary panel updates its contents to show information about the new selected item.



At any time, the "Refresh" button (on top of the ObsProject navigation tree) will update the information displayed in case it has been modified by a third party during the working session with the Project Tracker.

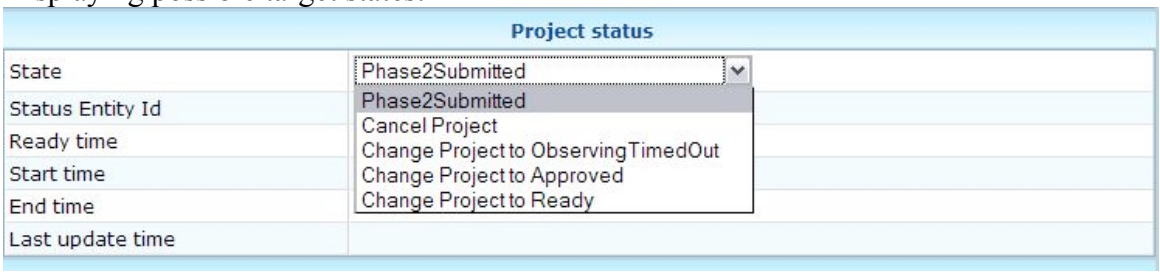
5.1.1. Changing ObsProject states

Project Tracker can change the Project state according to its life cycle if the user is authorized to do it.

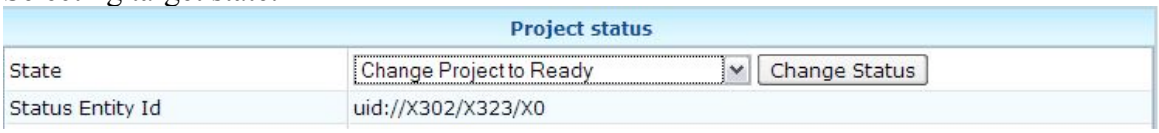
In Project summary window, the "Project status" panel shows the current status in a drop down list together with the other possible target states. If a new state is selected, a button labeled "Change State" appears. When clicked, a confirmation window will pop-up and, if accepted, the state change will be carried out. The state change trickles-down the corresponding state changes for its child elements (see lifecycle documentation).

The following screenshots shows the sequence of events:

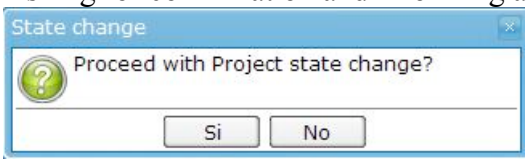
Displaying possible target states:

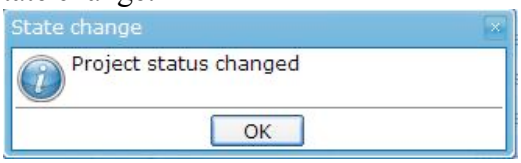


Selecting target state:



Asking for confirmation and informing about the state change:





If the user is not authorized to perform such a state change or if the state change is not possible, an error message will inform about it.

5.2. SchedBlock results page

If a SchedBlock query was submitted, results returned are a SchedBlock list matching the search criteria.

ALMA Project Tracker

Project search | Sched Block search

SB code	SB name	SB progress	SB state	RA (h:m:s)	DEC (d:m:s)	Band	Project code	Project state	Priority
uid://X58/X110/X36b	PKS1830-211 - B3/2		Ready			ALMA_RB_03	uid://X58/X17a/X2	PartiallyObserved	0
uid://X58/X111/X26a	PKS1830-211 - B6/2		Ready			ALMA_RB_06	uid://X58/X17a/X2	PartiallyObserved	0
uid://X58/X13a/X100	1325-43-B6/1		Ready	05:00:06.009	-42:58:57.675	ALMA_RB_06	uid://X58/X17a/X2	PartiallyObserved	0
uid://X58/X185/X21	1325-43-B6/2		Ready			ALMA_RB_06	uid://X58/X17a/X2	PartiallyObserved	0
uid://X58/X19b/Xc9	1325-43-B9/1		Ready			ALMA_RB_09	uid://X58/X17a/X2	PartiallyObserved	0
uid://X58/X203/X166	PKS1830-211 - B6/1		Ready	18:33:39.888	-21:03:39.769	ALMA_RB_06	uid://X58/X17a/X2	PartiallyObserved	0
uid://X58/X21a/X38e	PKS1830-211 - B7/1		Ready			ALMA_RB_07	uid://X58/X17a/X2	PartiallyObserved	0
uid://X58/X274/X20	1325-43-B3/2		Running			ALMA_RB_03	uid://X58/X17a/X2	PartiallyObserved	0
uid://X58/X27e/X248	PKS1413+135 - B6/1		Ready	14:15:58.817	13:20:23.712	ALMA_RB_06	uid://X58/X17a/X2	PartiallyObserved	0
uid://X58/X2c7/X170	PKS1413+135 - B3/2		Ready			ALMA_RB_03	uid://X58/X17a/X2	PartiallyObserved	0

1 / 2 [1 - 10 / 16]

When one SchedBlock is selected, the ObsProject navigation tree (see 5.1) appears with the corresponding SchedBlock selected and the summary window displays the SchedBlock details. Again, when browsing the ObsProject tree, the summary windows update its contents according to the selected item.

The detailed information for a SchedBlock is grouped into three panels ("SchedBlock {Name}", "SchedBlock details" and "Exec Status List"). These panels can be expanded or collapsed using the arrow buttons in the header of each one (surrounded by a red circle in the screenshot below).

Expanded:

Refresh

PKS1413+135 - B3/1
PKS1413+135 - B3/2

2 / 2 [21 - 22 / 22]

Sched Block: PKS1413+135 - B3/2

Name	PKS1413+135 - B3/2	State	Ready
Sched Block id	uid://X58/X2c7/X170	Status entity id	uid://X302/X323/X14
Seconds observed	(0 of 0)	Progress	
Mode	Single Field Interferometry	Standard mode	
Expected exec time	0.0	Maximum exec time	
Expected Exec count	1	Delay	

Sched Block details

Field Source List

Name	RA (h:m:s)	Dec (d:m:s)
Primary:	14:15:58.8	13:20:23

Spectral Setups

Name	Dynamic range	Transition name
Setup for H13CO+(1-0)	7.10	

Preconditions and constraints

Representative Frequency	86.75433	Dynamic range	7.1
Min angular resolution	0.8	Max angular resolution	
Baseline cal. valid	false	Polarization cal. valid	
Min hour angle	0.0	Max hour angle	
Max PWC	2.3000	Max wind velocity	0.0000
Phase stability	0.0000	Max seeing	0.0000

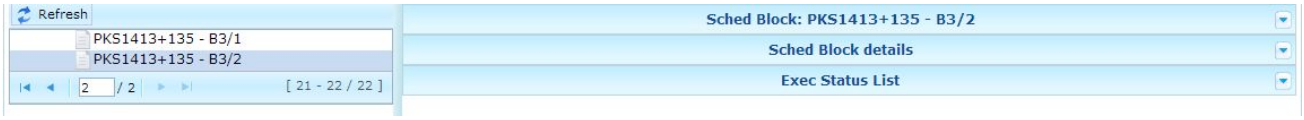
Calibration requirements

Pointing accuracy	1.0
Bandpass accuracy	0.1
Polarization accuracy	0.1

Exec Status List

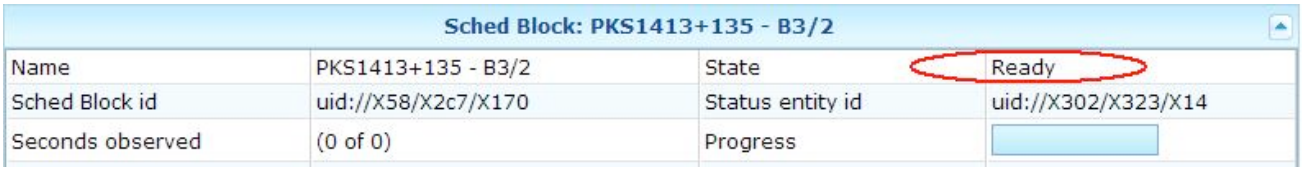
State	Ready Time	Start Time	End Time	Last update time	Time of Creation	Array Name	ExecBlock id
FullyObserv	N/A	2009-11-06 09:20:36	2009-11-06 09:30:36	N/A	2009-11-06 09:10:36		123455

Collapsed:



5.2.1. Changing SchedBlock states

Project Tracker can change the SchedBlock state. If the transition is possible, the state field (red circle in the screen shot below) will display a drop down list with the possible target states. If no state transitions are possible, the current state is displayed without any other option.



Sched Block: PKS1413+135 - B3/2

Name	PKS1413+135 - B3/2	State	Ready
Sched Block id	uid://X58/X2c7/X170	Status entity id	uid://X302/X323/X14
Seconds observed	(0 of 0)	Progress	

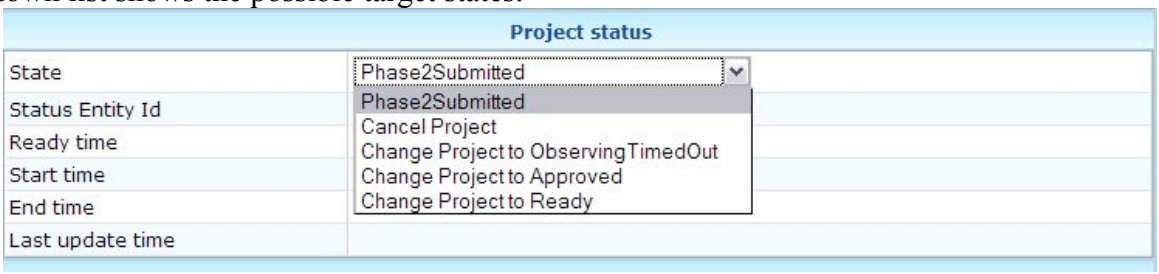
6. Changing states using the Project Tracker: examples

The Project Tracker can change some ObsProjects, ObsUnit sets and SchedBlock states depending on the user role and on the life-cycle of each entity. Here we present two simple use cases:

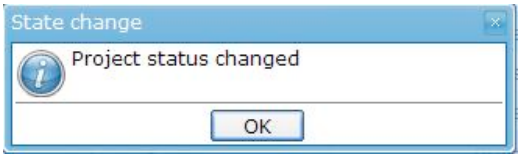
6.1. Changing an ObsProject state from Phase2Submitted to Ready

When a Project is in Phase2Submitted, all its Sched Block must be also in Phase2Submitted as well. From that state, allowed transitions for a project are "Ready", back to "Approved", "Observing TimedOut" or "Cancel".

Let's consider that the project is setup to become "Ready". Using the Project Tracker we can change the state to "Ready" if we have the appropriate role (AoD, ArcA in this case). To perform the transition, we must select the ObsProject in the project browser tree. In the Project status section, a dropdown list shows the possible target states.



If we select "Ready" and we click the "Change Status" button, the project state will be changed after asking for confirmation. This transition will trickle down the states transitions for its ObsUnit sets and Sched Block to "Ready" state as well.



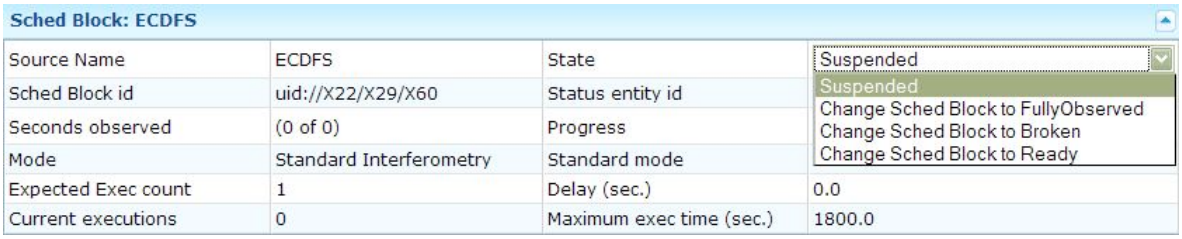
We can navigate through the project browser tree and all entities belonging to the ObsProject should appear as "Ready".

6.2. Changing a Sched Block from Suspended to FullyObserved

For this second brief example, we will consider that we have a project with one single Sched Block.

The Project Tracker allows the Sched Block state transition from Suspended to FullyObserved if the user has the AoD role. For the given example, as the Sched Block is in "Running" or "Suspended" state, the Project is in "Partially Observed" state.

Project Tracker will show the following:

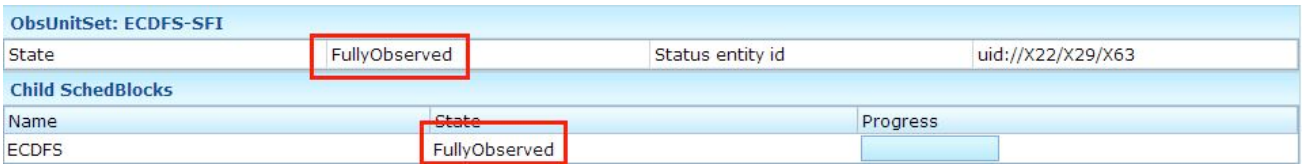


To change the Sched Block state, we must browse the project using the ObsProject tree and select the Sched Block we want to change the state.

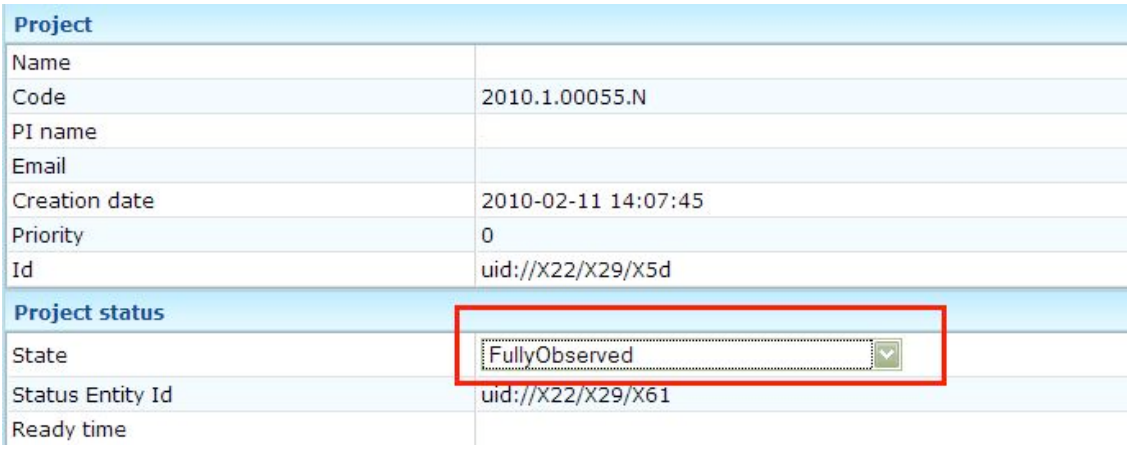
In Sched Block detailed view, we select "FullyObserved" as target state in the drop down list and we click on the "Change state" button, the given Sched Block will become "FullyObserved" and it will bubble up the ObsUnit set and ObsProject state transition to "FullyObserved".

To see the changes, browse the ObsProject tree and the new states should be displayed in the detailed view of the ObsUnit set and ObsProject as shown in the following screenshots.

For the ObsUnit set:



And Project state detailed screen would be:



For more detailed information about state changes please refer to the Project, ObsUnit set and Sched Block life-cycle documentation.

7. User section for Principal Investigators (PI)

Principal Investigators can track progress of their observing project and constituent schedule blocks. A PI will normally search by project, but can also search by schedule block, most likely when the PI has more than one active project.

7.1. Tracking

Principle investigators are only allowed to track their own projects and schedule blocks. They will use the project tracker mostly as a 'monitoring tool' for their projects and schedule blocks, especially in the case of problems (broken SBs, for example).

7.2. Allowed state changes

All done in the Observing Tool !

8. User section for Astronomers on Duty (AoD)

8.1. Tracking

An Astronomer-on-Duty (AoD) can track all projects and schedule blocks. In practice, an AoD will mostly track SBs planned for or executed during his shift.

8.2. Allowed state changes

8.2.1. Project level

Phase2Submitted → Ready

A *Phase2Submitted* project needs to be manually verified by the ArcA as being free of errors. Once this verification is complete the project can be changed to *Ready*. Either an ArcA or a AoD can make this change. An AoD might do this in case an ArcA has verified a project but cannot make the change him/herself (because of an internet connection failure, for example).

Phase2Submitted → Broken

A SchedBlock was not properly fixed by the PI, and can therefore be moved back to the *Phase2Submitted* state for the PI to attend to again (using the Observing Tool).

8.2.2. Schedule block level

Suspended → Ready

If the SchedBlock was *Suspended* because scheduling was running in semi-automatic mode, or it failed execution because of a system failure, changing weather conditions, or QA0 failures (in any case, not because of errors in the SchedBlock itself) then the AoD may change the SchedBlock to *Ready* for re-execution.

Suspended → FullyObserved

If execution of the SchedBlock completed successfully, QA0 was successful, and no further execution repeats are required then AoD may change the SchedBlock to *FullyObserved*. Scheduling may also be used for this. (*Output*: notification to Quicklook).

Suspended → Broken

Execution of the SchedBlock failed and the AoD decides that the PI needs to repair the SchedBlock before it can be re-executed. The AoD changes the SchedBlock to *Broken* for the PI's attention (Scheduling may also be used for this). This will bubble-up changing the parent ObsUnitSets and ObsProject to *Broken*. No other SchedBlocks should be executed while the ObsProject is in the *Broken* state.

9. User section for ARC Astronomers (ArcA)

9.1. Tracking

An ARC Astronomer (ArcA) can track all projects and SBs. An ArcA will mostly track projects and SBs he/she has to verify or repair, but will mostly make state changes at the project level.

9.2. Allowed state changes

9.2.1. Project level

Phase2Submitted → Ready

A *Phase2Submitted* project needs to be manually verified by the ArcA as being free of errors. Once this verification is complete the project can be changed to *Ready* (note: this change trickles-down to all *Phase2Submitted* ObsUnitSets and SchedBlocks changing them to *Ready*).

Phase2Submitted → Approved

If a *Phase2Submitted* project contains errors it can be changed back to *Approved* by the ArcA

Repaired → Broken

The ArcA manually inspects the *Repaired* Project and determines that it contains errors that require attention from the PI. The ArcA then changes the Project to *Broken*.

Repaired → FullyObserved **OR**

Repaired → PartiallyObserved

The ArcA manually inspects the *Repaired* Project and determines that it does not contain any errors. There are then two options:

- if it does not need any further observing. The ArcA then changes the Project to *FullyObserved.*
- it does need to be observed further. The ArcA then changes the Project to *PartiallyObserved.* This change trickles down changing all *Phase2Submitted* ObsUnitSets and SchedBlocks to *Ready* (other ObsUnitSets and SchedBlocks are not affected). The Scheduler can now continue running the project.

AnyState → ObservingTimedOut

If no more observing should be performed for a project, the ArcA can change a project from any state to *ObservingTimedOut.* The project will then be moved to the *Processed* state internally.

AnyState → Canceled

A project can be *Canceled* at any time by the ArcA; no further action will be taken (no processing, for example). This is effectively an *end state* for the project, and a dangerous transition to make.

9.2.2. Schedule block level

Phase2Submitted → Ready

This transition normally trickles down from the similarly named transition at the Project level, but an also be performed at the SchedBlock level.

10. User section for Quality Assurance Astronomers (QAA)

10.1. Tracking

A Quality Assurance Astronomer (QAA) can track all projects and SBs. A QAA will mostly track projects and SBs that fail QA2, and will only make changes at the SB level, all starting from the *Processed* state.

10.2. Allowed state changes

10.2.1. Project level

None.

10.2.2. Schedule block level

Processed → Broken

QA2 fails for the SchedBlock with errors that require the PI's attention. QAA changes the SchedBlock to *Broken*. This change bubbles-up changing all the enclosing ObsUnitSets and the ObsProject to *Broken*.

Processed → Ready

QA2 fails and the SchedBlock requires re-execution. QAA changes the SchedBlock to *Ready* so that it gets re-observed. This change bubbles-up changing all the enclosing ObsUnitSets and the ObsProject to *PartiallyObserved*.

Processed → Verified

The SchedBlock passes QA2. QAA changes the SchedBlock to *Verified*. This change bubbles-up to the enclosing ObsUnitSets and the ObsProject which will become *Verified* when all their children are *Verified* or *VerificationFailure*.

Processed → VerificationFailure

The SchedBlock fails QA2 but there is no more observing time available for the ObsProject (The ProjectWasTimedOut timestamp was set). QAA changes the SchedBlock to *VerificationFailure*. This change bubbles-up to the enclosing ObsUnitSets and the ObsProject which will become *Verified* when all their children are *Verified* or *VerificationFailure*.

A: Appendix: Life-cycles

A.1: Overview

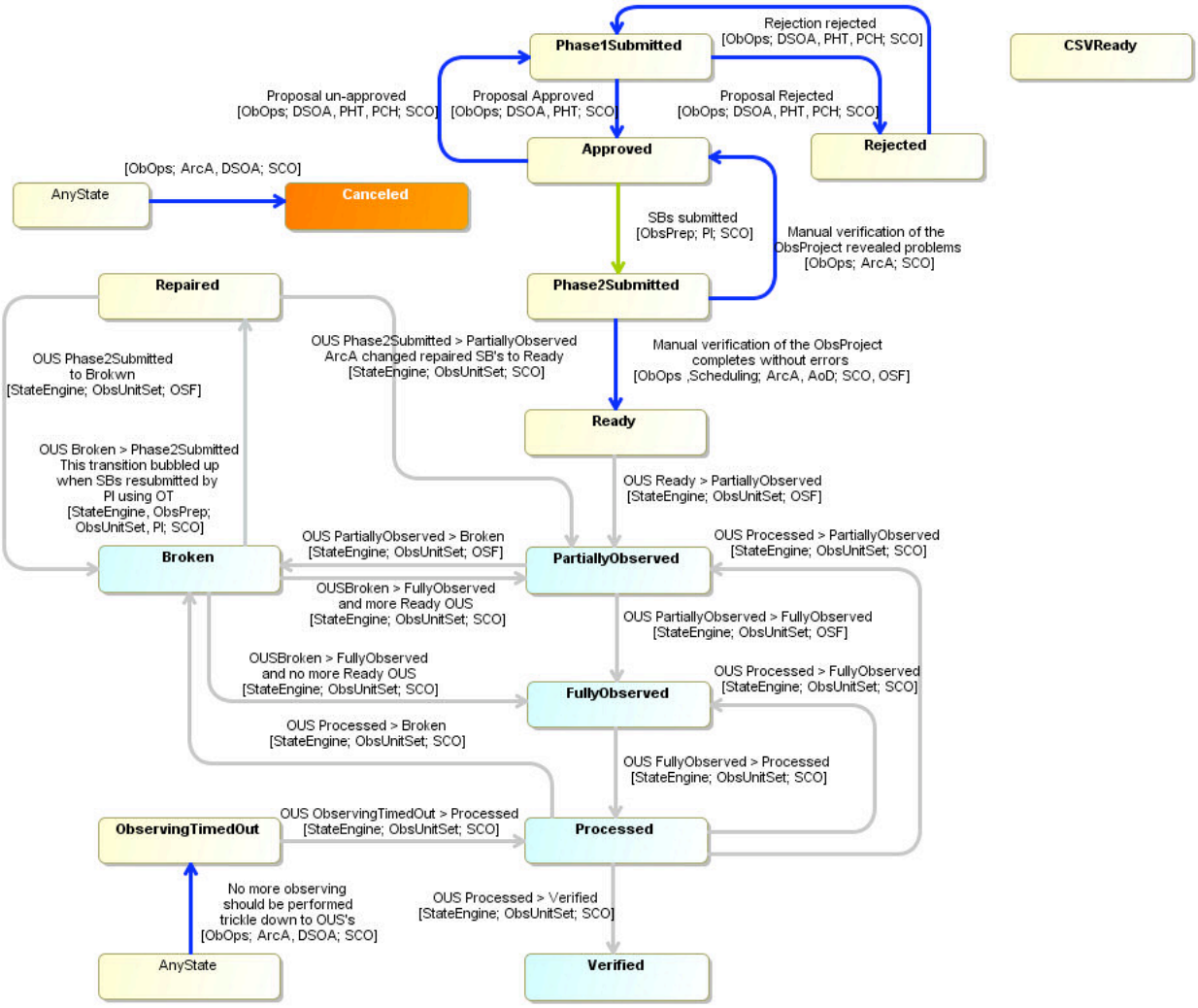
This Appendix displays four life-cycles, two of which (ObsProject and SchedBlock) are tracked by the Project Tracker. The life-cycles themselves are expressed as UML state diagrams in the next four sections of this appendix. They are described in detail in a separate document:
Life-cycle of ObsProjects (COMP-nn.nn.nn.nn.nn-A-SPEC)

The life-cycle is powered by the *StateEngine.* State transitions are initiated by Actors: an *Actor* (or *Role*) is some entity (human or software) capable of taking decisions and starting actions. The following table lists the known actors; they are represented as *stereotypes* (e.g. <<AoD>>) associated to the state transitions in the diagrams. Column *Color* indicated the color used in the diagrams to identify transitions (actions) initiated by that actor.

Actor	***Description***	***Color***
ArcA	*ARC Astronomer*, dedicated to user support at the ALMA Regional Centers	blue
AoD	*Astronomer on Duty*, performing observations at the OSF	light blue
	No actor: state transitions are initiated by trickle-down and bubble-up rules	gray
PI	*Principal Investigator* of an ObsProject	green
QAA	*Quality Assurance Astronomer,* performing QA activities at the OSC	magenta

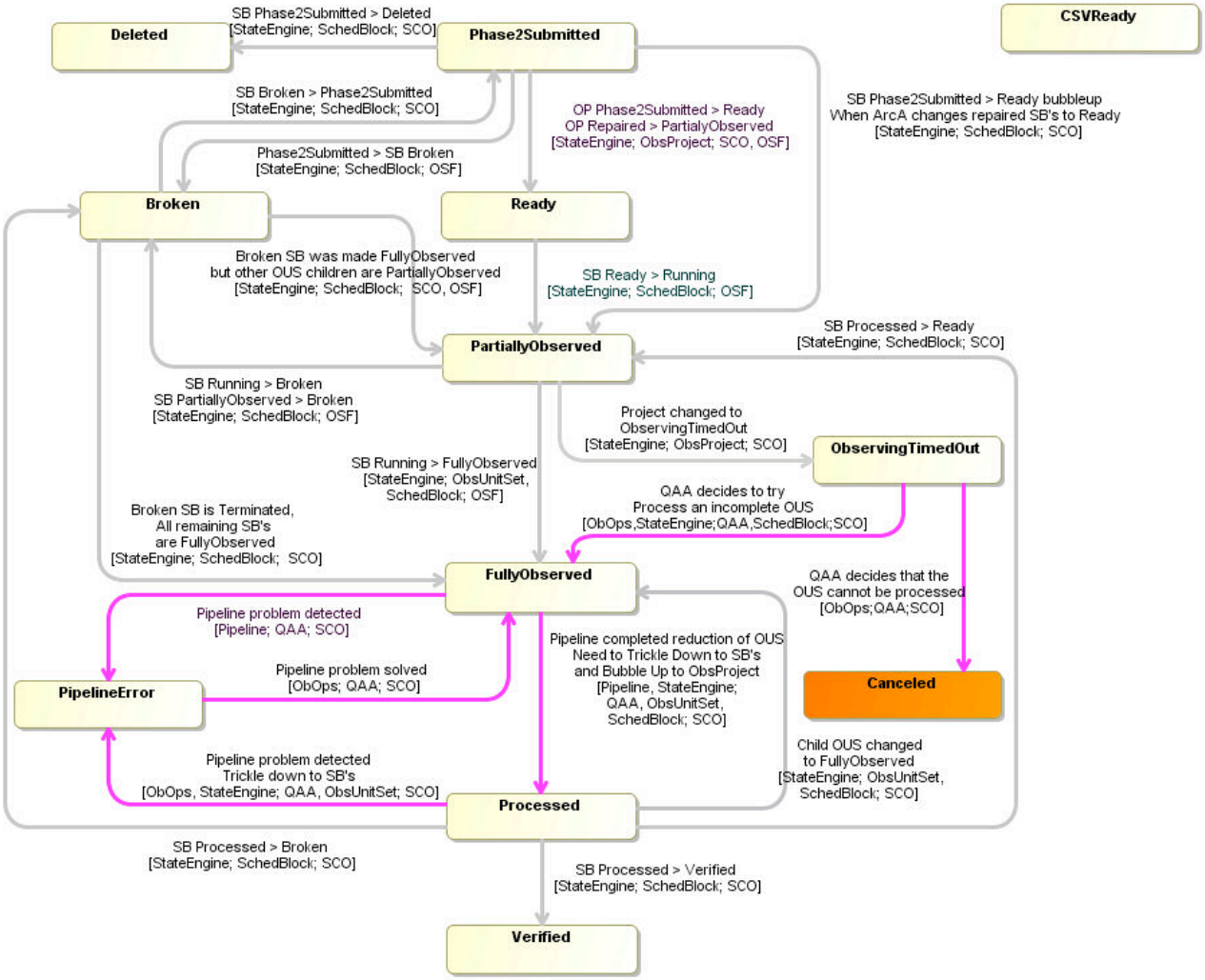
A.2: ObsProject Life cycle

The life-cycle of an ObsProject is shown in the following figure.



A.3: ObsUnitSet Life cycle

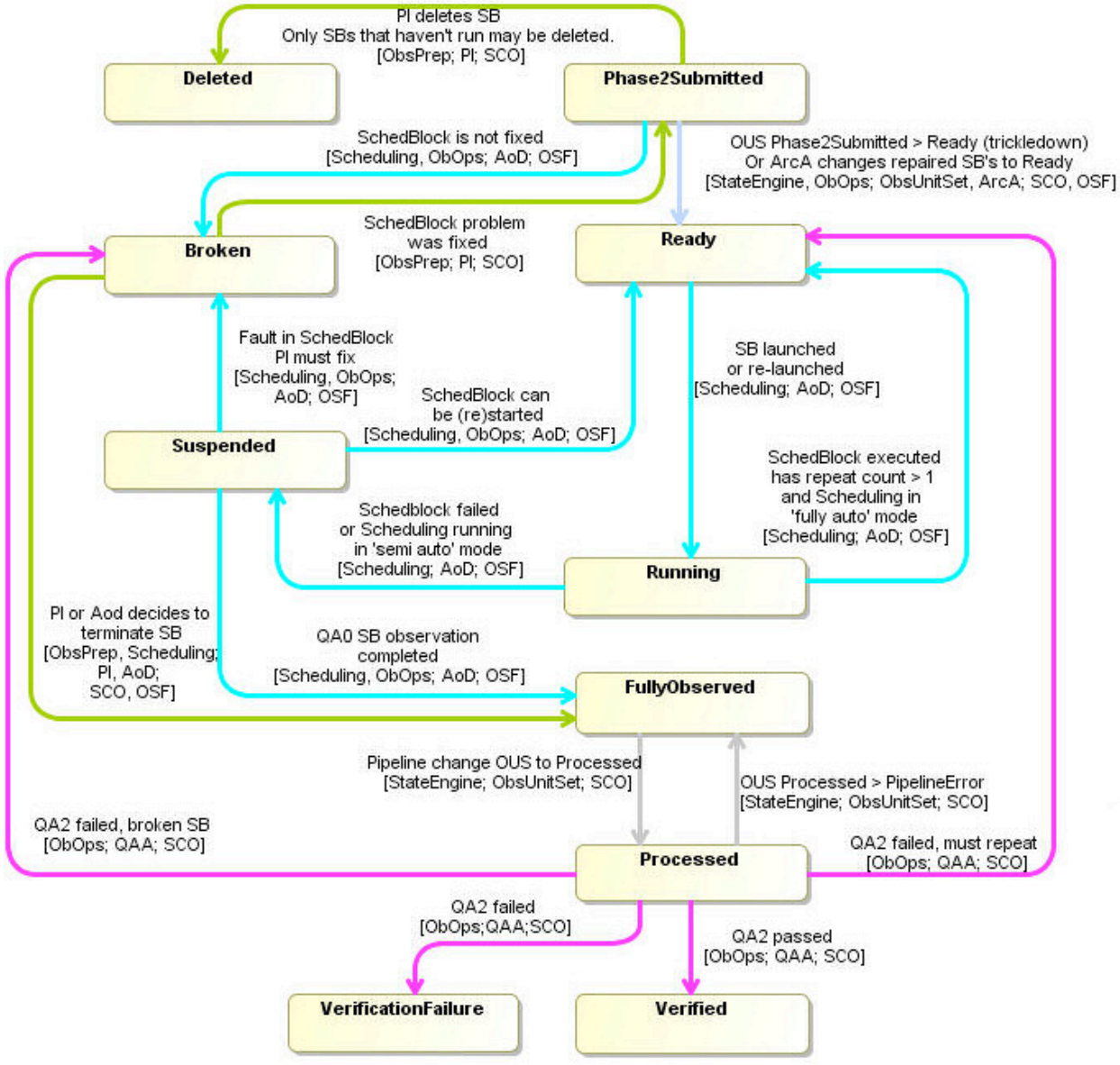
The life-cycle of an ObsUnitSet is shown in the following figure.



Note that most state transitions are derived; all manual state transitions are related to pipeline processing and data Quality Assurance. None of these state changes can be performed or tracked using the Project Tracker !

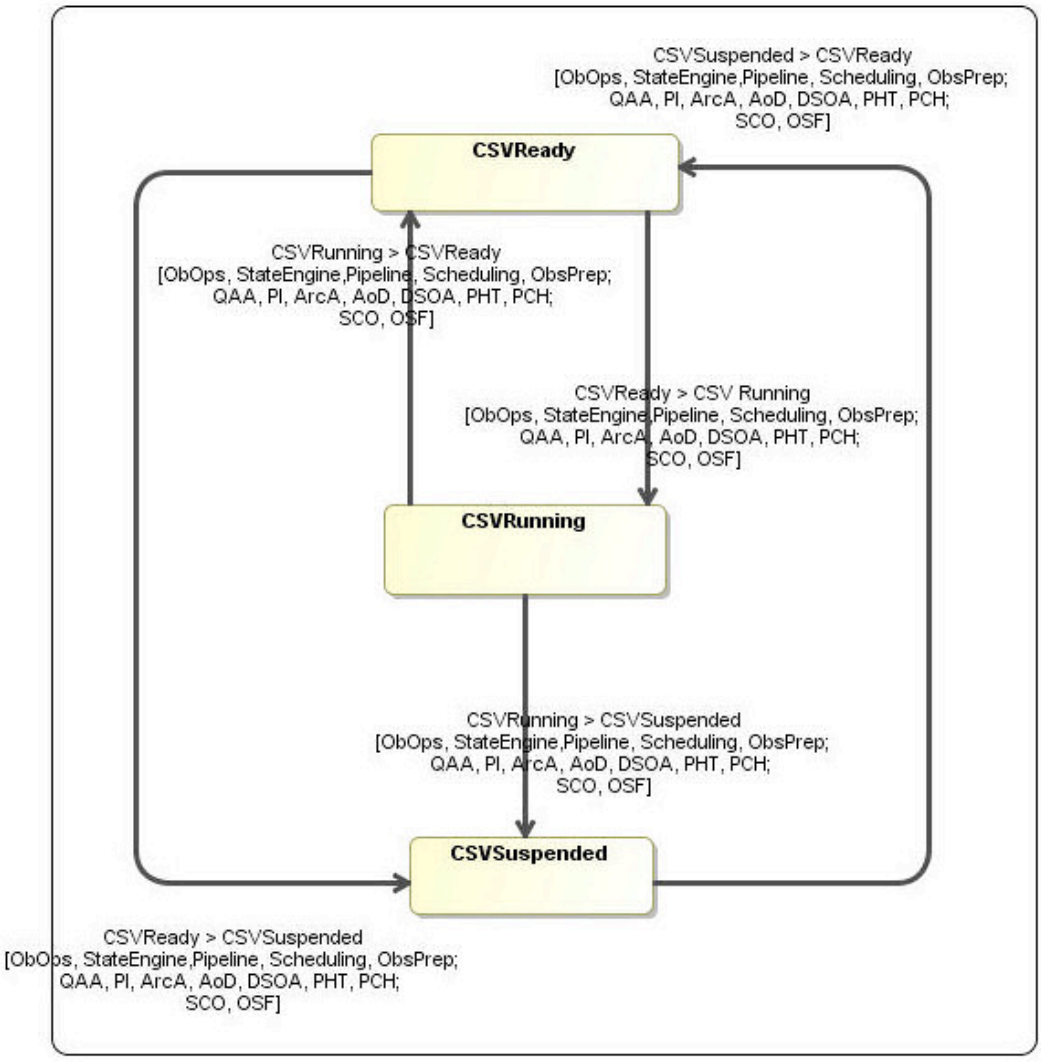
A.4 Sched Block lifecycle

The life-cycle of a SchedBlock is shown in the following figure.



Note that SchedBlocks retain their state (whatever state they are in) when the containing ObsProject has finished observing. That applies to any SB belonging to a Verified, Terminated (for instance a project that has reached its allocated observing time) or Canceled project.

A.5 CSV Sched Block life cycle



This is shown for completeness only, and will disappear from the manual when CSV is finished.