TMSS User Manual

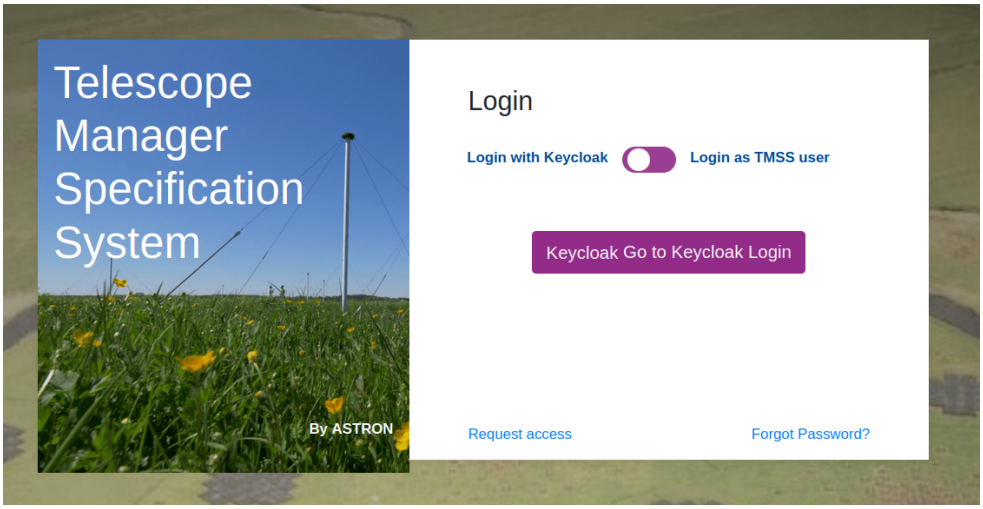
TMSS is the Telescope Manager Specification System used for specification and (dynamic) scheduling of LOFAR observations.

The goal of this document is to familiarize users with the most common TMSS use cases applicable to different types of user roles. Its main areas of interest are:

- Landing and login / profile editing.
- Observation specification.
- Scheduling units creation and editing.
- Inspecting of schedules and preforming actions on the timeline.

Logging into TMSS

Navigating to the TMSS landing page, the user is presented with the log in screen:



Users can access TMSS with a LOFAR account that is also used for NorthStar and the old observation specification system, MoM; this corresponds to the "Login with Keycloak" option shown on the log in screen:

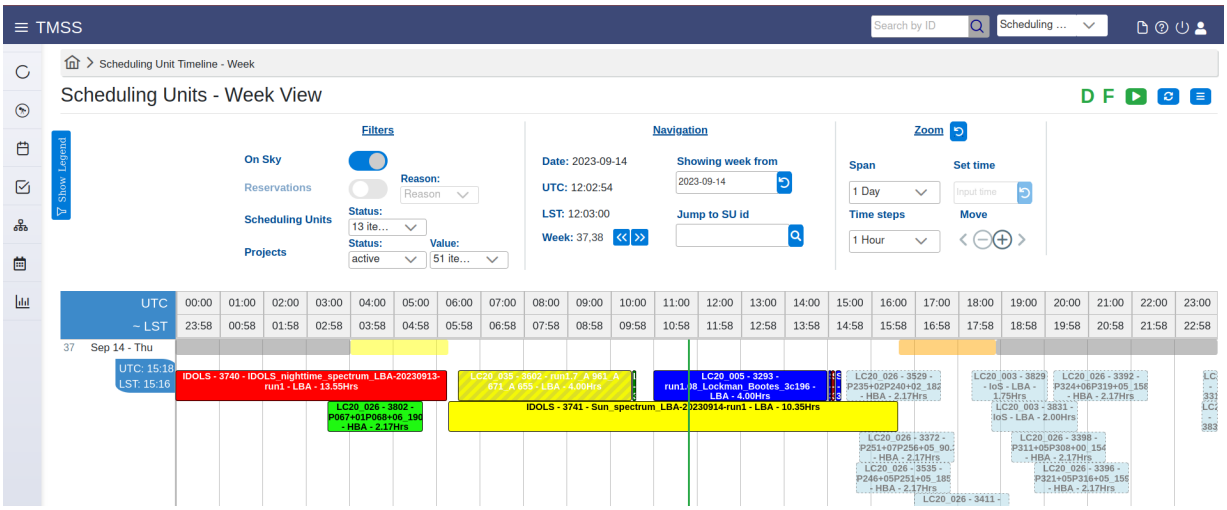
- If you had a LOFAR account before, but forgot your password, please use the Forgot Password link instead of making a new account.
- Also, please check first that you have the right password to your account by logging into the NorthStar proposal tool for LOFAR.

If you don't have a LOFAR account, you can create a new account.

If you can log into NorthStar, but not TMSS, then please send a request to the SDC helpdesk stating: *"I have created an account with user name <USERNAME>. Can you grant me access on this account to TMSS?"*

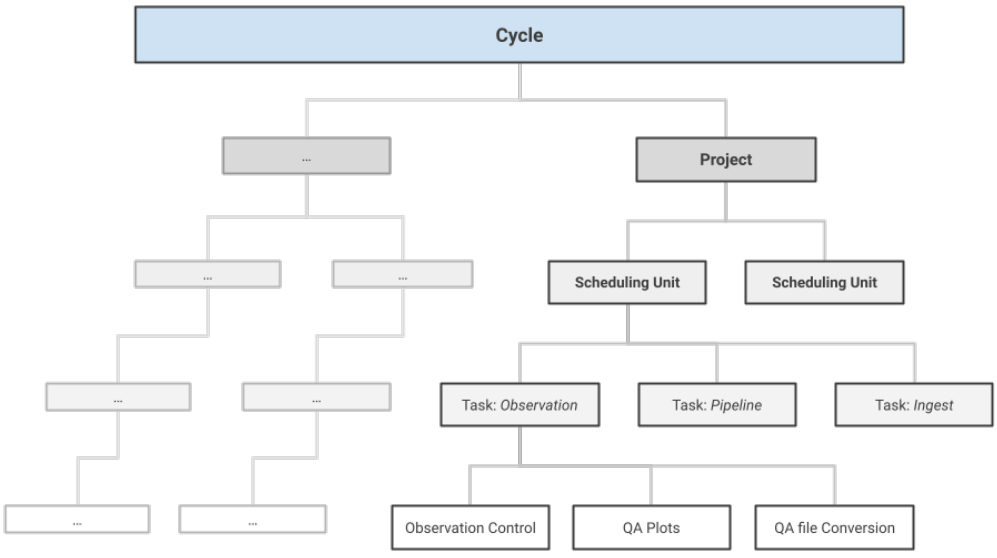
You may need to reset your password for your LOFAR account to work.

Assuming you have an account with the correct privileges, using the "Keycloak Login" button and entering the login credentials, upon successful login the TMSS landing page will be displayed showing the scheduling units in the (default) week view:



Interface

Users can navigate TMSS through different menus and tabs. This section aims to present an overview of the items contained in the sidebar menu (which is always visible and can be expanded by clicking on the icon in the top left corner of the screen). These items are: Cycle, Project, Scheduling Unit, Tasks, Workflow, Week View, Timeline and Reports. The figure below illustrates how these entries relate in a hierarchical structure to the entities connected with a given observing project.



Cycle

The Cycle menu item displays a page listing LOFAR observing cycles. These cycles contain all the projects accepted for observation from a given LOFAR proposal cycle. In TMSS, this menu shows the Cycle code, the start and end dates of said cycle and the number of projects within that cycle in TMSS. By clicking on the eye icon next to each cycle code one can see additional details of that cycle plus detailed information about the projects within that cycle.

Project

The Project menu item entails details about all of the various observing campaigns specified in TMSS, enables the specification of new projects as well as the change of project statuses. The table on this page exposes the main project properties, i.e. the Project Name, its status, its project category, a small description of the science objective, where the data will be stored, to which cycle the project belongs, the observing time, processing time, the storage size required, the assigned 'friend' of the project, and lastly the My Roles that shows the user's involvement with this project on TMSS.

Production projects are named according to the corresponding category, e.g. LC- for regular, LT- for long term and DDT- for Director's Discretionary Time. A project can have several statuses:

- Opened - Project has been created but is still subject to change
- Active - Project is active and observations can commence
- Finished - Project is finished either because the observation is finished or the cycle is over
- Cancelled - Project is cancelled and no observation will be taken
- Suspended - Project scheduling is (temporarily) on hold

Clicking the eye icon next to the project name/code the user is redirected to a new page. At the top of the page the user can find the Project-details which give an insight regarding the Project's initial set up. Additionally, that the user can find a table which contains all the SUs related to this specific project along with their specification details.

Week View

The Week View menu item page displays a complete overview of the dynamical LOFAR schedule. The user can quickly monitor the order and current status of different SUs along with their respective details.

At the far right of the title at the top of the page, there is an indication whether the dynamic and the fixed time scheduling rules are on or off; the corresponding letters (D and F) will be green if the corresponding mode is enabled, red if disabled. The button that follows in the same row is for enabling or disabling the dynamic and fixed time scheduling functionality. Further to its right is the refresh button, and the options button, allowing to add reservations, system issues or SUs.

Below the title bar, there is the settings section, split in three sub-modules: Filter, Navigation and Zoom. The user can filter the view according to on-sky duration, filter on reservation reasons and SU status as well as project status. The Navigation sub-section allows for selecting a week of interest (by using the calendar input field), or search for a SU using its ID. The two buttons at the bottom of this section allow for scrolling +/- 7 days from the current view. The user can reset to the current week by clicking on the button next to the calendar input field. The Zoom sub-section can be used to set the desired span to be zoomed over, using the Span drop-down menu, and select the time to zoom at via the 'Set Time' input field. Using the 'Time steps' drop down one can change the scale of the UTC/approximate LST bar below the settings section. The '+' and '-' icons can be used to zoom in or out interactively by clicking them, and the '< >' arrows fro moving left or right.

To the left of the Filters sub-section is the 'Show Legend' vertical button which will open/close the slider containing the legend explaining the color / hatch scheme of the week view slots.

Below the Filters section is the time slider displaying the UTC and the approximate LST.

Below the time slider is the section which contains the week view. It has a tabular grid background layout; the first column displays the date and day of each row, as well as the week number. The other columns can be re-scaled in width (as mentioned above) and represent time increments; their total number as well as the time span shown are determined by the settings selected in the zoom filter section.

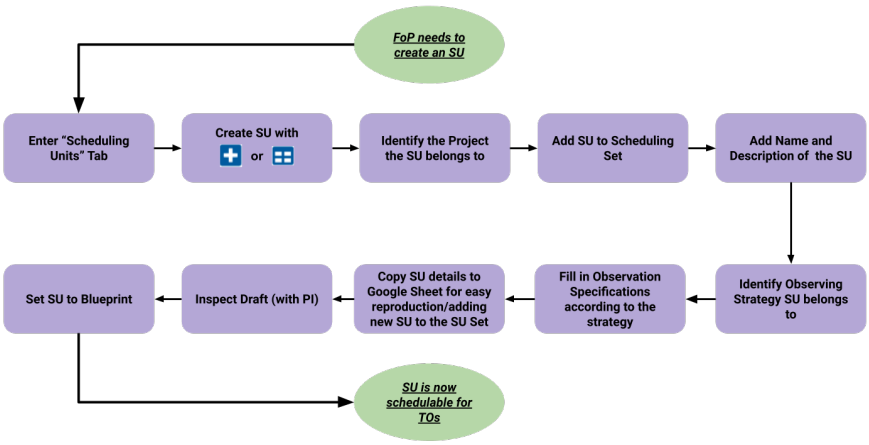
The SUs are represented as blocks overlaid onto the grid with their color indicating their status (yellow - observing, blue - scheduled etc. as outlined in the legend) and the containing text showing a few details: the project a SU belongs to, its ID and duration in hours. There are also blocks representing various system reservations. When the user hovers with the mouse pointer over a particular scheduling unit, a pop-up window appears listing the SU ID as well as an overview of its details. If a user clicks on a scheduling unit, a window appears to the right of the week view containing a more extensive listing of the SU as well as its associated tasks. In the top right corner of that window there are additional controls: to go to the SU view for that SU, cancel it, unpin its data as well as a button to close the details window. The week view also displays a fixed vertical bar marking the current UTC time as well as a blue vertical bar moving with the mouse pointer to indicate its UTC position. The exact value of the pointed UTC can be read off in the first column to the left. The user can also scroll the week view up, down or left, right using the mouse or the keyboard arrow keys.

Basic Project Administration

Users which have the TMSS user role 'Friend of Project' (FoP; also, the to be implemented Primary Friend of Project user role) will be able to execute actions related to basic project administration. In what follows, we describe a typical workflow for this user role.

This role assumes that a relevant Cycle as well as Project have already been created. The Cycle and Project entities as well as the details of their creation and editing are out of scope for the FoP user role and are described elsewhere in this Manual.

An overall schematic view of the workflow for creating a Scheduling Unit is shown below. More details regarding the observation specifications are described in the following sections.



Project content specification

During each LOFAR Observing Cycle (LC), different observing campaigns corresponding to the set of approved science projects are performed. These can be regular LC projects, long-term projects (LT) or Director Discretionary Time (DDT) projects. In addition there are (special) commissioning or maintenance projects (COM) which can also be part of a cycle, with the purpose of testing new strategies or testing system health.

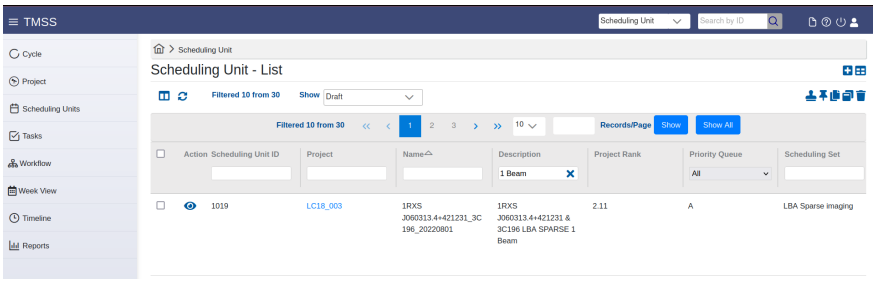
Scheduling Units

In order to observe the proposed targets, the observing specifications & pipelines from the proposal need to be translated into system parameters that the telescope can understand. In TMSS, this is done via "scheduling units" (SU).

Projects are organized in sets of SUs. A SU is a collection of system tasks (i.e. Observations, Pipelines, Ingest and Cleanup Tasks) with relations for scheduling blocks and sets and handling of the resulting data product outputs. The user specifies the SU and the associated tasks which contain the details about the observing runs to be performed and the associated data processing. SUs that are being created and are being specified are in the Draft state: they can still be edited. In order for a SU to be schedulable its status should be manually set to Blueprint (after which it cannot be edited anymore). The following table shows the list of the possible statuses that a SU can attain:

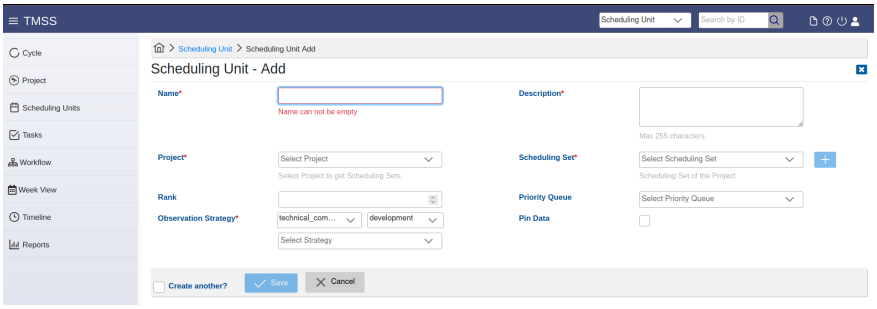
Status	Description
Defined	The scheduling unit exists
Schedulable	The scheduling unit is defined and ready to be scheduled by the scheduler
Unschedulable	The scheduling unit cannot be scheduled because: a. The scheduling constraints can not be met b. There is a scheduling unit blocking this unit from being scheduled c. There are too many stations unavailable for this scheduling unit to be scheduled
Scheduled	The scheduling unit is scheduled at this specific time
Observing	One or more observations are running
Observed	All observations are finished (or obsolete)
Processing	The pipelines are active / in the queue. There are no observations running.
Processed	All pipelines are finished (or obsolete)
Ingesting	The ingest task is running (and no processing is running)
Cancelled	One or more tasks are cancelled
Error	One or more tasks are in error
Finished	All processes are finished, including ingest

The SU main menu item exposes the SU - List view.



The user can either specify a single SU or a bulk set of SUs. The former is presented in this subsection, for the latter please refer to Scheduling sets subsection.

Add a scheduling unit. When the user clicks on the ⊕ icon in the top right corner, the "Scheduling Unit - Add" view is shown.



Here, the user can specify a scheduling unit and the related tasks. The specification input fields can be mandatory or optional. The mandatory input fields are marked by a red asterisk. The user *needs* to: a) enter a name for the scheduling unit, b) chose the related project from the drop bar menu, c) select what observation strategy it should have by selecting the right *purpose*, *state* and *template,* d) provide a small description of the scheduling unit and e) add it to a scheduling set (either by selecting one from the drop-down menu or by creating one through the + icon).

Field name	Content	Exam
Name*	Descriptive name	P125+ PSR B
Description*	Description of this scheduling unit	TMSS
Project*	Project to which this scheduling unit belongs	DDT19
Scheduling set*	Collection of scheduling units	March Calibra
Priority Rank	Rank within the proposal. Range from 0.0000 - 1.0000. Lower Rank has preference in scheduling.	0.0000 0.5000 0.7845 1.0000
Priority Queue	Discriminate between prio A and prio B observations.	A B
Observing strategy*	Strategy for observations The first two entries are filters on strategy categories. Default stategies to use would be "production" and "active".	LoTSS Pulsar
Prevent Automatic Deletion	Default: Follow project default.	False True

The user needs to specify an observing strategy. Available strategies can be filtered according to purpose and state usunbg the provided drop-down menus and selection checkboxes to ease the search. More than one filters can be selected, such as:

Purpose	Description	Example
Production	Strategies available for cycle observations	IM LBA Survey LoTSS Pulsar Timing
System Health	Strategies needed for system health monitoring	FE Monitoring Holography Clock Monitoring
Technical Commissioning	Commissioning of new strategies or new telescope functionality	Pulsar Timing Scintillation LOFAR2 LBA+HBA
Scientific Commissioning	Strategies for commissioning proposals from scientists	Fast Imaging for Transients

State	Description	Notes
Development	Strategies under development and undergoing testing.	Strategies may not work or
Active	Strategies used in production.	
Legacy	Strategy is no longer used, but should still work.	Can still be used for repetitions if a n
Obsolete	Deprecated strategies	Strategy should not be used, because it is succeeded by a new

An overview of some of the available *Active* Strategies for an observing cycle is shown in the table below:

	Purpose	Strategy name	Description
Active Strategies	Production	BF CV 8-bit	Beamformed observation and pulsar pipeline for conversion to
		BF CV FRB	Scheduling unit for Fast Radio Burst observations. Complex vo
		BF CV Timing Scintillation	Beamformed observation and pulsar pipeline for pulsar timing v
		BF FE - Ionospheric Scintillation	A beamformed fly's eye observation with the LBA to CasA, Cyg
		BF Pulsar Timing	Beamformed observation and pulsar pipeline for pulsar timing.
		IM HBA 1 beam	This observation strategy template defines a single-beam HBA
		IM HBA LoTSS 2 beam	This observation strategy template defines a LoTSS (Co-)obser
		IM LBA 1 beam	LBA Imaging Observing Strategy using 1 Beam and a parallel C
		IM LBA LoDSS 5 beam	LBA Imaging Observing Strategy using 5 Beams and a parallel
		IM LBA Survey 3 beam	LBA Imaging Observing Strategy using 3 Beams and a parallel
	Technical Commissioning	FE RT Test	Test FE observation with one station
		Solar Campaign	Solar observing strategy. Imaging + Beamformed observation c

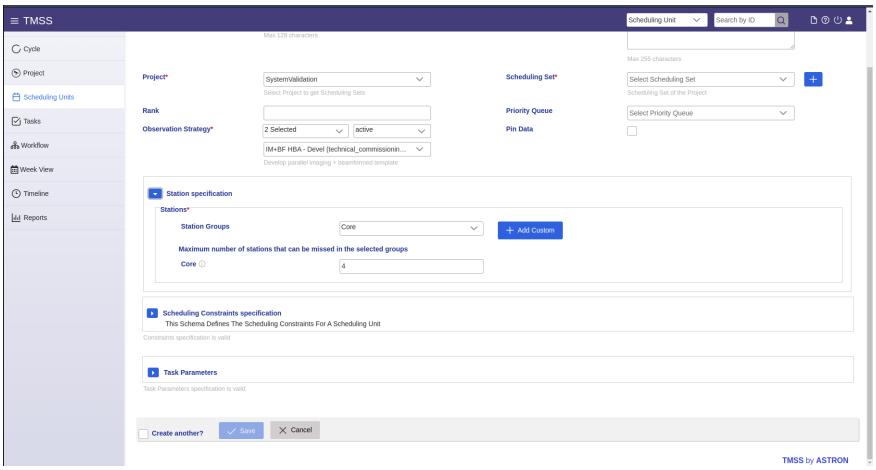
An overview of observing strategies for some default observing modes:

Observing mode	Observing mode explanation
LBA Imaging	Imaging with the Low Band Antennas (LBA) is performed with one or more target beams and a calibrator beam in parallel. Sche
HBA imaging	Imaging with the High Band Antennas (HBA) is performed with one or more target beams within the tile beam. Calibrator observ

Beamformed complex voltage / baseband	This beamformed data mode provides the highest time resolution data. Currently it is offered on a single pointing with several d

When the user selects an observing strategy from the drop down menu , the "Scheduling Unit - Add" view expands and the **Station Specification, Scheduling Constraints Specification and Task Parameters** sections are shown, respectively.

Station Specification

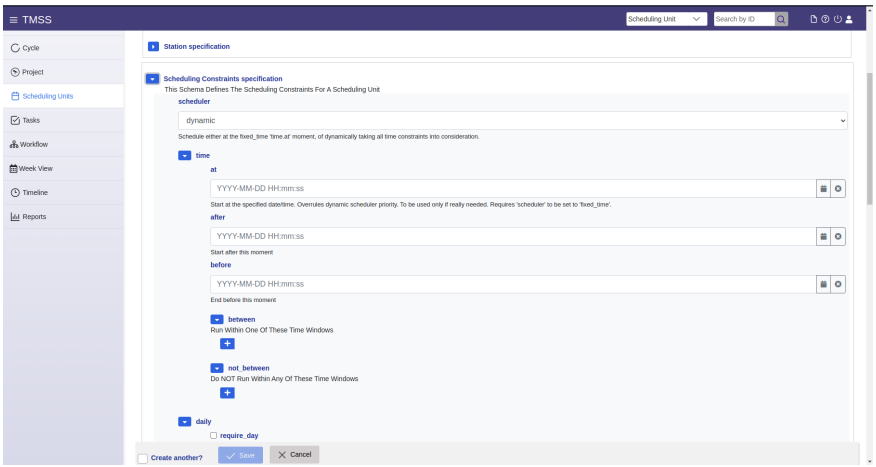


In the Station Groups input field, the user can select which station groups to use, while it is possible to choose more than one. By selecting a station group, a new input field appears with the respective name. In this field, the user can select the number of stations that can be absent at the time the observation is scheduled. Additionally, the user can press the icon next to the group to see which stations are in it. The available Station Groups and the maximum number of missing stations for each group are listed below:

Station group	Max stations missing
Superterp	0
Core	4
Remote	4
Dutch	4
International	2
International Required	1
All	6

The user can also add one or more Custom Groups by clicking the "+ Add Custom" button. In a similar fashion, by adding a custom group two new input fields appear. In the drop bar menu, the user can select one or more station that are gonna be part of the custom group, while at the 'Maximum No. Of Missing Stations' input field the number of absent stations at the time the observation is scheduled. If a station is reserved, it will be removed. If there are too few available stations, the observations will either not be scheduled (fixed_time) or will be scheduled at a later time if possible (dynamic scheduling).

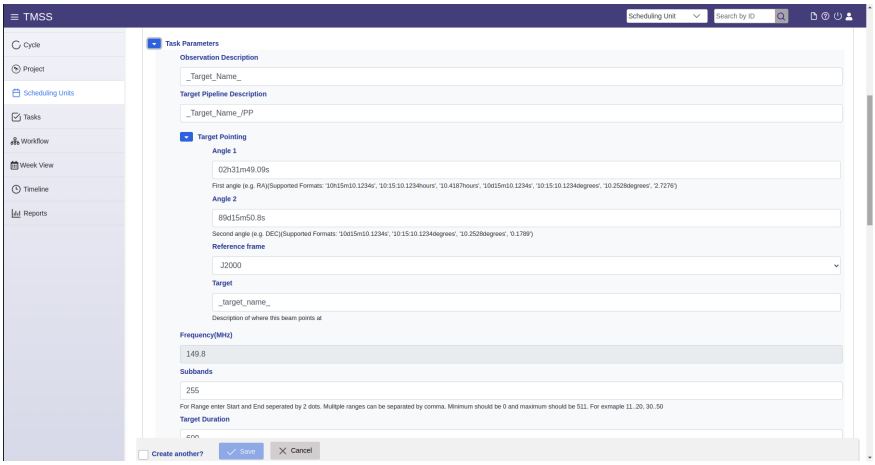
Scheduling Constraints Specification



The Scheduling Constraints Specification section lets the user specify parameters to perform scheduling (manual or dynamic) end execution of the observing tasks of the SUs. The scheduling constraints are typically optimised (i.e. with default values) in different ways for the different observing strategy templates. The most common are given below:

Field name	Content
Scheduler	Type of scheduling to use. Default is to use the dynamic scheduler, so scheduling units are picked up automat
time at	Run observations at this specific time. **Only use this if really required, e.g., the target is also observed wit
time after	Minimum start time of this scheduling unit. Default: start of cycle *Observations will by default also be scheduled only in the cycles connected to the project.*
time before	Maximum end time of this scheduling unit. Default: end of cycle
time between	Only schedule within the time windows specified here. More time-windows can be specified by pressing the +
time not between	Do not schedule within the time windows specified here. More time-windows can be specified by pressing the
Daily	require_day : Day time observations. Run when the sun is higher than 10 degrees above the horizon at the Su require_night : Night time observations. Run when the sun is lower than 10 degrees above the horizon at the S avoid_twilight : Avoid sunrise and sunset. Run when the sun is higher than 10 degrees above the horizon at th
transit_offset	Offset in (UTC) seconds from transit for all target beams in the observation. Alternatively, use you can specify
min_distance	Minimum distance to the Sun, Moon and Jupiter (latter mostly relevant below 30 MHz) in degrees (backend us Current default 30, or 28.64 degrees
min_elevation.target	Minimum elevation for all SAPs in the target observations
min_elevation.calibrator	Minimum elevation for the SAP of all calibrator observations
Reference pointing	If true, will be used for scheduling calculations taking into account the transit_offset *Note: If used, the reference pointing direction should be identical to the tile beam pointing direction (for HBA).*

Task Parameters



An observing strategy necessitates certain settings and the Task Parameters section allows the user to specify them. In this section options such as pointing, target and observation names, and more advanced options such as sources to demix are included. The given parameters are determined by the observation strategy and thus there are many options and parameters to present. There are different strategy groups, such as Imaging (IM), Beam-Formed (BF), Solar campaign etc., and an in depth understanding of the telescope's capabilities is necessary in order to provide meaningful specification parameters. In this section, the aim is to give a quick overview of the different task parameters that are presented in all the current active strategies.

Task Parameter	Present in these strategies	Description
Duration	**All** except BF FE - Ionospheric Scintillation and FE RT Test	Observation duration in hour:min:s
Observation Description	**All** except BF FE - Ionospheric Scintillation and FE RT Test	Usually target (and/or calibrator) n
Pipeline Description	**All** except BF FE - Ionospheric Scintillation and FE RT Test	Usually target pipeline (and/or calil
Target Pointing	**All** except BF FE - Ionospheric Scintillation and FE RT Test	Define pointing to target(s and/or c
Digifil options	BF CV FRB	
Raw output	BF CV FRB and BF CV Timing Scintillation	Whether to include the raw data in
Sub-band per file	BF CV FRB and BF CV Timing Scintillation	The maximum number of sub-banc
Optimize period and DM	BF CV Timing Scintillation and BF Pulsar Timing	
Sub-integration time	BF CV Timing Scintillation and BF Pulsar Timing	

Frequency channel per file	BF CV Timing Scintillation	Number of frequency channels per
Duration FE (1..4)	BF FE - Ionospheric Scintillation, FE RT Test and Solar Campaign	Duration of (one of the) the fly's ey
Description FE (1..4)	Solar Campaign	
Pointing FE (1..4)	Solar Campaign	Define FE pointing given in Angle
Frequency	IM HBA 1 beam and IM LBA 1 beam	Frequency range of the observatio
Sub-bands	IM HBA 1 beam and IM LBA 1 beam	Sub-band numbers specification (a
Run adder	IM HBA 1 beam, IM LBA 1 beam, IM HBA LoTSS 2 beam and IM LBA LoDSS 5 beam	Do/Don't create plots from the QA
Tile Beam	IM HBA LoTSS 2 beam	HBA Only, insert pointing of the tile
Filter	IM LBA 1 beam	Bandpass filter applied
Antenna set	IM LBA 1 beam	Select the antenna mode to observ
Time averaging steps	IM LBA 1 beam, IM LBA 1 beam and IM LBA Survey 3 beam	Factor used to average the data in
Freq averaging steps	IM LBA 1 beam, IM LBA 1 beam and IM LBA Survey 3 beam	Factor used to average the data in
Demix pipeline	IM LBA 1 beam and IM LBA Survey 3 beam.	Given in several drop-down menus

Edit a scheduling unit

Editing a scheduling unit is done in the most straightforward manner by finding the associated scheduling set filtering in the Scheduling Units tab in TMSS or simply by searching for the SU name in the search bar of TMSS. Then selecting the correct scheduling unit by clicking the
'eye' icon on the left-hand side of the table. Once the user enters the 'Scheduling Unit - Details' menu, make sure you are in the 'Draft' tab of the 'Task Details' section. Now if the user wants to change the global description of the scheduling unit or, for example, wants to change the project or description, one can click the 2nd icon on the top right (pencil and paper icon) to change the SU's Details. From this view, the user can also change the Task Details by selecting the appropriate task that needs changes and clicking the edit button that is right from the Task Details header. Below the Task Details section one can see the familiar Observation Specifications as shown during the SU creation and these can be changed accordingly as well on a SU level.

Tasks and sub-tasks

The tasks are already defined when creating a scheduling unit, and the standard form of the tasks is already created for the given strategy chosen for the SU. Each observation strategy has a unique set of parameters that ultimately define these tasks. In the most general case, tasks are divided in different categories that are: Observation, Pipelines and Ingest. Most often the Observation tasks (depending on the strategy) consist of the Target observations (the number depending on how many beams the strategy has) and some Calibrator observation. The Pipeline tasks consist of a pre-processing pipeline associated with each calibrator, and a pre-processing pipeline for each *beam* in the strategy. Lastly the Ingest tasks consist of ingesting the pre-processed data products to the indicated destination (defined in the project) and a cleanup which removes the data from the disk. Each of these tasks can be viewed in their 'Task - Details' through the eye icon and their sub-parameters can be inspected and changed.

Observation Task Specification

Within an Observation Task the user can view and edit the observation specification, such as the station set-up, observation duration etc. Very similar so what was written before during the SU creation

Pipeline Task Specification

Within a Pipeline Task the user can view and edit the parameters for the pre-processing pipeline such as averaging factors, RFI flagging strategy and cluster details.

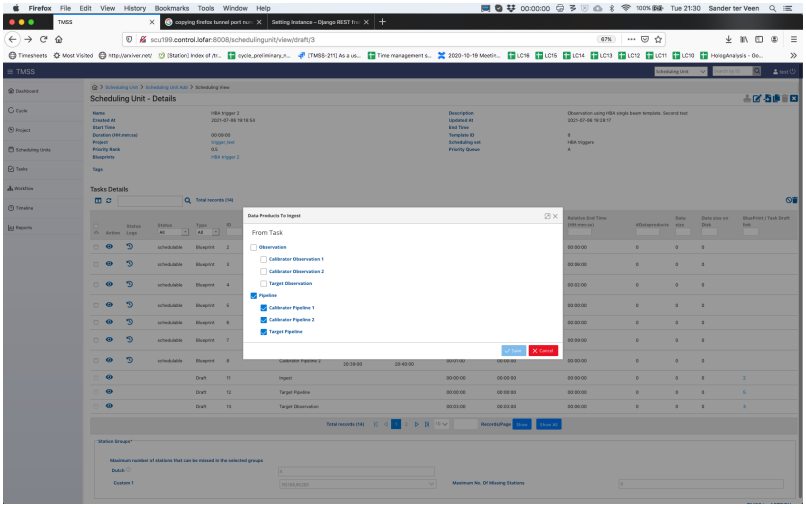
Ingest Task Specification

Within a Ingest Task the user has to make sure that the predecessor tasks are correct before the ingest and cleanup happens.

Changing dataproducts to ingest

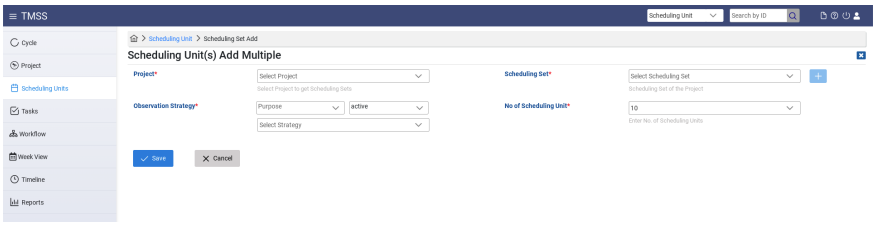
The dataproducts to ingest are part of the observing strategy. For most observing strategies, we only ingest the pipeline data. To change this, and ingest for example also the raw data, navigate to the scheduling unit page and press the ingest button  . This gives a pop-up where you can select which data products to ingest.

This can be done both for drafts and blueprints.

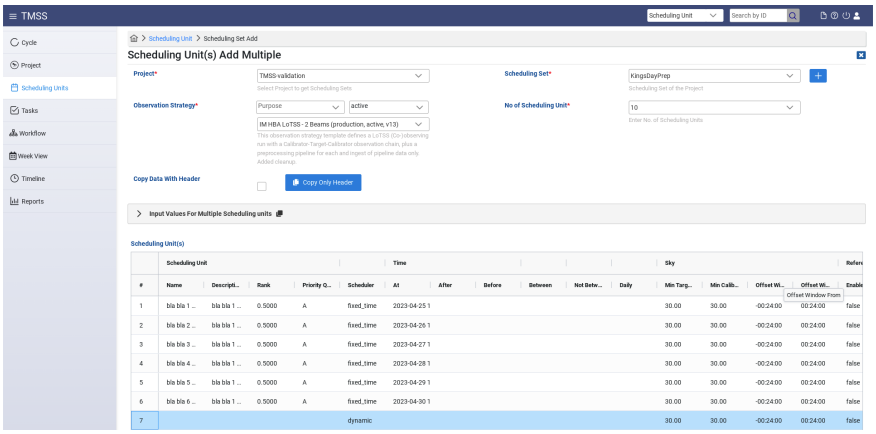


Bulk Scheduling Units Specification (Scheduling Sets)

During the creation of a SU, the user can add the SU to a Scheduling Set which can be used as an easy filter in the SU menu to search for the appropriate tasks, but if for example the one pointing the SU has been created for is part of many different SUs in a project, then it has to be sorted into the correct Scheduling Set belonging to that one project. A user can also create *multiple* SUs at once that are then belonging to such a scheduling set by using the  button. This introduces the following menu to the user:



From this menu the user can specify the creation of scheduling units in a similar way as before but with the addition that they can select how many scheduling units one wants to make that belong to the same scheduling set. Once the appropriate scheduling set is chosen, this menu unfolds and turns into the view as seen below.



This way it is easiest to define all the appropriate tasks at once, plus through this view the user can easily copy paste the first SU's information into a spreadsheet and perform all needed editing of the fields and finally copy back into the TMSS table view. An example of such a spreadsheet is shown below.

Submission of Scheduling Units

The user may notice that after the creation of a SU from the previous sections the "Type" of the Tasks in the "SU - Details" view are set to *Draft*. The *Draft* status allows the user to still edit a task or scheduling unit before submission. However, in order to make a SU *schedulable* , it has to be properly submitted. This is done by setting the scheduling unit to *Blueprint*. ***Once a task has been set to Blueprint the tasks cannot be edited and can be scheduled immediately, so please first make sure all settings are correct.*** It will be scheduled at an appropriate time which should be visible in the "Week View". To create a blueprint, click on the  icon:

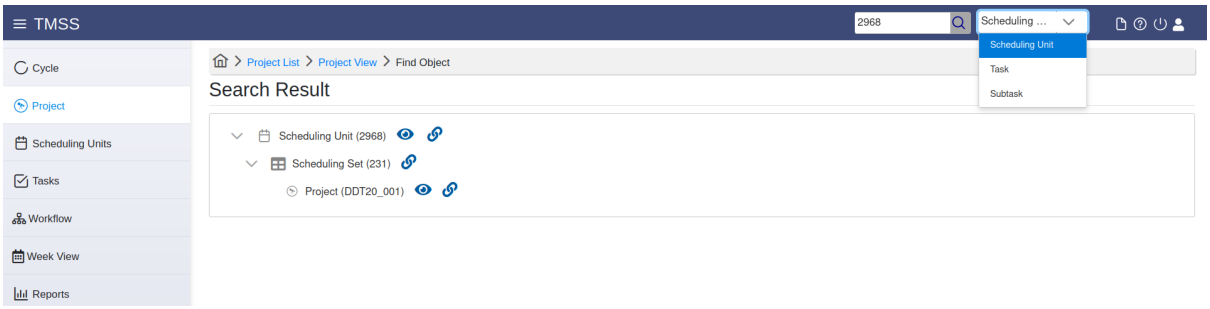
- On the scheduling unit page
- By first selecting scheduling units on the scheduling unit list page
- By first selecting scheduling units from the list on the project page

Scheduling Units Failure and Re-submission

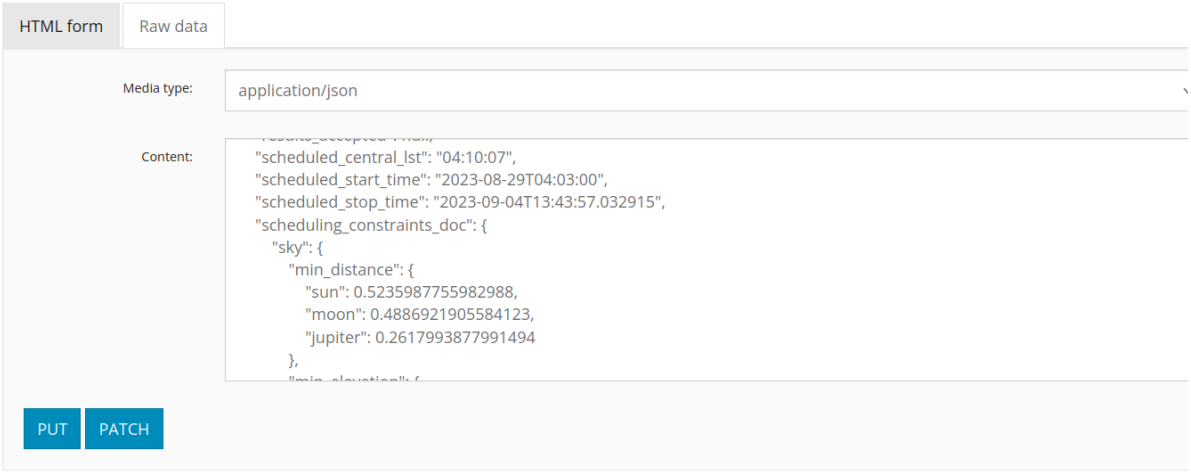
It is possible that an observing session results in bad data. This can be either due to not matching the requirements specified in the tasks or due to external circumstances (e.g. observing conditions poor). It means that the data can't be accepted, so the corresponding flag needs to be set. It requires the FoP to:

- Set the corresponding SU data acceptance flag to **FALSE** (see procedure below). **Warning**: This should be done using the QA workflow interface, but a manual procedure using the TMSS API is also available.
- Evaluate if repeating the failed observing session described by the failed SU is within the policy for the project (i.e. check priority and if the failed session was already a repetition)
- If possible, add more tasks to the SU; to this aim new tasks can be added in a SU by using in the "Scheduling Unit - Details" menu and then clicking on the 'paper-and-pencil' icon next to the "Task Details" section.
- If possible repeat the process of specification and submission by generating a copy of the SU draft; to this aim copy the failed blueprint of the SU to a (renamed) draft SU and blueprint it. In this case, make sure that the new SU does not retain any fixed timeslot from the failed copy. Also, make sure that any archived data related to the failed SU to be removed from the LTA via opening a ticket in the Helpdesk (project users) or directly cleaning up the archive (for SDCO operators).

In order to set a SU data explicitly to **FALSE** the following procedure can be used:



- At the top of the TMSS window, in the search input field we enter the ID of the SU **blueprint**, while in the drop-down menu next to it we select to search for SUs (this is the default entry, but we can also search for Tasks and Subtasks)
- We then click on the 'link' icon next to the 'Scheduling Unit' entry (the first row in the search results listing).
- The SU API view opens in another browser tab. At the bottom of the page, we click on the 'Raw data' tab in the input form section and for the '**results_accepted**" key in the 'Content' text area we change its value from '**null**' to '**false**'.



- To confirm the change, we click the 'Patch' button at the bottom of the page.
- Now, the SU data acceptance flag will be set to FALSE, and any related (also pinned) data to the SU will be deleted, or have to be deleted manually if the prior steps were performed before the associated cleanup task has run.
- If data were archived, an LTA cleanup action can be requested by project users via opening a ticket in the Helpdesk or directly performed by SDCO operators.

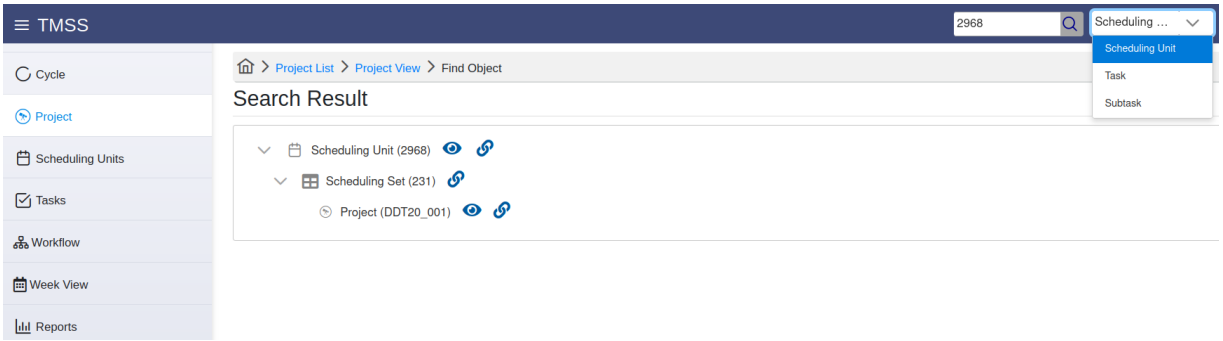
This concludes the Observation Specifications description. However, this is not where the responsibilities of the FoP end, as after the observation was successful the FoP has to complete the QA workflow together with the TO and the PI.

QA workflow

Accessing the workflow view

There are multiple ways to access the workflow administration space for a given SU:

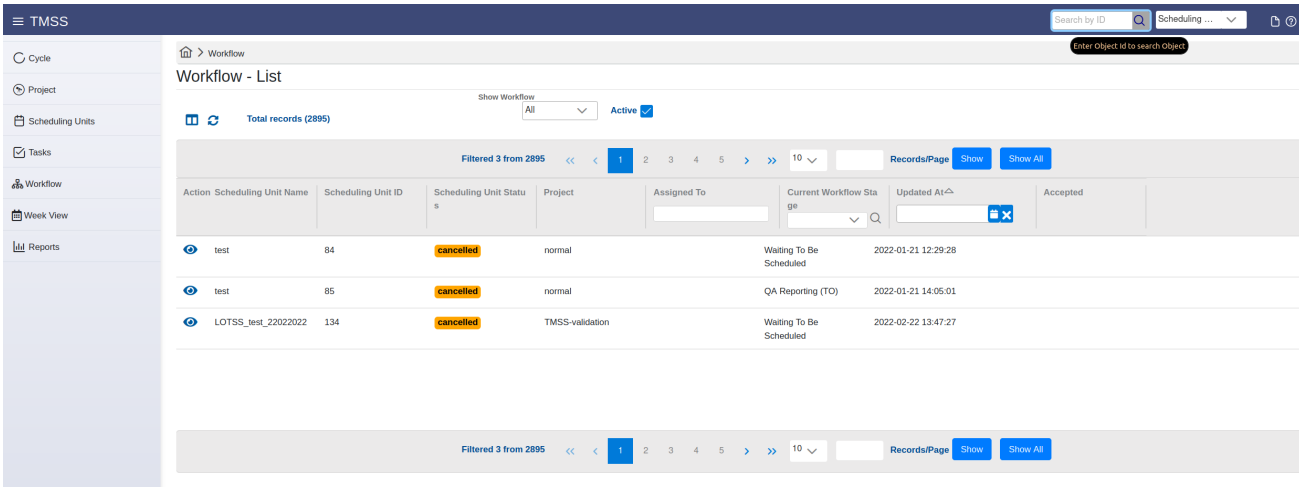
- If looking for a specific workflow, it is possible to find it by:
  - Using the search field in the upper bar on every TMSS page we can search for SUs using their *blueprint* IDs. The drop down menu next to the search box needs to be set to the (default) value of 'Scheduling Unit' (it can also be used to search for Task and Sub-task IDs).



Then, click on the 'eye' icon next to the scheduling unit, and on the SU details screen which will open, click on the 'workflow' icon (; second from the left in the row of icons on the top right of the page, across the page title).

- Going to the scheduling units menu page, selecting *Blueprint* from the top drop-down menu, then enter the SU *blueprint* id in the corresponding column and press "Enter" to search. Then, we click on the Eye icon on the left to see the SU blueprint. Once on the details page, we click on the View Workflow icon (second from the left at the top of the page). The workflow page for this SU opens.

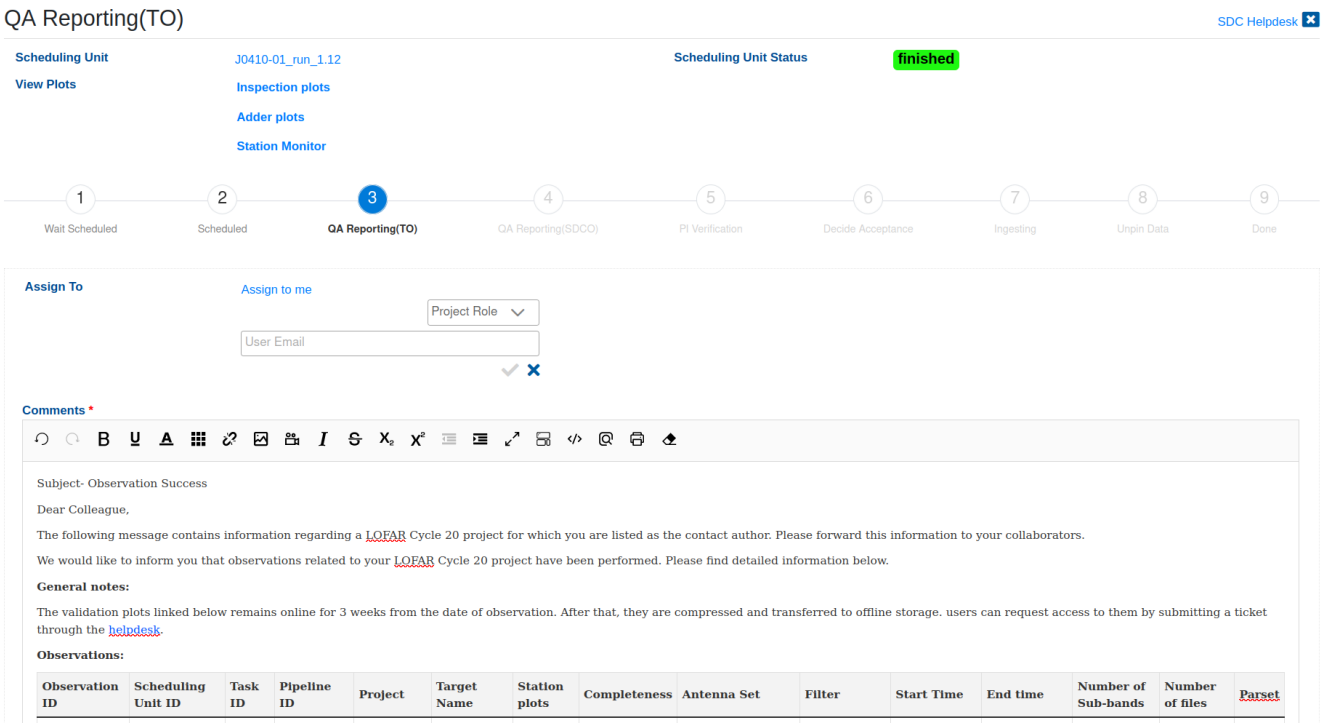
- If one wants to access workflows that require actions, we can use the workflow menu page accessible by clicking the corresponding menu item on the TMSS main menu on the left of the page, a listing of workflows will appear:



We can see the SUs which workflows are in a state we select from the drop-down above. The checkbox indicates that we filter by default on all active ones, others disappear. To find a particular SU (workflow), the user should make use of the drop-down menu options or use the column filtering options. Workflows are only associated with blueprints, so the IDs referred to here are SU *blueprint* , not draft IDs. Clicking on the 'eye' ison in the first column will open the workflow page for the corresponding row.

Managing the workflows

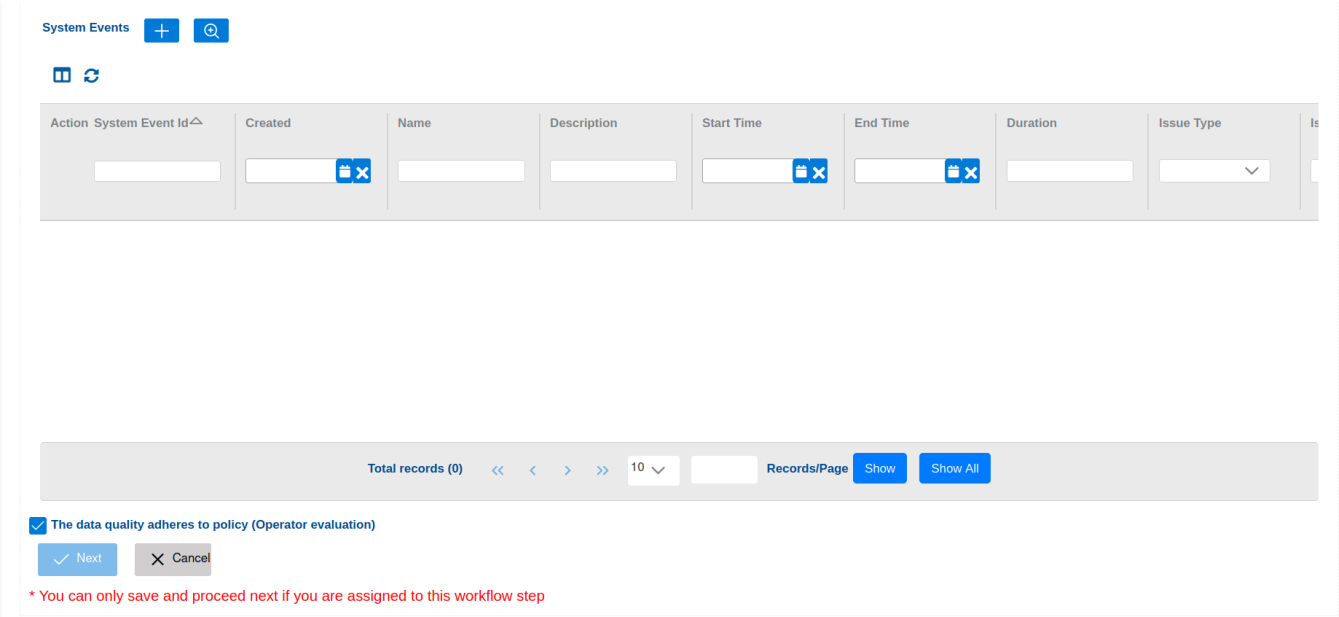
The management of the workflows is done through the dedicated workflow view page:



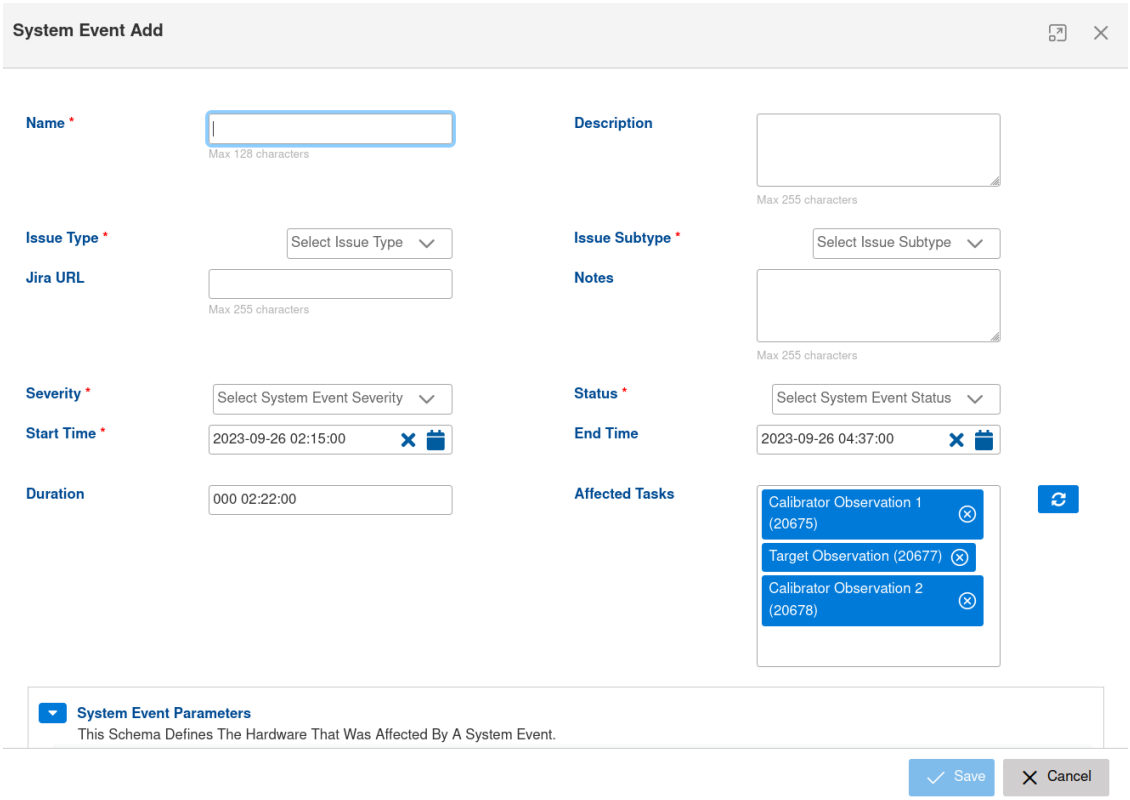
At its top there are links to the SU details page, as well as to the various inspection plots related to the observing run. These can be used by the TO/SDCO /PI as an aid when performing the quality assessment (QA). Below, a graphical representation of the workflow is given consisting of 9 steps, with the number highlighted in blue indicating the current level of progress. Their associated overviews are accessible depending on the role the user has.

If the workflow is not assigned to the current user, s/he can use the "assign to me" to perform the assignment, or choose a user to assign the QA to using an e-mail address, or assign by role, choosing from the roles provided in the "Project Role" drop-down menu.

The QA starts at level 3 where the users with telescope operator (TO) role can enter reports or comments related to the quality of the data and the performance of the system in the provided text area. It is usually pre-populated by a standard observing report.



At the bottom of the page, there is a list where the TO can enter system events relevant for the QA by adding an new one (using the "+" button) or by searching for existing ones and adding them to the list (using the "Search" button next to the "+" one). The new event page opens in a pop-up where the user can enter the relevant event details:



The TO can filter the listed system events using the provided column header fields in the list.

Finally, if the TO approves that the data adheres to policy, s/he can click the "Next" button to sent the QA for the following round of assessment by the SDCO/PI.

Each of the users / roles in the workflow steps can approve or disapprove of the data quality and enter an appropriate comment. The approval state is reflected by the state of a checkbox at the bottom of the page after all of the user roles have decided on the QA state. Then, the QA assessment is finished, and the PI has an overview of the procedure. The data is unpinned / deleted or archived depending on the QA outcome. The **Data Accepted** colu mn in the blueprint listing on the TMSS project view page will indicate whether data for a given executed SU blueprint is accepted or not (false).

Please note that SDCO is still using the Jira system for handling observation reports and project users will be notified to complete the QA workflow via the corresponding ticket.

The Radio Observatory will not have the opportunity to check all data manually before it is exported to the LTA, although some automatic diagnostics are generated for system monitoring, and offline technical monitoring will be carried out regularly. The FoP or the expert user in charge of project support will send to the project PI a notification after each observation with detailed information on where to find the relevant plots. The project team is encouraged to analyze the data, at least preliminarily, soon after the observations, and to get in touch through the ASTRON helpdesk about any possible problems. Observations that turn out to have an issue that makes them unusable may be considered for only one re-run, as soon as the observing schedule allows.

Additional information about the observing and processing policies adopted by ASTRON during the LOFAR Cycles is available at the relevant pages.

Contact author instructions

As a contact author, you will be notified by e-mail or by JIRA ticket if new reports are ready for inspection. Please make sure you can receive e-mail from ASTRON domains. You can also see all assigned tasks to you by going to the workflow page and filtering on "assigned to me".

You are asked to confirm you will accept the data. Please write your confirmation or rejection in the box. In case there are issues that you want to raise for which you consider not accepting the data, then please add in the comment box and untick the "PI accepts box". For the data policy, please consult the relevant information page. Your friend-of-project will contact you in JIRA for the final decision on what to do with the data. After this period you still have 4 weeks for a detailed data inspection. In case there are issues, please report them in JIRA. Please note that in case you do not accept the data, this data cannot be used and should be removed from your systems. We will also remove them from the LTA. A repetition will be scheduled instead if your observation is eligible for one, see again the policies.