



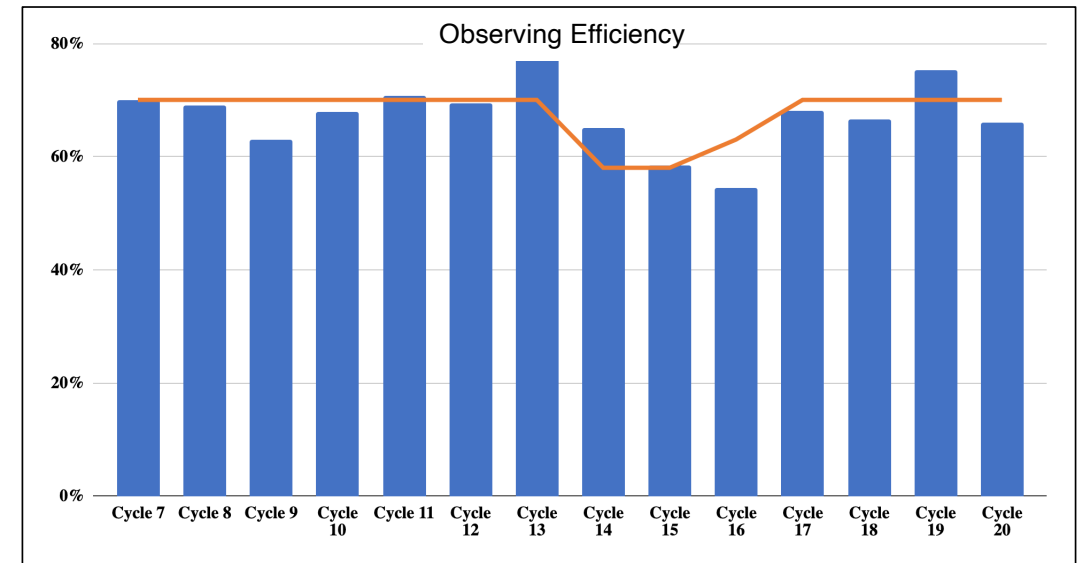
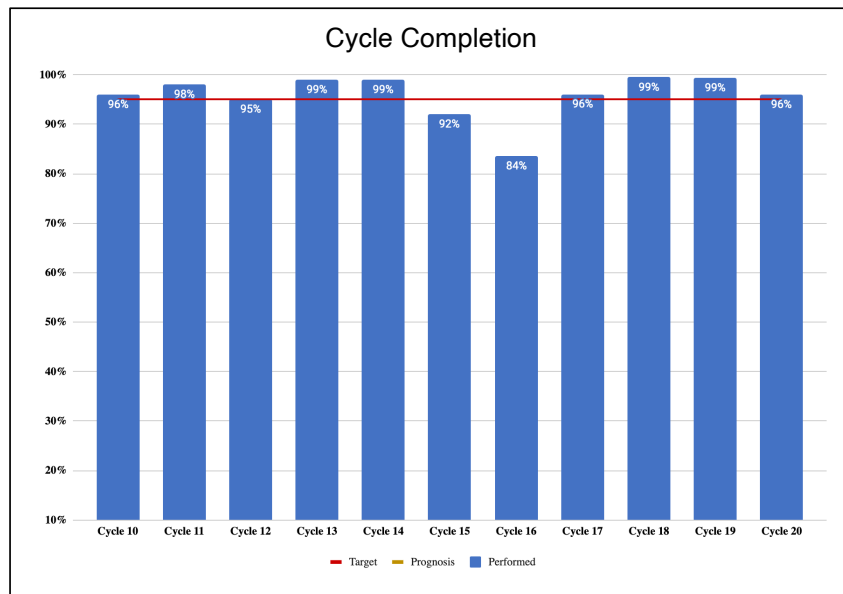
Operating the LOFAR2.0 Observatory

R. F. Pizzo

Head Science Data Centre Operations

Paris, 23 September 2025

LOFAR1.0 Operations Halted – Preparing for LOFAR2.0

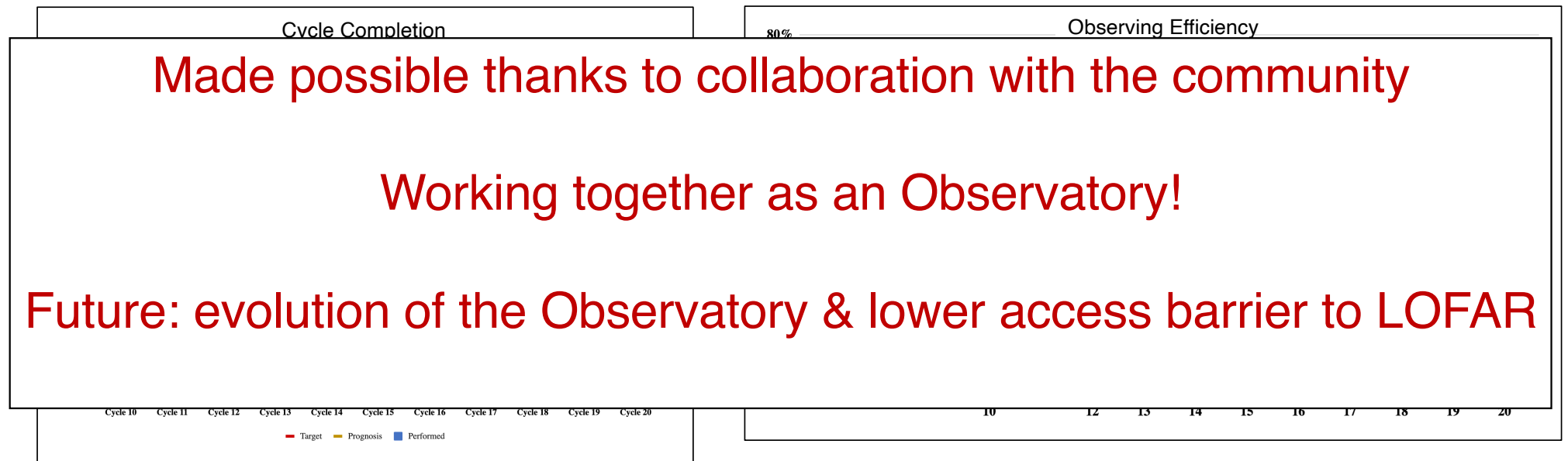


- Target efficiency: 70%
- Target completion: 95%
- Cycle 20: 96% completed

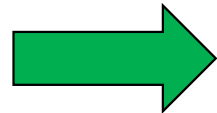


Similar targets for LOFAR2.0

LOFAR1.0 Operations Halted – Preparing for LOFAR2.0

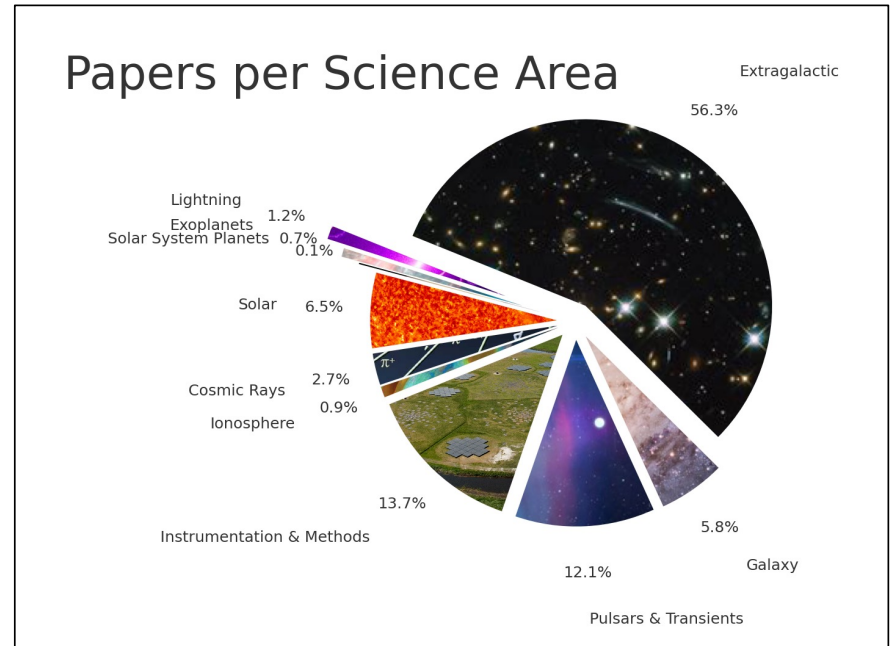
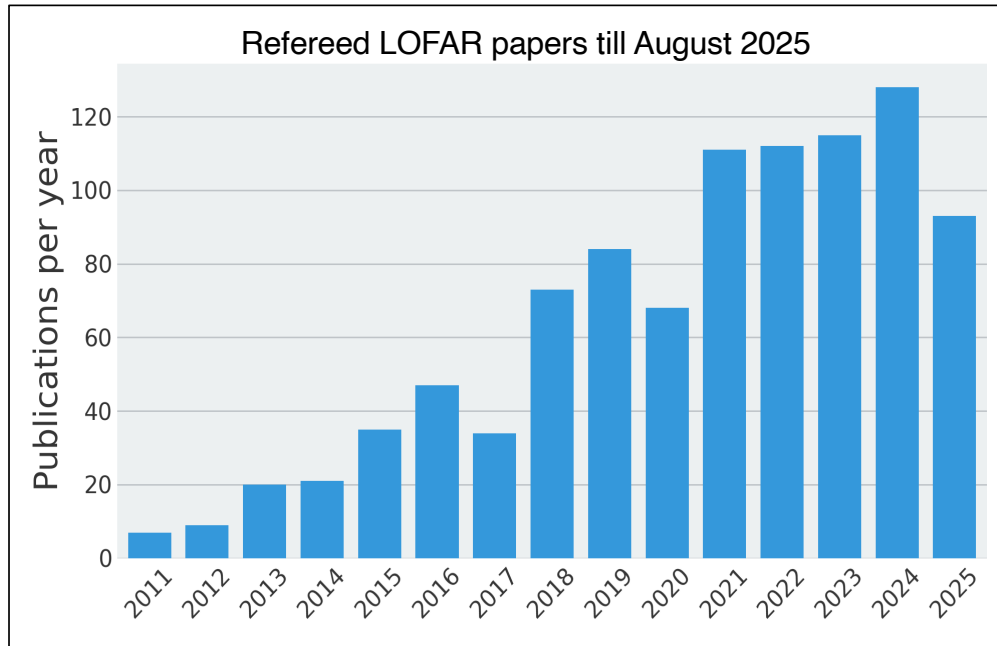


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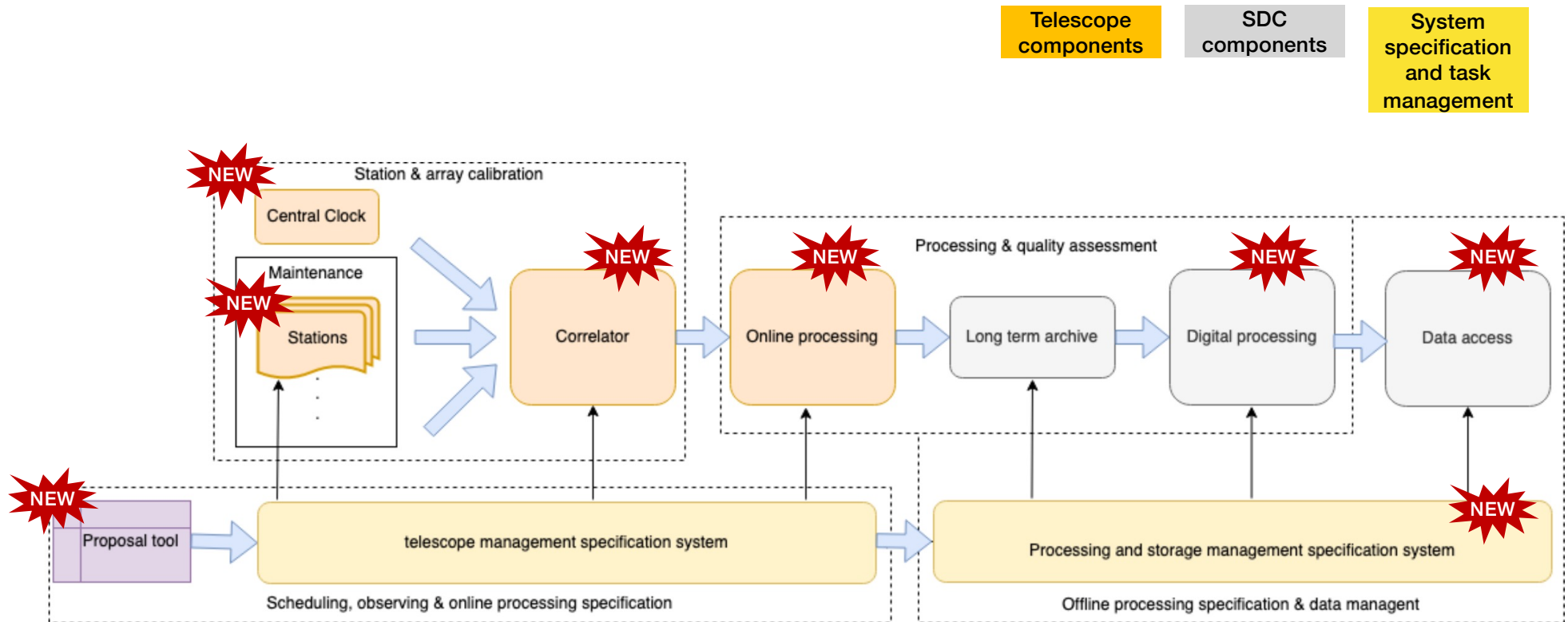
Similar targets for LOFAR2.0

LOFAR Science Output



- ~ 1000 refereed publications
- Publication rate: **2 papers per week** – top 10% of all astronomical facilities

LOFAR2.0: New Challenges

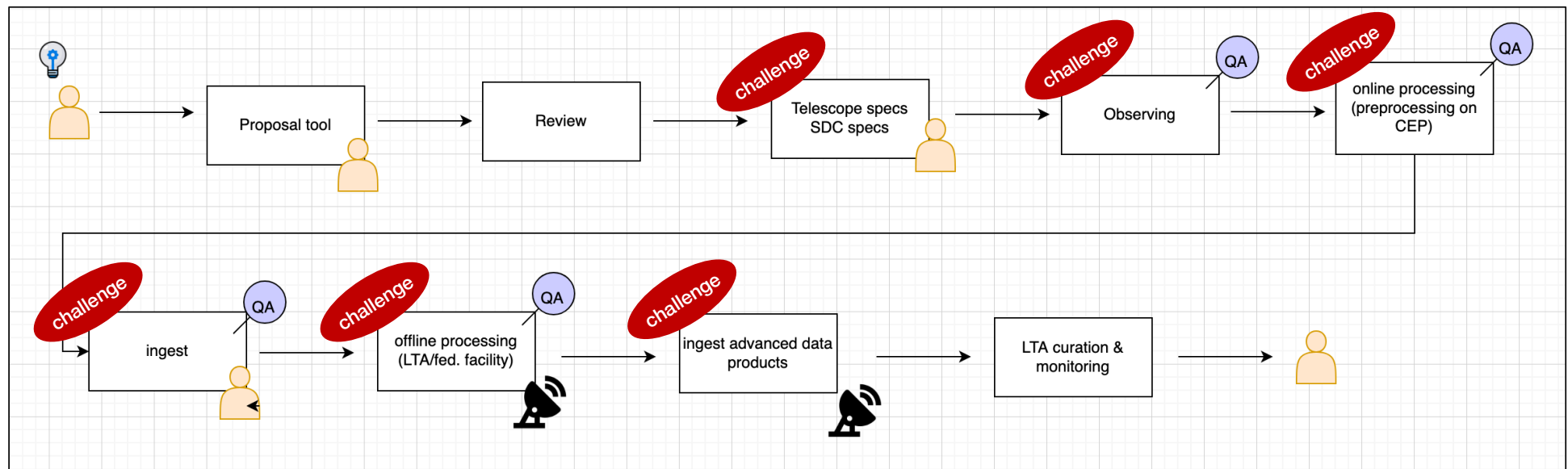


The LOFAR2.0 Data Handling Workflow

Streamlined system
specification

efficient dynamic
scheduling

improvement in the full data
quality assessment, data
acceptance policies

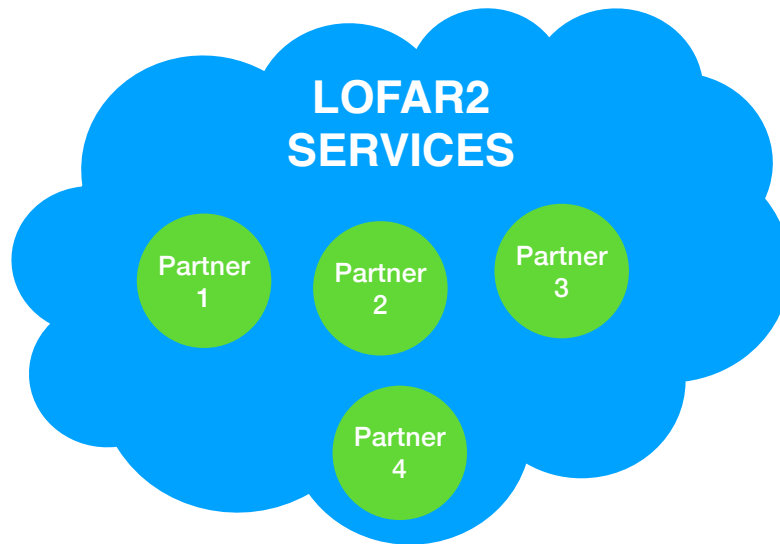


Expanding the current
processing infrastructure
to match shared
operational model

+ resource procurement
+ definition of science
ready data product
(legacy product)

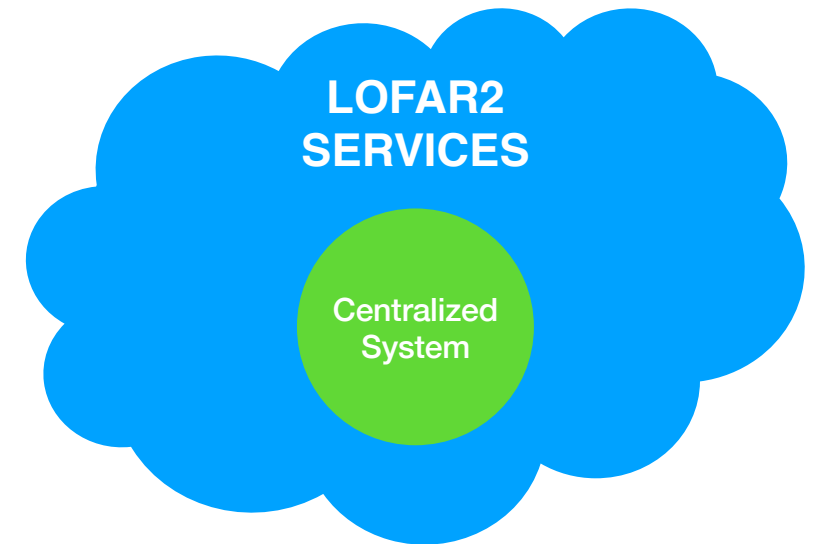
Operational Model(s)

federated



Progressive
centralization

centralized



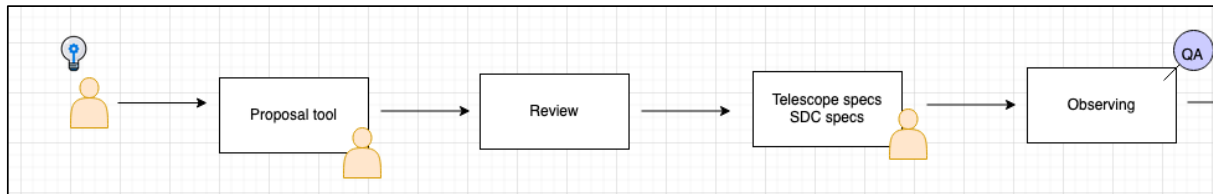
time

Federated. Managed by an external entity (e.g. a national data centre, a large programme) under agreement with the Observatory/ERIC, using hardware pledged to and allocated by LOFAR ERIC. Data products *must be* returned to the LTA.

Centralized. Directly under the control of the Observatory Operations team, on hardware provisioned at an LTA site (SURF, FZJ, PCSS... potentially UK, IT, others).

Services: *bulk processing capabilities, storage, execute processing workflows, support, etc.*

Proposing & Observing: TULP & TMSS



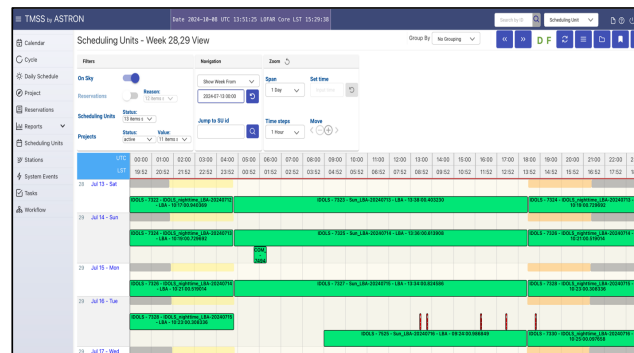
➤ TULP (NorthStar successor) under development and being commissioned

- Support proposal creation and experiment specification
- **Support review process**
- Transfer **technical specs** of allocated projects **automatically** to **facility management systems** (LOFAR & SDC)
- Integrate with **FAAI**

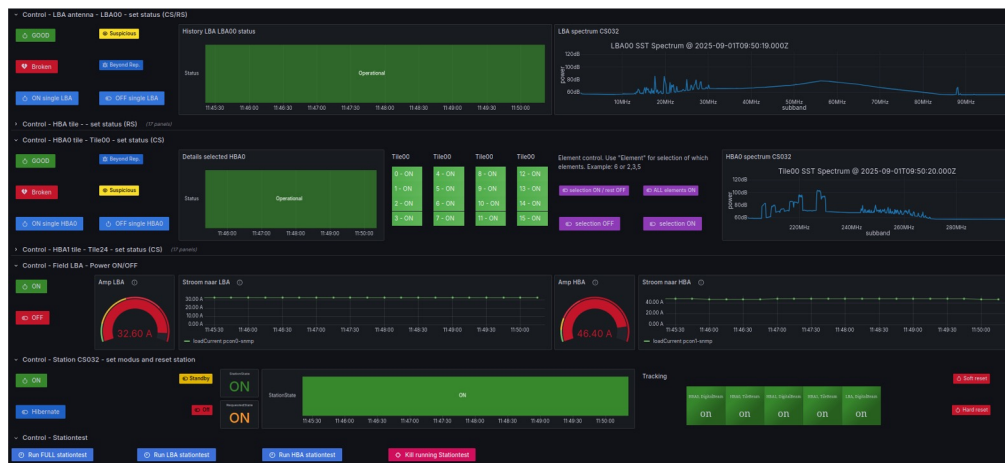
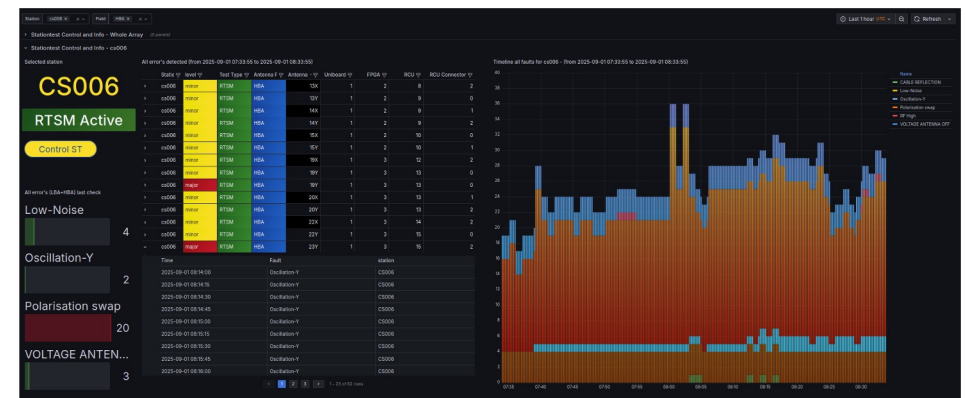
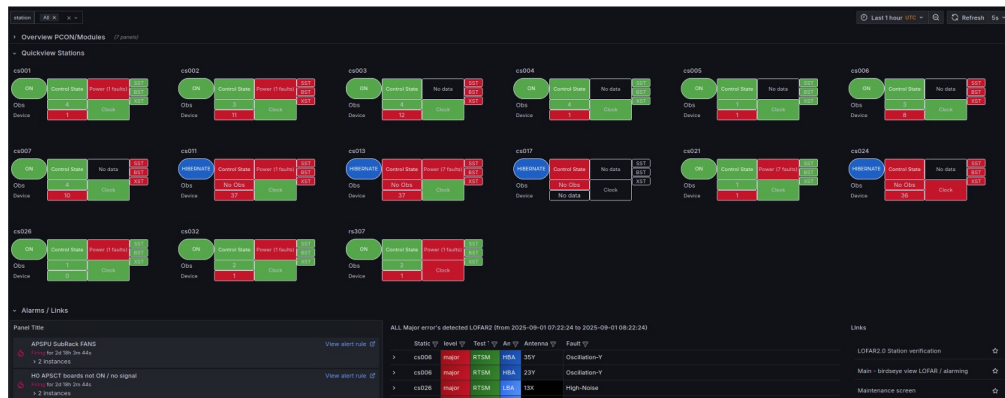


➤ TMSS:

- **gateway** for the interaction with the PIs
- **Automation:**
 - Interaction with TULP
 - Dynamic scheduling to be further enhanced
 - Data quality assessment and acceptance



LOFAR Monitoring: Helicopter view on the full observing system



- Easy **view on the whole array** at various levels
- Hardware- / Software- / Firmware- / Spectrum **alerts**
- Health monitoring of LBA / HBA (RTSM, station test, live spectrum plots)
- Bulk actions on the system

Grafana screens – Telescope Operations

Central Processing: Cobalt3 & CEP6

➤ Cobalt2 → Cobalt3

- GPU hardware with TensorCore software
- Transition 1 March 2026

➤ CEP4 → CEP6

- Experimental & operational part
- Phased upgrade, first part up Oct 2025

➤ Network upgrade

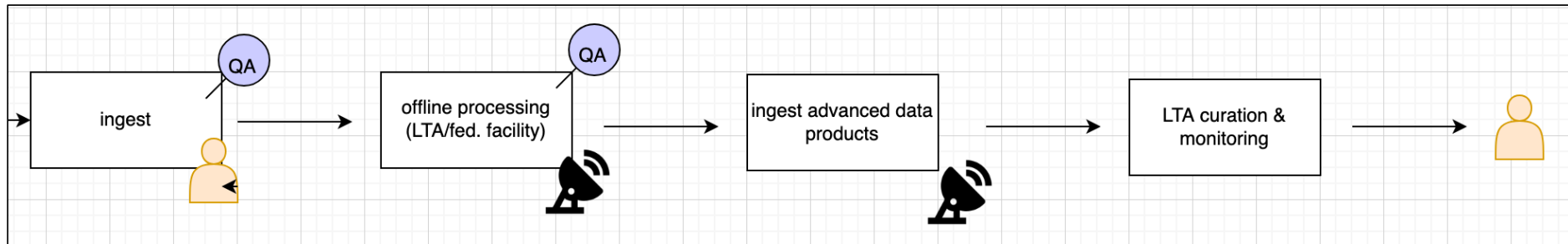
- Multicast
- 1.6Tbs link from stations to CEP

➤ Improved energy efficiency

see CEP poster by LOFAR2.0 team for more information



Generating Science-Ready Data Products: LTA Operations



POPPY Specifications Tasks Task Details Dashboard Filter Quality Validation IngestQ Failures Discarded Finished Monitoring Diagram Configuration Admin [Sign Out marco](#)

Specifications

[New Specification](#) [Clear Filter](#) Search for...

First Previous 1 2 Next Last

ID	Type	Status	Pre	WF	Project	SAS_ID	Processing	Ingest policy	Filter	Inputs	Batch	Tasks	Error	Actions
1	regular	expanded	-	31	lc6_015	526155	srm.grid.sara.nl	srm.grid.sara.nl	lc6_015_surf-mi-comp	232	8	29	-	Run Tasks Remove Tasks
2	regular	discarded	-	30	lt16_004	847244	-	default-lta	nv-juelich	3	10	-	-	Remove Tasks
4	regular	defining	-	29	ddt2_001	239952	-	-	ddt2_001-mi-comp	488	8	-	-	Edit +0 LTA Inputs
6	regular	discarded	-	-	-	-	-	-	-	-	-	-	-	-
7	regular	discarded	-	-	-	-	-	-	-	-	-	-	-	-
8	regular	finished	-	-	-	-	-	-	-	-	-	-	-	-
9	regular	finished	-	-	-	-	-	-	-	-	-	-	-	-
10	regular	discarded	-	-	-	-	-	-	-	-	-	-	-	-
11	regular	discarded	-	-	-	-	-	-	-	-	-	-	-	-
12	regular	discarded	-	-	-	-	-	-	-	-	-	-	-	-

Validation

These are the SAS_ID's in status stored that can be validated. Click one of the quality buttons to validate.

[Clear Filter](#) Search for...

First Previous 1 2 3 4 5 6 7 Next Last

SAS_ID	Workflow	Project	Filter	Plots	Summary	Annotate	Calc Q	Quality	Validate (choose a Q)	Discard
847244	30	lt16_004	nv-juelich	Plot	SLM	Plot	poor	-	Validate Good Medium Poor	Discard
813950 SAP5	30	comts_002	comts_002_813950SAP5-mi-comp	Plot	SLM	Plot	poor	-	Validate Good Medium Poor	Discard
813950 SAP4	30	comts_002	comts_002_813950SAP4-mi-comp	Plot	SLM	Plot	poor	-	Validate Good Medium Poor	Discard
813950 SAP3	30	comts_002	comts_002_813950SAP3-mi-comp	Plot	SLM	Plot	poor	-	Validate Good Medium Poor	Discard
813950 SAP2	30	comts_002	comts_002_813950SAP2-mi-comp	Plot	SLM	Plot	poor	-	Validate Good Medium Poor	Discard
253404	30	lc3_014	lc3_014-vk-2bits	Plot	SLM	Plot	good	-	Validate Good Medium Poor	Discard
158113	30	lco_022	lco_022_mi_bf1gzm	Plot	SLM	Plot	-	-	Validate Good Medium Poor	Discard
149286	30	lco_022	lco_022_mi_bf1gzm	Plot	SLM	Plot	-	-	Validate Good Medium Poor	Discard
81275	30	lco_011	lco_011_vk_bf1gzm_master	Plot	SLM	Plot	-	-	Validate Good Medium Poor	Discard
81273	30	lco_011	lco_011_vk_bf1gzm_master	Plot	SLM	Plot	-	-	Validate Good Medium Poor	Discard

First Previous 1 2 3 4 5 6 7 Next Last

- Explored via LOFAR Data Valorization (LDV)
- Critical part of the data chain – build the model
- Two steps to generate science-ready data products:
 - Building the infrastructure
 - Define the policies

LOFAR Long Term Archive [LOGIN](#)

[HOME](#) [SEARCH DATA](#) [BROWSE PROJECTS](#) [HELP](#) [LCL 037](#)

Observation 1 to 100 (showing 100 of total 387) -

Averaging Pipeline (total 0) -

Calibration Pipeline (total 0) -

Imaging Pipeline (total 0) -

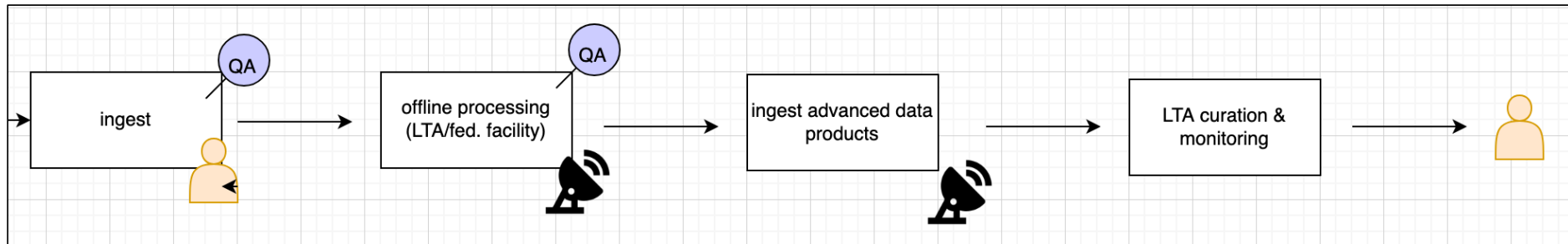
Long Baseline Pipeline (total 0) -

Pulsar Pipeline 1 to 100 (showing 100 of total 387) -

edit columns first previous 1 2 3 4 next last

#	Project	Release Date	Pipeline Name	Pipeline Version	SAS ID	Pulsar Selection	dotSinglePulseAnalysis	Name	convertRawToBit	subIntegrationLength	Source	All DataProduct	Quality	Plans
1	LCL_027	2015-05-15	11544+4937/PULP	n/a	1027091	Pulsar in observation specs, file or SAP	0	Pulsar Pipeline	0	-1.0	show	show	Good Medium Poor	0
2	LCL_027	2015-05-15	81237+25/PULP	n/a	1027065	Pulsar in observation specs, file or SAP	0	Pulsar Pipeline	0	-1.0	show	show	Good Medium Poor	0
3	LCL_027	2015-05-15	81133+16/PULP	n/a	1027047	Pulsar in observation specs, file or SAP	0	Pulsar Pipeline	0	-1.0	show	show	Good Medium Poor	0
4	LCL_027	2015-05-15	11024+0718/PULP	n/a	1027025	Pulsar in observation specs, file or SAP	0	Pulsar Pipeline	0	-1.0	show	show	Good Medium Poor	0

Data Ingest and Curation



➤ To guide the development and commissioning activities:

1. Definition of **LOFAR2.0 data products** to be supported, with associated documentation
2. Definition of **Data Management Plans** for L2LPs:
 - Products to be delivered, processing to be executed, advanced products generated, data releases & publication plan, requested support

➤ Tools under development to put in practice the LOFAR ERIC

data policy:

- Proprietary → public
- Legacy products kept indefinitely
- Intermediate data to be retired after a period

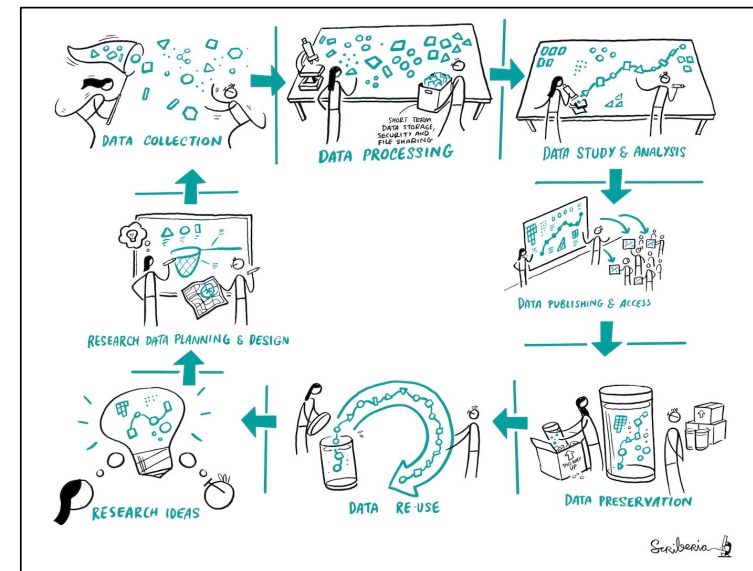


Image: *The Turing Way* project illustration by Scriberia. Used under a CC-BY 4.0 licence. DOI: [The Turing Way Community & Scriberia \(2024\)](https://doi.org/10.26434/chemrxiv-2024-12345).

Conclusions

- Operating LOFAR2.0 means operating a **NEW OBSERVATORY**.
- **Challenges** at various steps of the data chain. Key will be **automation**.
- Operations will rely on a new set of tools, functionalities, procedures.
- Aim is to achieve at least **similar operational performance** as for LOFAR1.
- Active developments also involving the community to build the LOFAR2.0 Observatory.