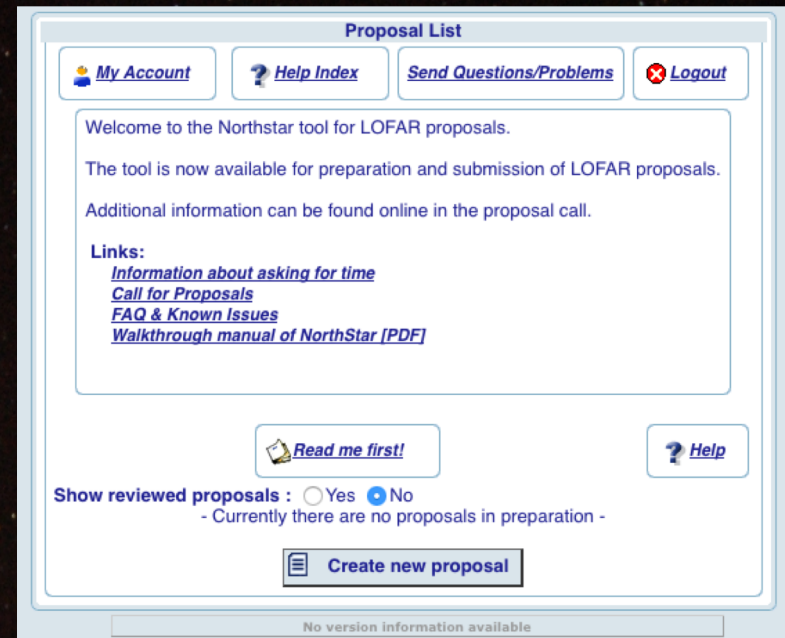


Northstar, LOFAR and ASTRON: 14 years of experience developing proposal tools

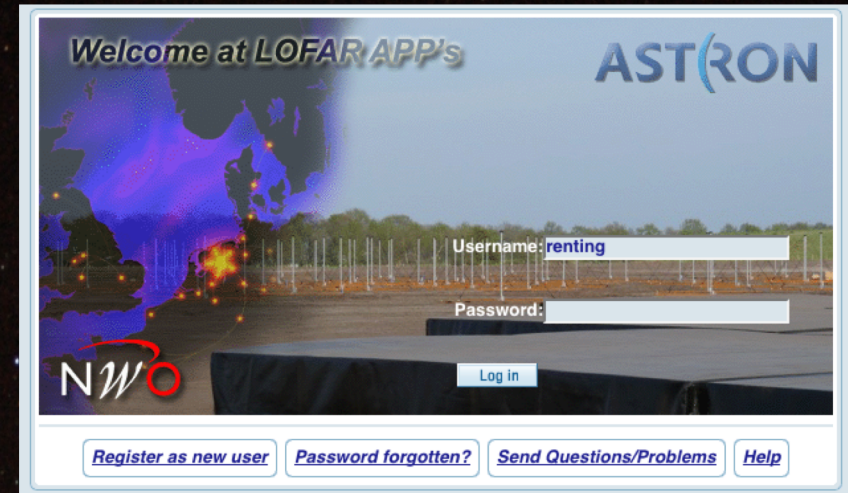
Adriaan Renting, Sander ter Veen
Proposal Workshop
4 June 2018

Northstar Proposal and Review tool

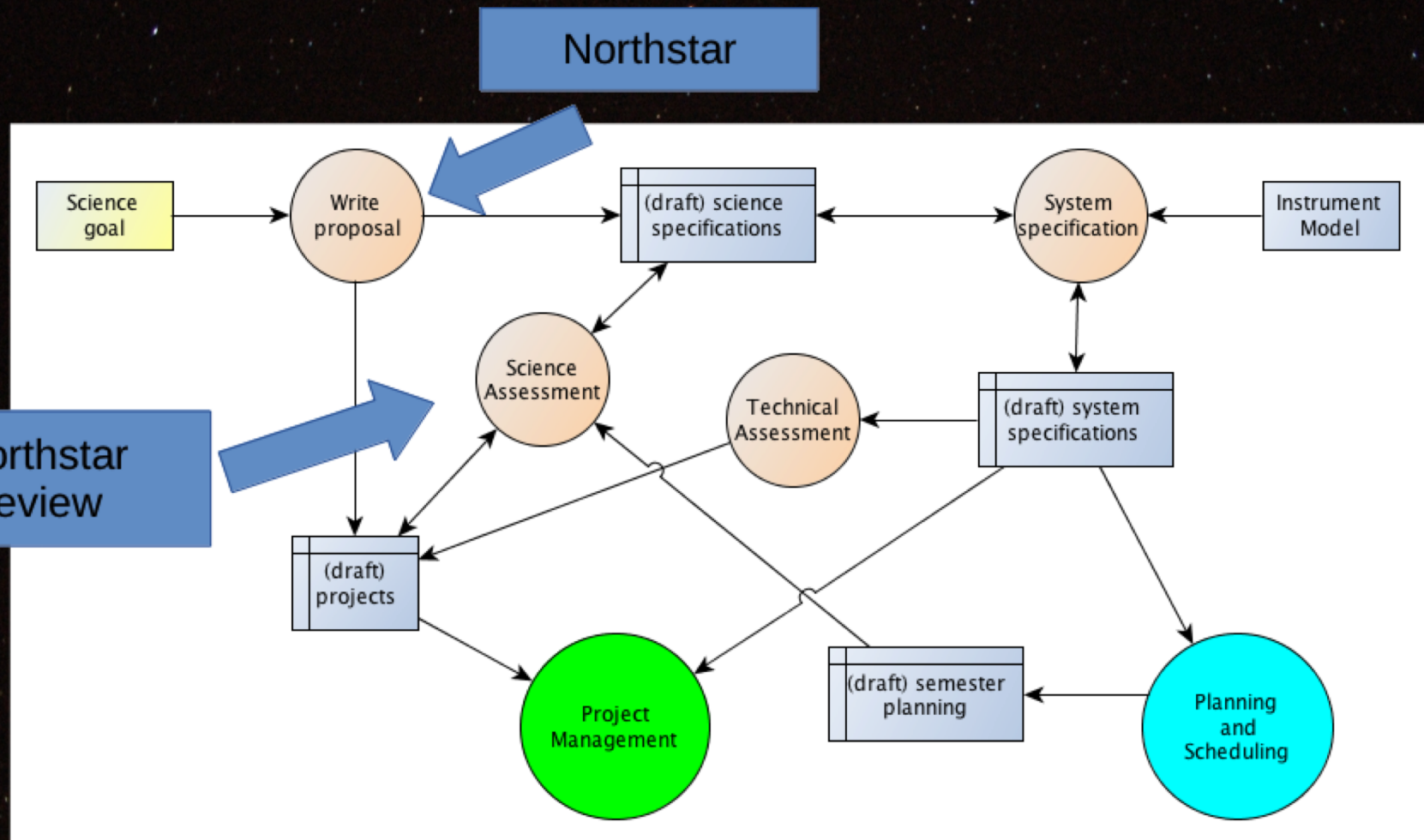
- Designed and built in 2004-2005
- First operational in spring 2005
- Java/Hibernate/Swing/MySQL/SAAS technology
- Multiple installs, e.g.
 - ASTRON (LOFAR, *WSRT*), JIVE/EVN, (e-)MERLIN, Effelsberg, Onsala, OHP, Yebes, ASTRO-OPTICON (22), *WHT/INT, JCMT, UKIRT*
- Separate application to support review process
- Output of PDF and XML files for Project Management
- Application is outdated and becoming hard to maintain
- Current process not fully supported, requiring manual steps



- Shared single sign-on for users
- Non-registered and registered users (2500+)
- Contact author needs to be registered
- Science justification for proposal
- List of observing targets
- Partial observation and pipeline specification
 - Simplified instrument model
- Mostly forms, partly free text input, PDF submission
- Close interaction with observatory webpages describing instrument capabilities
- Supporting applications (Exposure/Storage Calculator)
- Technical Panel does technical review together with Science and Operational Support group
- Program Committee does Science Review and allocation



Proposal process model



LOFAR introduction



LOFAR

ASTRON

International LOFAR Telescope

7 countries

51 Stations

107,712 Antennas

Opened 12 June 2010

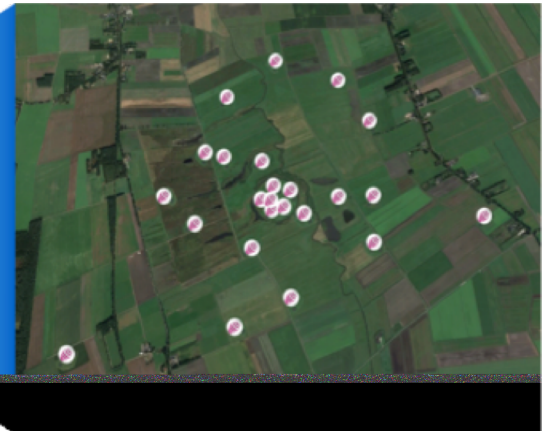
Fully operational 2012



Europe



Netherlands



Core

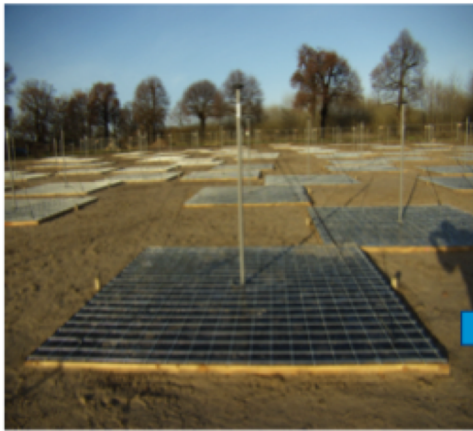
LOFAR introduction



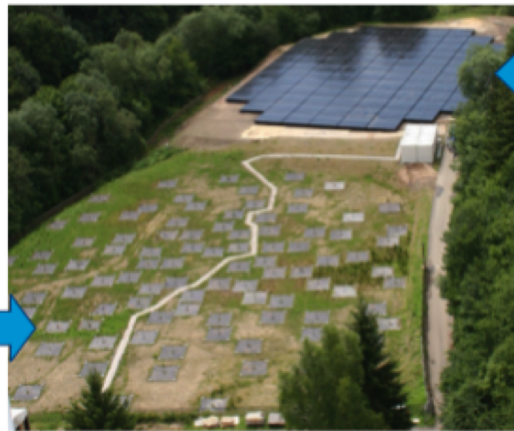
LOFAR

ASTRON

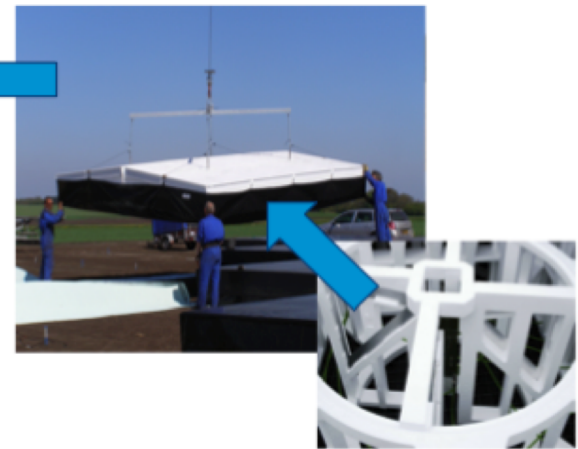
Low Band Antennas 10-90 MHz, 96 per station
High Band Antennas 110-250 MHz, up to 96 tiles of 16



LBA



Station



HBA

20 Tbit/s raw data rate
225 Gbit/s real time data stream to central processing
92 TFLOP real time processing
96 TFLOP and 3.6 PB offline processing and storage
2 Gbit/s to Long Term Archive, total 34 PB stored



Three main modes:

- Interferometry: high spatial resolution
- Tied Array: high time resolution
- Transient Buffer: short response time, full resolution, limited time window

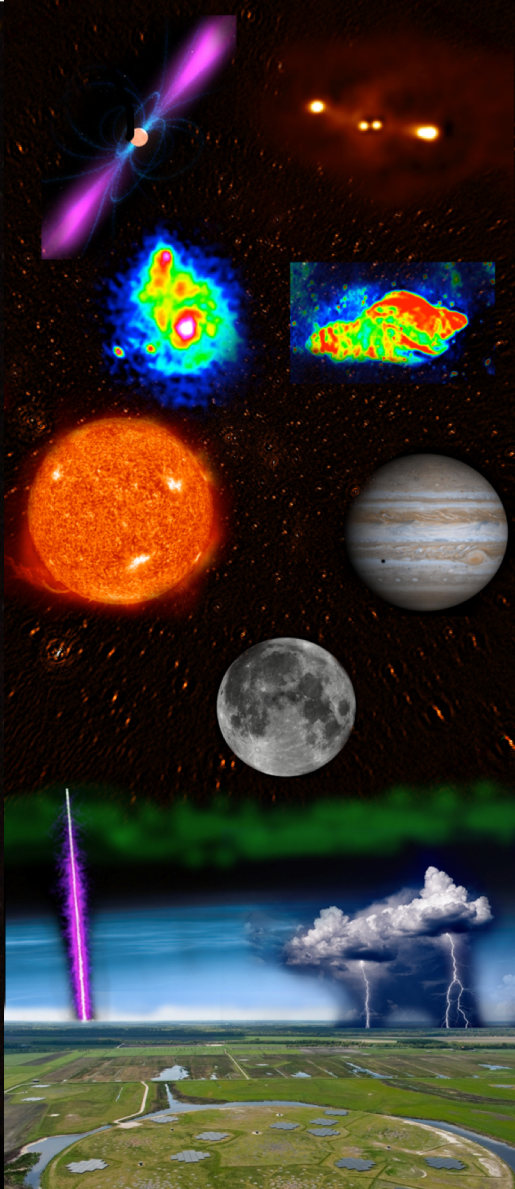
Mode	Time	Spatial	Spectral	Sensitivity (1s)
Interferometer	0.5s	0.13 arcsec	610 Hz	2.5 mJy
Tied Array	5 μ s	2 arcmin	610 Hz	51 mJy
Transient Buffer	5 ns	1m/20m	1 Hz	10^{17} eV

- 400+ beams on the sky
- Response time in seconds
- 76 MHz bandwidth continuous or 192 kHz segments across multiple beams and frequencies



Wide range of science applications

- Low frequency sky surveys
- Epoch of Reionization, cosmology
- Galaxies, AGNs
- Pulsars
- Transients: FRB, Grav. Waves
- Interstellar medium
- The Sun, Moon, (Exo)planets
- Space weather
- Cosmic Rays
- Ionosphere
- Lightning
- Earthquakes
- Etc.



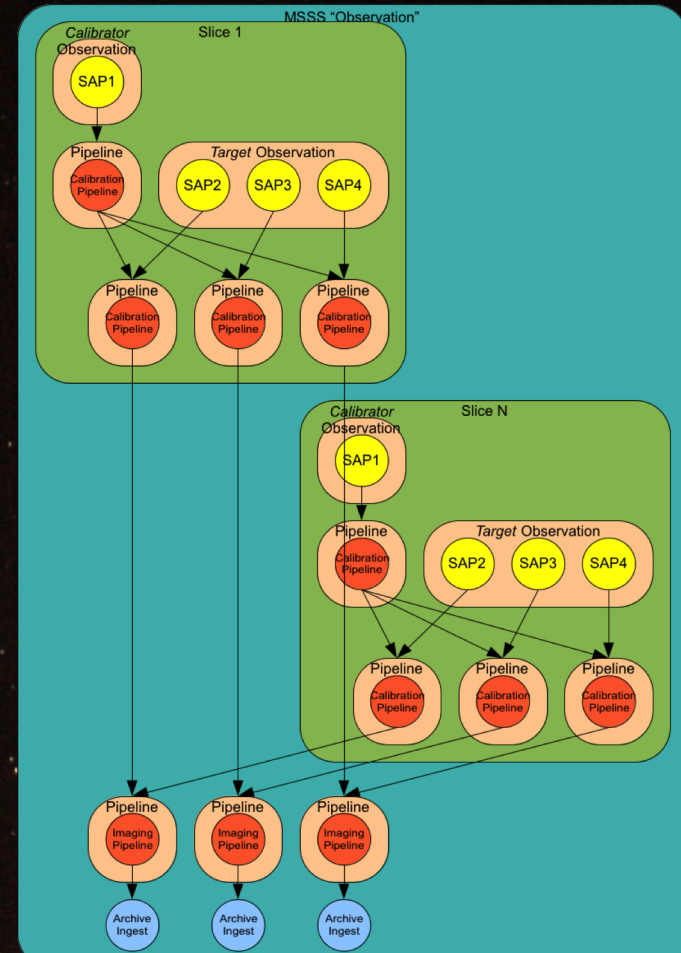
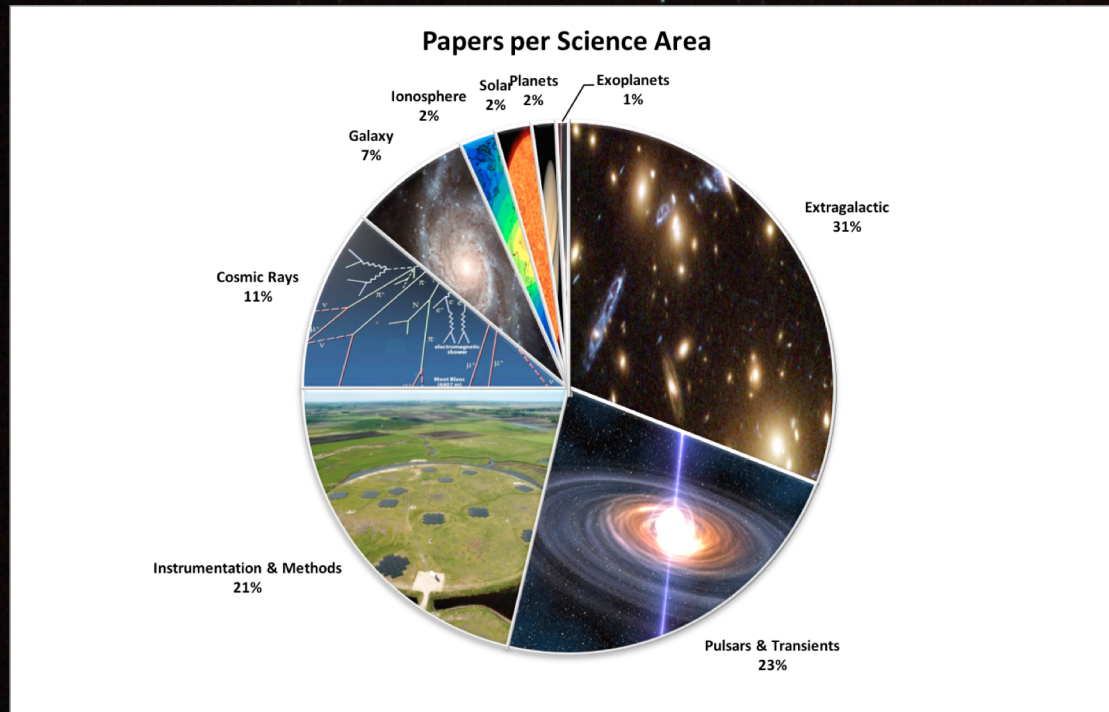
Project complexity



LOFAR

ASTRON

- ± 100 projects/year (2 cycles)
- 10,000 Observations/year
- 25,000 pipelines/year



www.astron.nl/radio-observatory/lofar-science/lofar-papers/lofar-papers

Probable requirements

- Support an evolving instrument model
- Allow for changing allocation policies
- Support both science and technical review
- Incorporate resource allocation
 - Observing Time, Processing Time, Storage
- Interface to scheduling system
- Support for specification templates
- Interface to specification system
- Interface to project management system
- Single Sign-on and support for user federations (e.g. European Open Science Cloud, Shibboleth)
- Multiple telescopes (LOFAR, WSRT)
- Support for out-of-cycle proposal submission (DDT)
- Web based access
- Life deploy of updates

- Shared development has worked for us
 - See also talk by Hanno Holties on Wednesday
 - Slack, GitHub, JIRA, etc.
- Local maintenance
 - Evolving requirements after initial development
 - Fast response times near proposal deadline
- Current development resources too limited for independent development: mostly allocated to upgrading specification and project management systems and LOFAR 2.0 projects
- ASTRON preferred languages: Python, C++, (Java being phased out).
- Preferred Open Source (ASTRON is publicly funded)

Thank you



**Thank you
Vielen Dank**



Questions?



LOFAR

ASTRON

Real time observations of 2015 solar eclipse

ASTRON



International LOFAR Telescope