

<b>14:00 - 14:05</b>	<b>WELCOME</b>	
<b>The LOFAR Radio Observatory: status and future work</b>		
<b>14:05 - 14:25</b>	R. F. Pizzo	<i>LOFAR Observatory Overview and feedback from 3rd LOFAR Users Meeting</i>
<b>14:25 - 14:40</b>	M. <u>Brentjens</u>	<i>The LOFAR Technical Working Group</i>
<b>14:40 - 14:55</b>	J. <u>Annyas</u>	<i>LOFAR Development Roadmap</i>
<b>14:55 - 15:10</b>	E. <u>Orru'</u>	<i>The Calibration and Imaging Tiger Team 2</i>
<b>15:10 - 15:25</b>	R. C. <u>Vermeulen</u>	<i>Using LOFAR now, soon, and later</i>
<b>15:25 - 15:55</b>	<b>Coffee Break</b>	
<b>Users experience &amp; feedback</b>		
<b>15:55 - 16:05</b>	A. <u>Bonafede</u>	<i>The LOFAR Users Committee: update activities and feedback</i>
<b>16:05 - 18:30</b>	<i>Discussion between Users and RO: Users experience (proposals, observations, data reduction, ...)</i>	



# LOFAR OVERVIEW AND FEEDBACK FROM 3<sup>rd</sup> LOFAR USERS MEETING

R. F. Pizzo

# ARRAY STATUS

# International LOFAR Telescope (ILT)



- 50 operational stations completed
- 38 NL stations, 12 international stations
- 1 new station in Ireland (IE613) – completion in 2017
- 1 new station funded in Latvia (completion by end 2019)

Chilbolton

Dutch stations

Norderstedt

LOFAR Core (NL)

Potsdam

Baldy

Jülich

Borówiec

Effelsberg

Tautenburg

Łazy



Nançay



Unterweilenbach



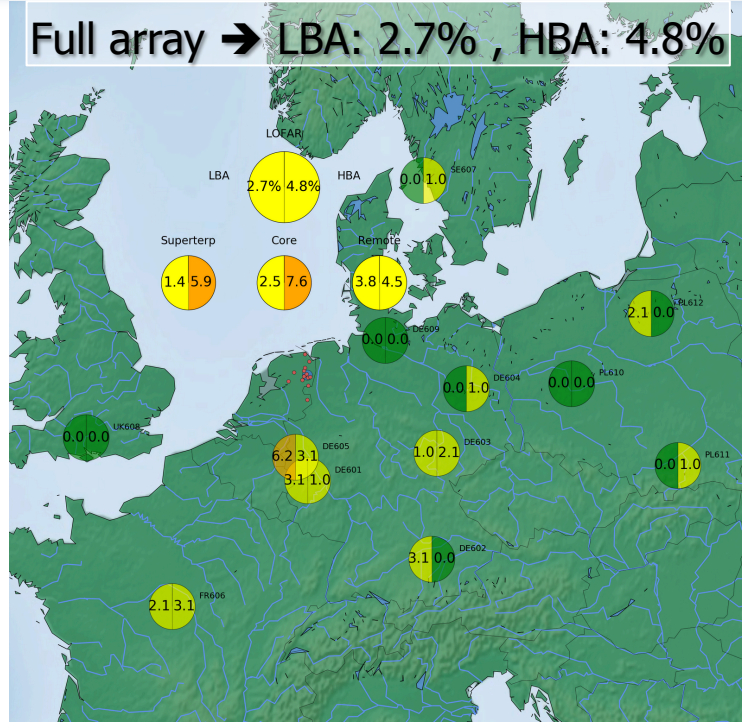
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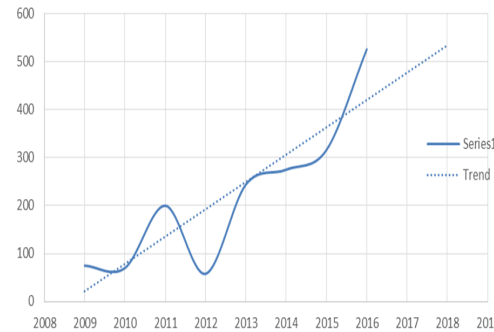
# SYSTEM HEALTH



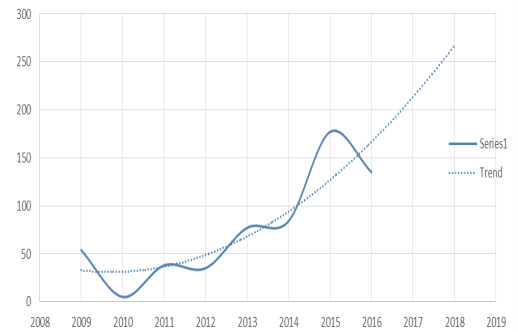
Full array → LBA: 2.7% , HBA: 4.8%



HBA-FE replaced



Trend Rejected LBA antennas



All operational  
 < 5% not operational  
 < 15% not operational  
 > 15% not operational

- Current status available at [https://proxy.lofar.eu/array\\_status/](https://proxy.lofar.eu/array_status/)
- Maintenance season ended in October – 1200 HBA and 200 LBA repair actions performed.

# STATION CALIBRATION



Station	LBA Sparse Even <sup>a</sup>	LBA Sparse Odd <sup>a</sup>	LBA Outer <sup>a</sup>	LBA Inner	HBA Low	HBA Mid	HBA High
CS001	20-04-17	21-03-17	07-04-17	21-09-15	19-02-15	23-12-15	11-02-15
CS002	20-04-17	21-03-17	07-04-17	21-09-15	11-02-14	23-12-15	24-02-15
CS003	20-04-17	21-03-17	07-04-17	21-09-15	11-02-14	23-12-15	24-02-15
CS004	20-04-17	21-03-17	07-04-17	21-09-15	11-02-14	23-12-15	19-02-15
CS005	20-04-17	21-03-17	07-04-17	21-09-15	11-02-14	23-12-15	19-02-15
CS006	20-04-17	21-03-17	07-04-17	13-07-15	11-02-14	21-01-16	19-05-14
CS007	20-04-17	21-03-17	07-04-17	21-09-15	11-02-14	23-12-15	24-02-15
CS011	20-04-17	21-03-17	07-04-17	21-09-15	19-02-15	23-12-15	24-02-15
CS013	20-04-17	21-03-17	07-04-17	21-09-15	19-02-15	23-12-15	19-02-15
CS017	20-04-17	21-03-17	07-04-17	13-07-15	19-02-15	23-12-15	24-02-15
CS021	20-04-17	21-03-17	19-05-16	05-09-14	19-02-15	13-01-16	19-02-15
CS024	20-04-17	21-03-17	07-04-17	21-09-15	19-02-15	23-12-15	19-05-14
CS026	20-04-17	21-03-17	07-04-17	21-09-15	19-02-15	23-12-15	19-02-15
CS028	20-04-17	21-03-17	07-04-17	21-09-15	19-02-15	23-12-15	24-02-15
CS030	20-04-17	21-03-17	07-04-17	21-09-15	19-02-15	23-12-15	19-02-15
CS031	20-04-17	21-03-17	19-05-16	05-08-14	19-02-15	23-12-15	24-02-15
CS032	20-04-17	21-03-17	07-04-17	13-07-15	19-02-15	23-12-15	24-02-15
CS101	20-04-17	21-03-17	07-04-17	21-09-15	19-02-15	23-12-15	24-02-15
CS103	20-04-17	21-03-17	07-04-17	21-09-15	19-02-15	23-12-15	24-02-15
CS201	20-04-17	21-03-17	07-04-17	21-09-15	19-02-15	23-12-15	19-02-15
CS301	20-04-17	21-03-17	07-04-17	21-09-15	19-02-15	23-12-15	24-02-15
CS302	20-04-17	21-03-17	07-04-17	21-09-15	19-02-15	23-12-15	19-02-15
CS401	20-04-17	21-03-17	07-04-17	27-06-12	19-02-15	23-12-15	24-02-15
CS501	20-04-17	21-03-17	07-04-17	21-09-15	19-02-15	23-12-15	24-02-15
RS106	20-04-17	21-03-17	07-04-17	21-09-15	20-12-16	01-05-17	20-12-16
RS205	20-04-17	21-03-17	07-04-17	21-09-15	20-12-16	01-05-17	20-12-16
RS208	20-04-17	21-03-17	07-04-17	22-07-14	20-12-16	01-05-17	04-11-15
RS210	20-04-17	21-03-17	07-04-17	21-09-15	04-11-15	01-05-17	20-12-16
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RS307	20-04-17	21-03-17	07-04-17	21-09-15	20-12-16	01-05-17	20-12-16
RS310	20-04-17	21-03-17	07-04-17	21-09-15	20-12-16	01-05-17	21-01-16
RS406	20-04-17	21-03-17	07-04-17	21-09-15	20-12-16	01-05-17	20-12-16
RS407	20-04-17	21-03-17	07-04-17	21-09-15	20-12-16	01-05-17	20-12-16
RS409	20-04-17	21-03-17	07-04-17	21-09-15	20-12-16	01-05-17	20-12-16
RS503	20-04-17	21-03-17	07-04-17	21-09-15	20-12-16	01-05-17	20-12-16
RS508	20-04-17	21-03-17	07-04-17	21-09-15	20-12-16	01-05-17	20-12-16
RS509	20-04-17	21-03-17	07-04-17	21-09-15	20-12-16	01-05-17	20-12-16
DE601				01-05-17	20-12-16	01-05-17	20-12-16
DE602				01-05-17	20-12-16	01-05-17	20-12-16
DE603				01-05-17	20-12-16	01-05-17	20-12-16
DE604				01-05-17	20-12-16	01-05-17	20-12-16
DE605				13-07-15	20-12-16	01-05-17	20-12-16
FR606				01-05-17	20-12-16	01-05-17	20-12-16
SE607				01-05-17	20-11-16	01-05-17	20-12-16
UK608				01-05-17	20-12-16	01-05-17	20-12-16
DE609				01-05-17	20-12-16	01-05-17	20-12-16
PL610				20-12-16	01-05-17	20-12-16	
PL611				01-05-17	20-12-16	01-05-17	03-02-16
PL612				01-05-17	20-12-16	01-05-17	20-12-16

- Current status
  - <http://astron.nl/radio-observatory/astronomers/current-status>
- Contact points: (M. van der Wiel+ observers)
- Significant progress made since last year meeting:
  - regular updates
  - tables LBA sparse being finalized
- Station calibration still competing with Cycle operations
- New station calibration method to be finalized: **Holography**.
  - It will be worked on from October (S. ter Veen)
  - It will make both data collection, handling and reduction (much) easier!

# **ACHIEVEMENTS AND ISSUES**

# MAIN OPERATIONAL ACHIEVEMENTS...SO FAR

ASTRON

- Completed the 8<sup>th</sup> operational Cycle
- 15000 hours successfully observed in support to 260 projects
- Replaced two operational clusters and a correlator (CEP4 replaced CEP2 in Dec 2016)
- Grown the array with more stations, hardware and capabilities
- Ingested > 28 PB (!) of data in the Long-term archive (visibilities, images and BF data) - yearly growth 7 PB/year. Largest astronomical data collection to date.
- Supported an ever growing community: 550+ people
- Brought the instrument closer to our users:
  - 60 Busy Weeks
  - LOFAR Schools (200+ participants)

## Current Radio Astronomy Archives



4<sup>TH</sup> LOFAR School (5-9 Sept 2016)

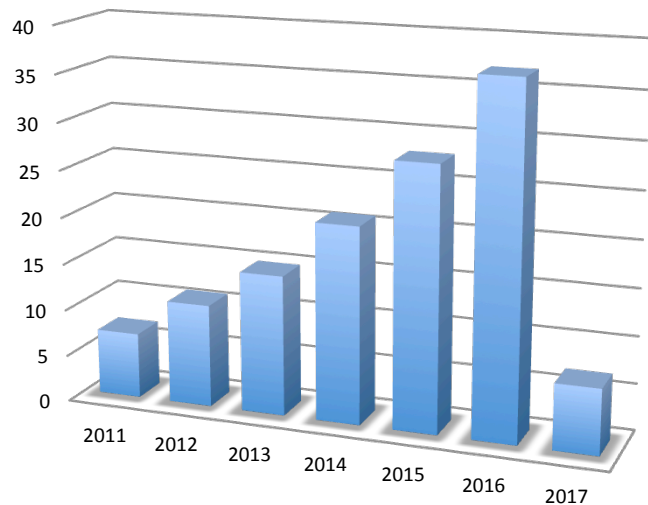




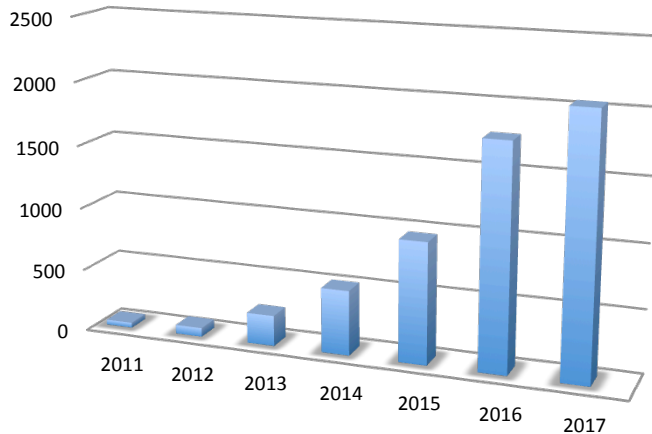
# LOFAR SCIENCE OUTPUT



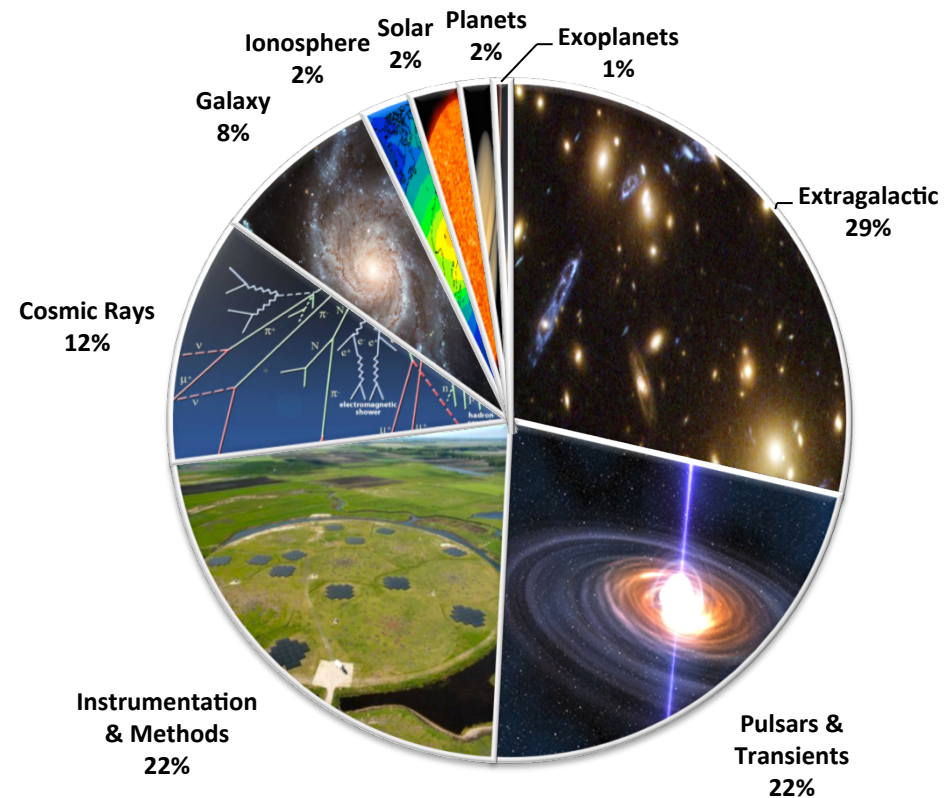
Number of refereed LOFAR papers per year (till April 2017)



Cumulative number of citations (till April 2017)



Papers per Science Area



- 126 refereed
- 87 unique first authors
- 555 unique authors

# MAIN OPERATIONAL ISSUES



- I. **Ingest system instability**-> long ingest queue -> CEP2 full
- II. **CEP2 was end of life** -> now replaced with CEP4
- III. CEP4 commissioning **demanded significant resources** -> observing delays
- IV. CEP4 data losses – still causes failures to various BF observations
- V. Data quality monitoring relies on insufficient tools
- VI. Preparing and supporting Cycle, DDT, and commissioning observations still remain **very manual procedures**, which put a **significant burden** on the Science Operations & Support group (and also inevitably lead to human errors). **These routines still await significant automation.**

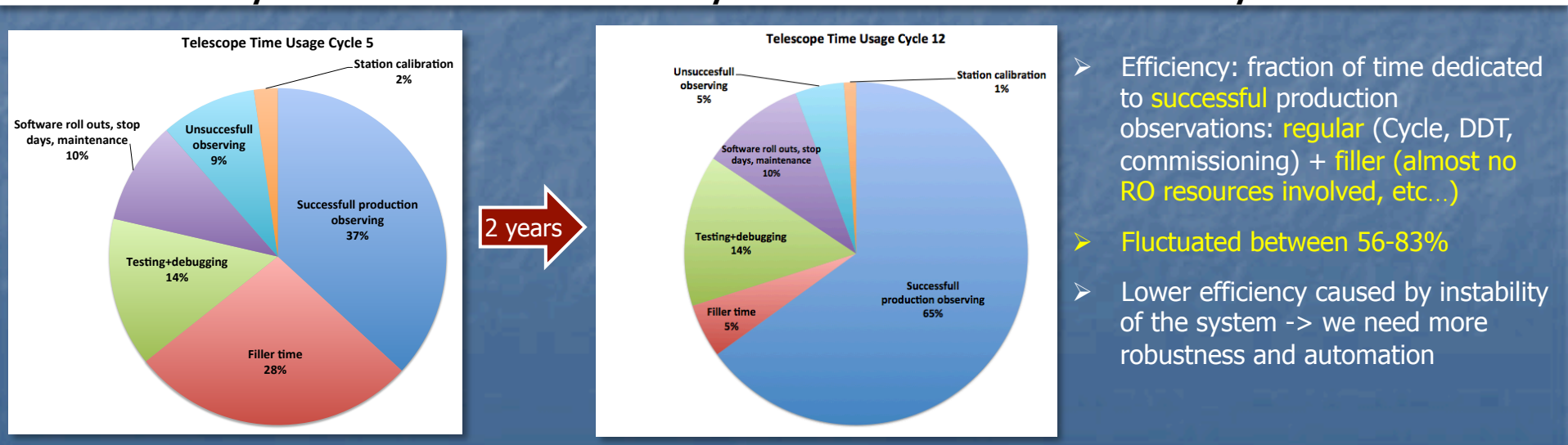
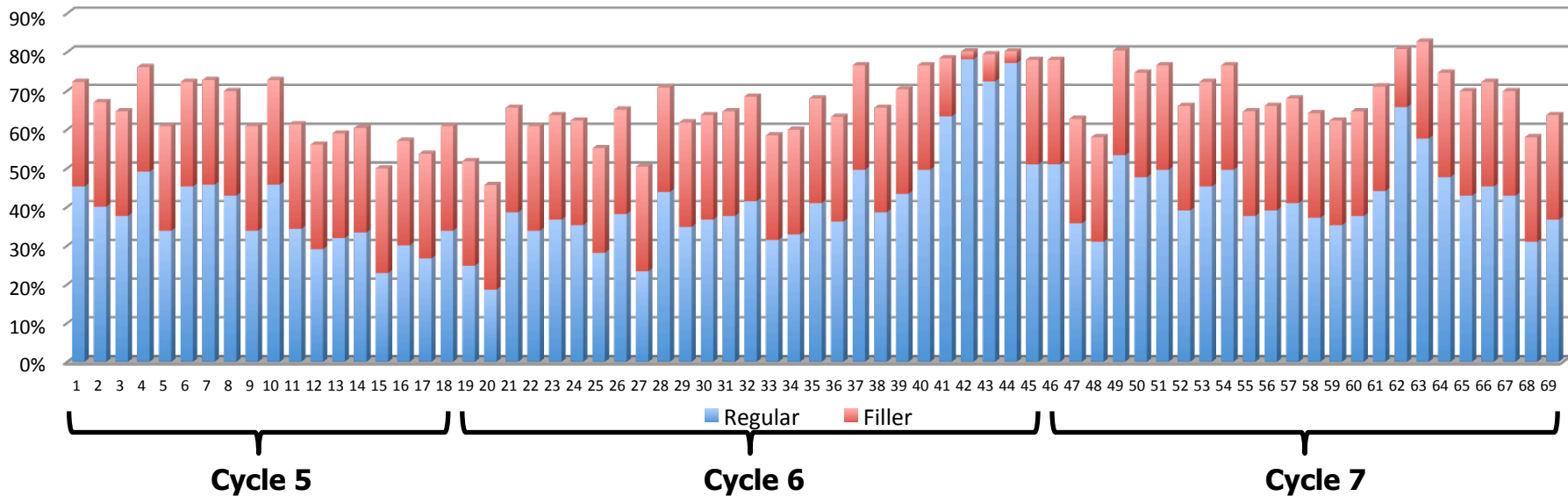
now mitigated



**IMPROVEMENTS IN THESE AREAS WILL DELIVER HIGHER OBSERVING EFFICIENCIES**

# CHALLENGE AHEAD: IMPROVE LOFAR OBSERVING EFFICIENCY

LOFAR Observing Efficiency 2016 - 2017



- Efficiency: fraction of time dedicated to **successful** production observations: **regular** (Cycle, DDT, commissioning) + **filler** (almost no RO resources involved, etc...)
- **Fluctuated between 56-83%**
- Lower efficiency caused by instability of the system -> we need more robustness and automation

# **SCIENCE OPERATIONS**

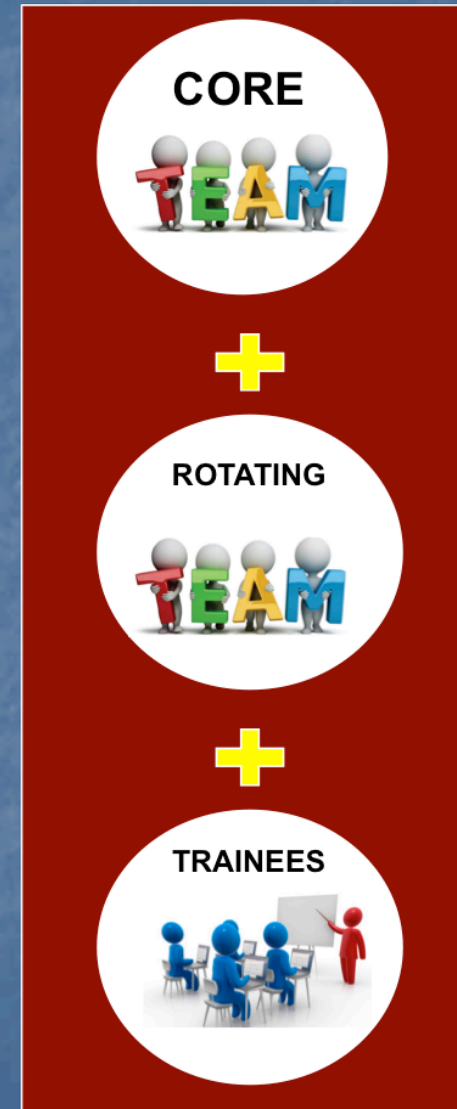
# SCIENCE OPERATIONS – NEW GROUP STRUCTURE



LOFAR

ASTRON

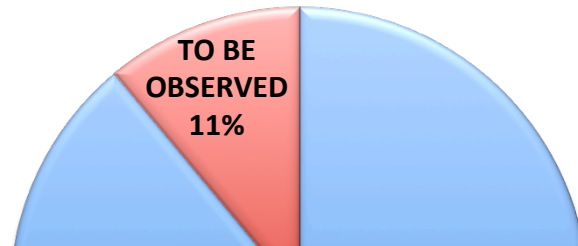
- Group name: **Science Operations & Support -> SOS**
- Address: **sos@astron.nl**
- Group with 3 components:
  - **'Core team'** – 4 FTE's: permanent – ensure continuity to LOFAR Science Operations
  - **rotating component:** 4 FTE's – temporary
  - **trainees** (1-2 per year; sharing knowledge about how to operate a massive array)



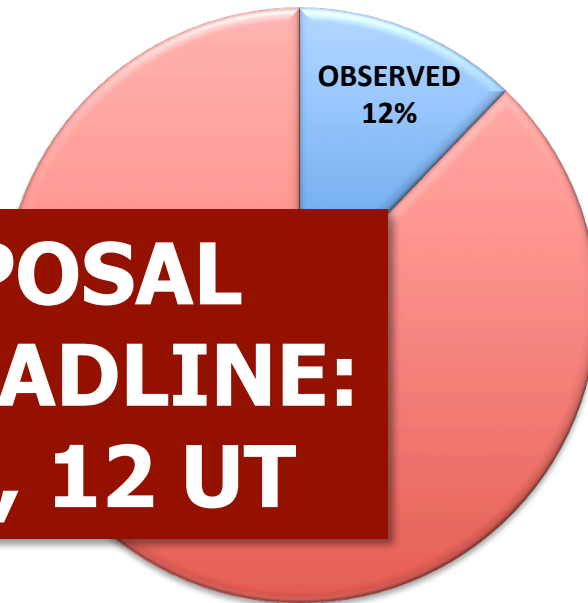
# CYCLE 7 & 8 OBSERVING PROGRAMS



STATUS CYCLE 7

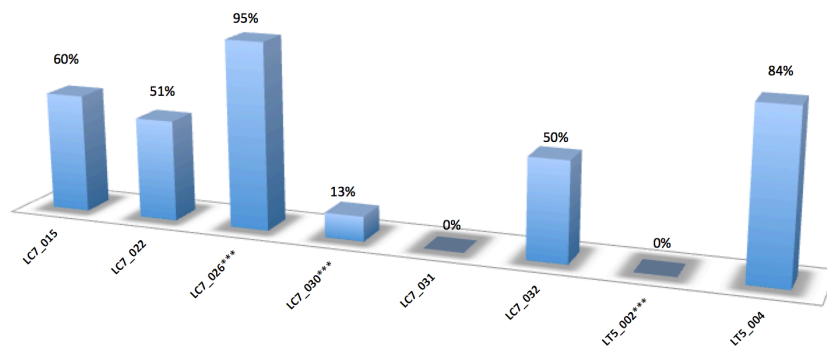


STATUS CYCLE 8

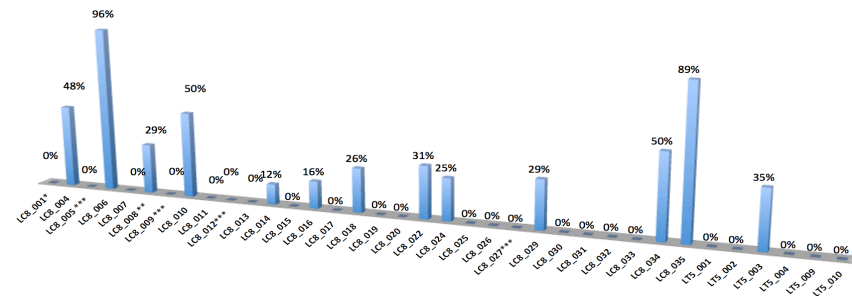


**CYCLE 9 PROPOSAL  
SUBMISSION DEADLINE:  
13 SEPTEMBER, 12 UT**

Status of active Cycle 7 projects



Status of active Cycle 8 projects




# EXPLOITING LTA PROCESSING RESOURCES




- Goal: make LTA processing resources available to users under a LOFAR umbrella allocation
- Since June 2016, RO is engaged in a discussion with SARA & its expert users. More recently Juelich and Poznan also involved.
- Current status: it is possible to access SARA without the need for GRID certificate to **perform pre-processing**
- Next step:
  - make pre-factor available in the LTA
  - Explore processing resources at Juelich and Poznan




Netherlands Institute for Radio Astronomy
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( THE DWINGELOO )

CODE OF CONDUCT

( SUMMER STUDENT )

PROGRAMME

( WISE PROGRAMME )

**radio\_observatory**

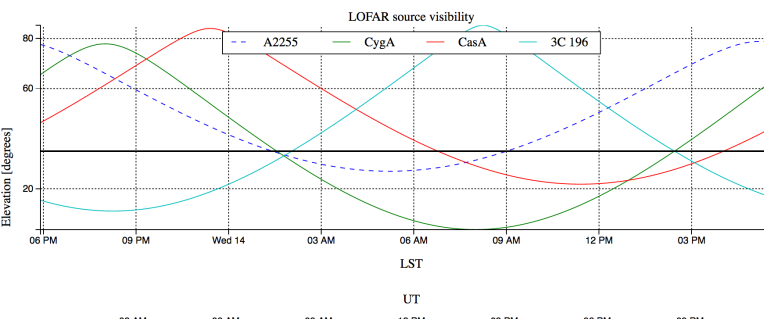
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**Development**

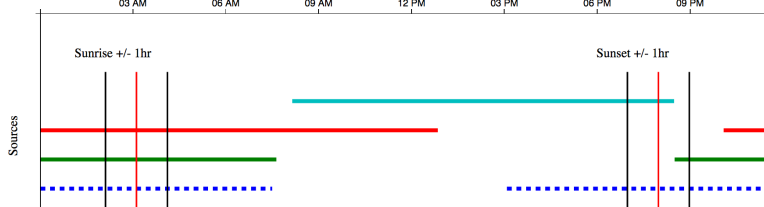
- [Devel settings](#)

<b>Target</b>	A2255	<input type="button" value="Resolve"/>	<b>A team:</b>	<b>Solar system:</b>	<b>LOFAR calibrators:</b>	<input type="button" value="Calculate"/>
<b>RA</b>	17:12:31.04	[hh:mm:ss.s]	Cyg A <input checked="" type="checkbox"/>	Sun <input type="checkbox"/>	3C 48 <input type="checkbox"/>	
<b>DEC</b>	+64:06:33.2	[dd:mm:ss.s]	Cas A <input checked="" type="checkbox"/>	Jupiter <input type="checkbox"/>	3C 147 <input type="checkbox"/>	
<b>Date</b>	06/13/2017	[mm/dd/yyyy]	Tau A <input type="checkbox"/>	Saturn <input type="checkbox"/>	3C 295 <input type="checkbox"/>	
<b>Min. elevation</b>	35	[deg]	Vir A <input type="checkbox"/>		3C 196 <input checked="" type="checkbox"/>	
					3C 380 <input type="checkbox"/>	

LOFAR source visibility



Sources



The angular distance on the sky (dd:mm:ss.s) between the target and:

- Cyg A: 33:29:09.3
- Cas A: 40:39:00.5
- 3C 196: 62:14:10.0

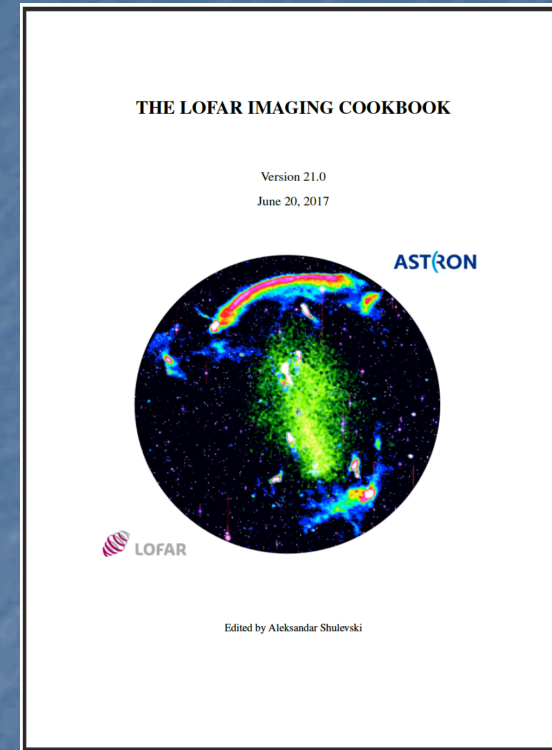
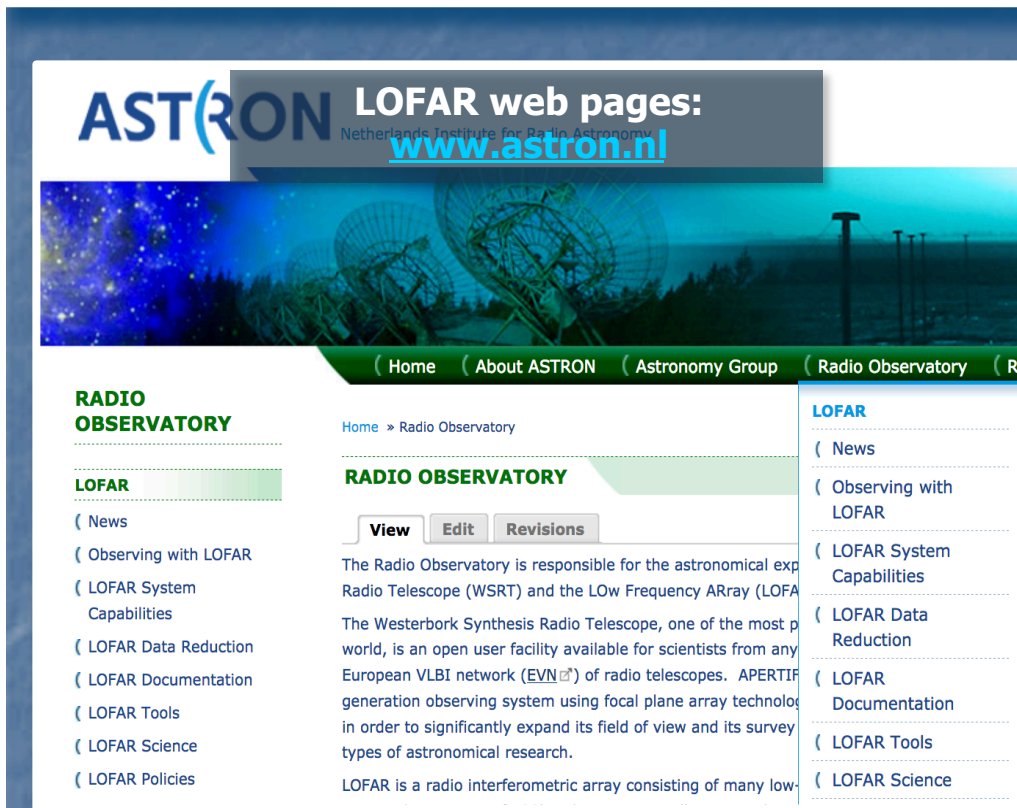
➤ **LOFAR calculators:**

- Computes the visibility of a particular target as seen from the LOFAR super-terp as well as its angular distance from the A-team sources

LOFAR TARGET VISIBILITY CALCULATOR



# DOCUMENTATION



- New structure
- More user-friendly – info is easier to find


- New layout where tutorials take a central stage
- Informative content concerning reduction tools online

# LOFAR SLIDES REPOSITORY



Presentations

Upload presentation



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### General information

The LOFAR Slides Repository represents an important collection of slides on LOFAR technical updates and scientific results presented at various Meetings, Conferences, Workshops, and Schools. These slides give a comprehensive and up to date overview of the status of LOFAR and its scientific output, therefore providing an important source of information to all users who, for example, wish to include it in their presentations for future events.

The ASTRON Radio Observatory maintains this repository. Slides from LOFAR Status Meetings, LOFAR Science Meetings and LOFAR Schools are uploaded by the Science Operations and Support group. We solicit all members of the LOFAR community to also submit the LOFAR slides that they present at conferences and meetings, so to keep the repository complete and up to date and to contribute to the dissemination of LOFAR results. To submit your contribution, please use the appropriate upload section.

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### Available LOFAR presentations


Search in **ALL** fields:

	Summary slides	General users slides	Status Meeting	Science Meeting	User Meeting	School
2009	0	0	6	0	0	0
2010	0	0	76	0	0	0
2011	0	0	51	32	0	0
2012	0	0	98	0	0	0
2013	0	0	102	33	0	0
2014	0	0	89	42	10	29
2015	1	0	77	40	12	0
2016	1	0	64	47	16	22
2017	2	0	29	0	0	0

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Please upload your presentation by using the form below. Only pdf files are accepted.

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Date of presentation:

Title of presentation:

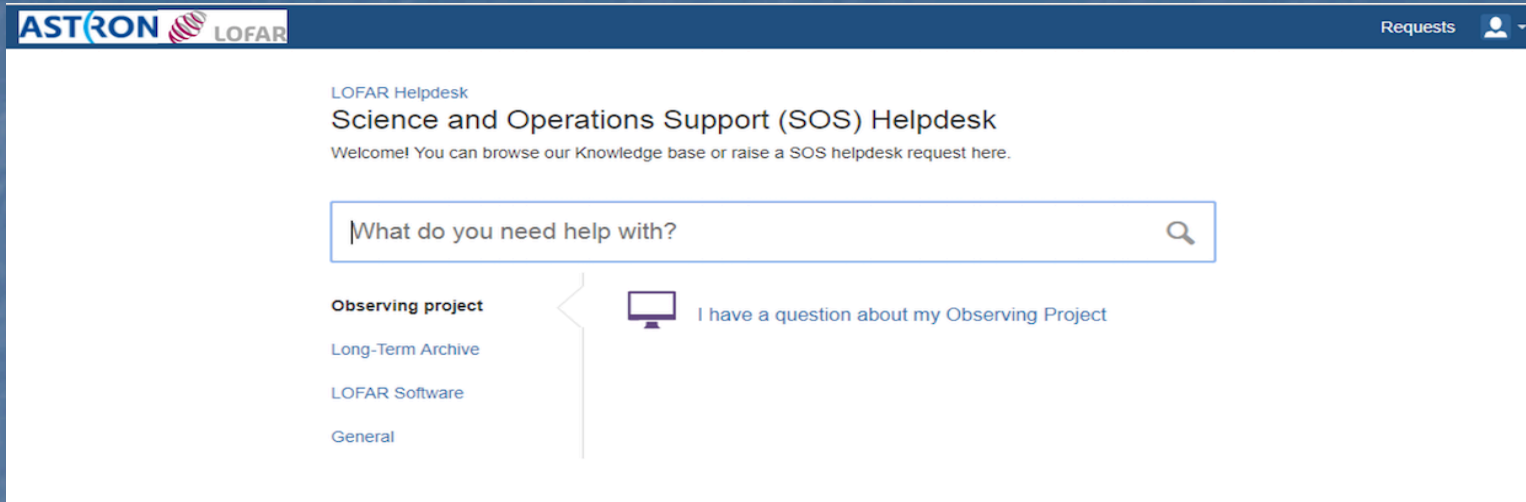
Name Meeting/Workshop/Conference:


Are these summary slides?  Yes  No

Your presentation (pdf-format)  No file selected. *(only one dot (.) in name)*


I'm not a robot

- **Unique repository** for LOFAR slides from LSM's, Schools, LOFAR Science & Users Meetings
- Repository of **user's slides** about LOFAR science




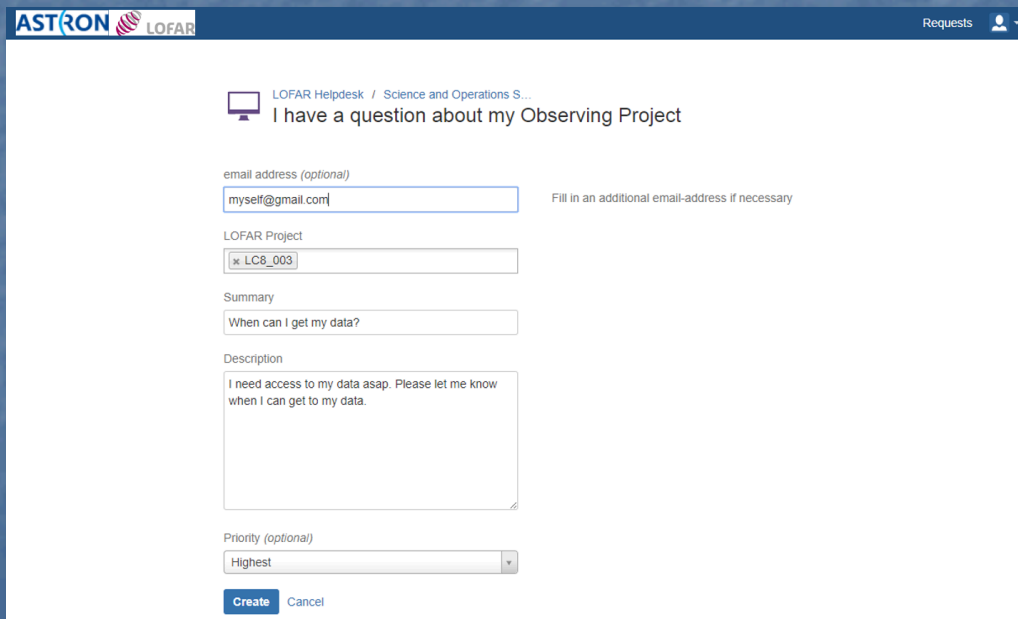
ASTRON LOFAR Requests 


LOFAR Helpdesk  
**Science and Operations Support (SOS) Helpdesk**  
 Welcome! You can browse our Knowledge base or raise a SOS helpdesk request here.



- Observing project**
- Long-Term Archive
- LOFAR Software
- General

 I have a question about my Observing Project



ASTRON LOFAR Requests 

LOFAR Helpdesk / Science and Operations S...  
**I have a question about my Observing Project**

email address (optional)  
 Fill in an additional email-address if necessary

LOFAR Project

Summary

Description

Priority (optional)

- Issue tracking system
- Main **communication channel** between users and Radio Observatory
- **Helpdesk** for user support
- FAQ & documentation

**FEEDBACK FROM 3<sup>RD</sup>  
LOFAR USERS MEETING**

## LOFAR RADIO OBSERVATORY FEEDBACK TO THE LOFAR USERS COMMITTEE REPORT

The Radio Observatory thanks the LOFAR Users Committee for the report which provides a very important summary of the current state of development and procedures from a LOFAR user's perspective.

In this document, feedback to each of the points raised by the Users Committee is given in italics below.

In some cases, we make explicit requests for further work.

### 1. Software requirements

#### Top priorities

- a. LUC: Obtain an accurate beam model for the current configuration.

*RO: A project to address this requirement is currently in progress. R&D have a new antenna engine under development but a full resolution is expected in 2017.*

*See also point 6b.*

- b. LUC: Implement frequency de-aliasing so that the user can add together a large number of channels.

*The requested functionality has been implemented and is now currently used in the calibration software.*

- c. LUC: (i) Make the LOFAR software more user-friendly by changing the CEP3 reservation system to optimize usage. For example, allowing users to reserve a fixed block of time.

*RO:*

- (i) *People have succeeded in using the current computing facilities.*

## RADIO OBSERVATORY FEEDBACK TO THE LUC INTERMEDIATE REPORT

R. Pizzo, J. Annyas, M. Drost  
15-03-17

The Radio Observatory has internally discussed the points raised by the LUC in their intermediate report, received on 21 February 2017. The answers to those points are reported in boldface below. We have numbered all points. We ask the LUC to please do the same in future reports, as this will make it easier to directly reference to them.

### Part 1

1. The LUC express its concern for the many points that have been raised by the LUC in the first report, confirmed as crucial by the RO, but that are still pending because of lack of man power. The LUC sees as a priority that the staff at RO working on LOFAR documentation and software development is reinforced.

**RO: This is acknowledged by the ASTRON MT; the RO has the permission to increase the manpower in the department. Specifically:**

- **Science Operations & Support (SOS) will build a core of permanent positions and the group's size will increase by 1 FTE;**
- **the Software Support group increased with 3 FTE in 2016 and will at least grow with another 2 FTE in 2017;**
- **Operations & Maintenance will increase with 1 FTE in 2017.**

Training of the new employees is ongoing and will continue throughout 2017. We expect to see the first changes around summer 2017.





**A special note about SOS:** the aforementioned restructuring of the group is primarily meant to answer the long-standing needs to (i) have better continuity in Science Operations through a core-team of permanent people and (ii) increase the amount of science time for the group members (previously was only 20%), allowing them to have better career perspectives after their appointment at ASTRON. While the restructure of the group does not answer directly the need to have better documentation, it is expected that the improvement of the system robustness, reliability, and automation through a reinforced Software Support group will gradually allow a better-shaped SOS to invest more of his resources in documentation.

- LUC reports in May 2016 and Jan 2017, followed by RO reactions
- Feedback on 'common user' experiences, needs, and desires
- It should assist in synthesizing conclusions from the Users meetings

# FROM 3<sup>RD</sup> LOFAR USERS MEETING – SYSTEM ENHANCEMENTS






<p>Responsive Telescope</p>		<p>By Oct. 2017; see <a href="#">J. Annyas'</a> talk</p>
<p>Make <a href="#">TBB mode</a> operational</p>		<p>Will follow responsive telescope</p>
<p>Commissioning of Tied Array mode for <a href="#">total power spectroscopy</a></p>		<p>See <a href="#">M. Brentjens'</a> talk</p>

# FROM 3<sup>RD</sup> LOFAR USERS MEETING – PROPOSING, OBSERVING, PROCESSING

<p><b>NorthStar</b> improvements (tutorials added, bugs solved)</p>		<p>Improved User's experience during submissions</p>
<p>Change <b>CEP3</b> reservation and access procedure</p>		<p>Reservation now 8 weeks and CPU hours allocation will be enabled in near future</p>
<p>Better <b>models</b> for element and station beams</p>		<p>Analysis by R&amp;D in progress – see <b>M. Brentjens' talk</b></p>
<p><b>Installation LOFAR software</b> at external computing facilities</p>		<p>Did not get high priority</p>

# FROM 3<sup>RD</sup> LOFAR USERS MEETING – LTA



Scripts to <b>interact</b> with LTA		For searching the LTA and get status staging
Improve <b>download speeds</b> from LTA		Slow speed were related to firewall at SARA
<b>Automatic notifications</b> about completed ingest jobs		Very close to completion
Ease of access and searchability of LTA		<b>LTA survey done</b> – list of improvements awaits implementation
<b>User Ingest</b>		<b>ST1 user ingest</b> in final phase of completion. General user ingest mechanism will follow



**THANKS !**