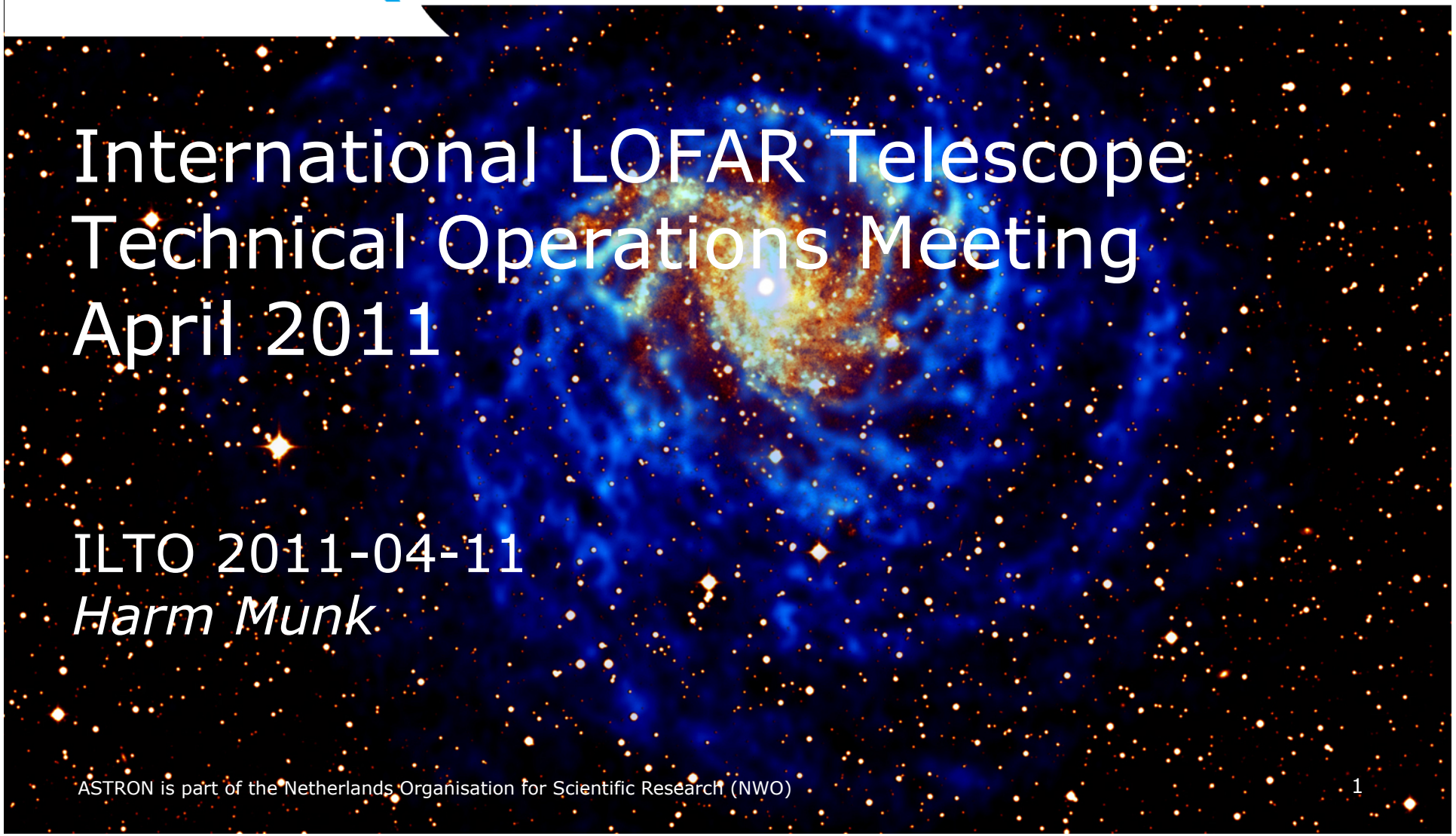
ASTRON

Netherlands Institute for Radio Astronomy



# International LOFAR Telescope Technical Operations Meeting April 2011

ILTO 2011-04-11

*Harm Munk*

# Agenda

- Monday, April 11
  - 12:30 - 13:30 Lunch
  - 13:30 – 15:00 Meeting
  - 15:00 – 15:30 Coffee break
  - 15:30 – 16:00 Visit control room (ROCR)
  - 16:00 – 17:30 Meeting
  - 18:30 – .. : ..Dinner at Hotel Wesseling

# Agenda

- Tuesday, April 12
  - 09:30 – 10:00 explanation of L/HBA repairs workshop
  - 10:00 – 11:30 workshop
  - 11:30 – 12:30 Wrap up
  - 12:30 – 13:30 Lunch, end of meeting

# Introduction

- Participants

| | |
|---|---|
| Benedetta Ciardi | Garching/Unterweilenbach, DE (EVO) |
| Leif Helldner | Onsala, SE |
| Tobia Carozzi | Onsala, SE |
| Meike Jahn | Jülich, DE |
| Enno Middelberg | Jülich, DE |
| Mathias Hoeft | Tautenburg, DE (EVO) |
| Derek Mckay-Bukowski | Chilbolton, UK (EVO) |
| Christian Vocks | Potsdam, DE |
| Andreas Horneffer | Effelsberg, DE |
| James Anderson | Effelsberg, DE |
| Masaya Kuniyoshi | Effelsberg, DE |
| Antonis Polatidis (head supp. sci.) | ASTRON, NL |
| Menno Norden (sys. eng.) | ASTRON, NL |
| Teun Grit (sys. & nw admin) | ASTRON, NL |
| Harm Munk (head TO) | ASTRON, NL |
| Henri Meulman (hw engineer) | ASTRON, NL |
| Corina Vogt (LOFAR coordination) | ASTRON, NL |

# Introduction

## Open meeting

- Discus operations structure and processes for the International LOFAR Telescope (ILT)
  - Maintain an operational ILT from
    - 9 owners owning 44 stations
    - connected through a network run by ~10 providers
    - data processed at the CIT (Centre for Information Technology) of the Groningen University
    - data stored in Amsterdam, Groningen, and Jülich

    coordinated by ASTRON's Radio Observatory
  - Maintain the ILT components
- Discuss station construction and maintenance, exchange experience

# Topics

- Developments last year
- Organisation
- Station maintenance
- Station operation
- Organisation and information exchange

# Developments

- Stations built last year
  - Dutch
    - 4 extra core stations: CS011, 013, 028, 031
    - 2 planned remote stations: RS406, 508
  - International
    - DE603 HBA
    - DE604 HBA
    - DE605 HBA (LBA to be build)
    - FR606
    - UK608

# Developments

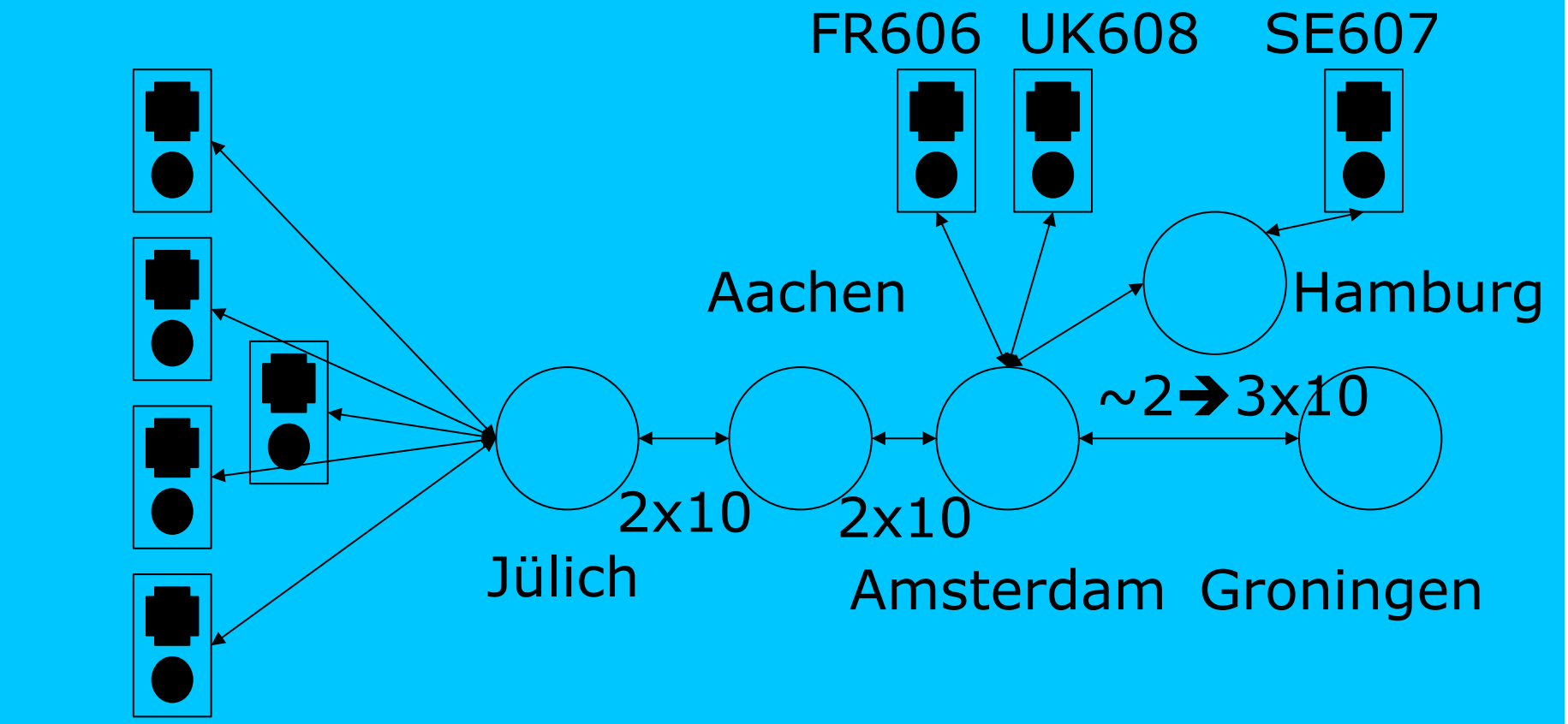
- Network
  - All but two NL stations connected: RS508, 509
  - DE604, DE605 no CEP connection
- Issues

# Developments

- Stations to be built
  - Dutch
    - Seven remote stations to be build
  - International
    - SE607 Onsala
    - DE60? Bielefelt?
    - PL61?
    - IR61?
- Network
  - Two extra 10 Gb/s lines Amsterdam Groningen
  - One extra 10 Gb/s line Aachen Amsterdam

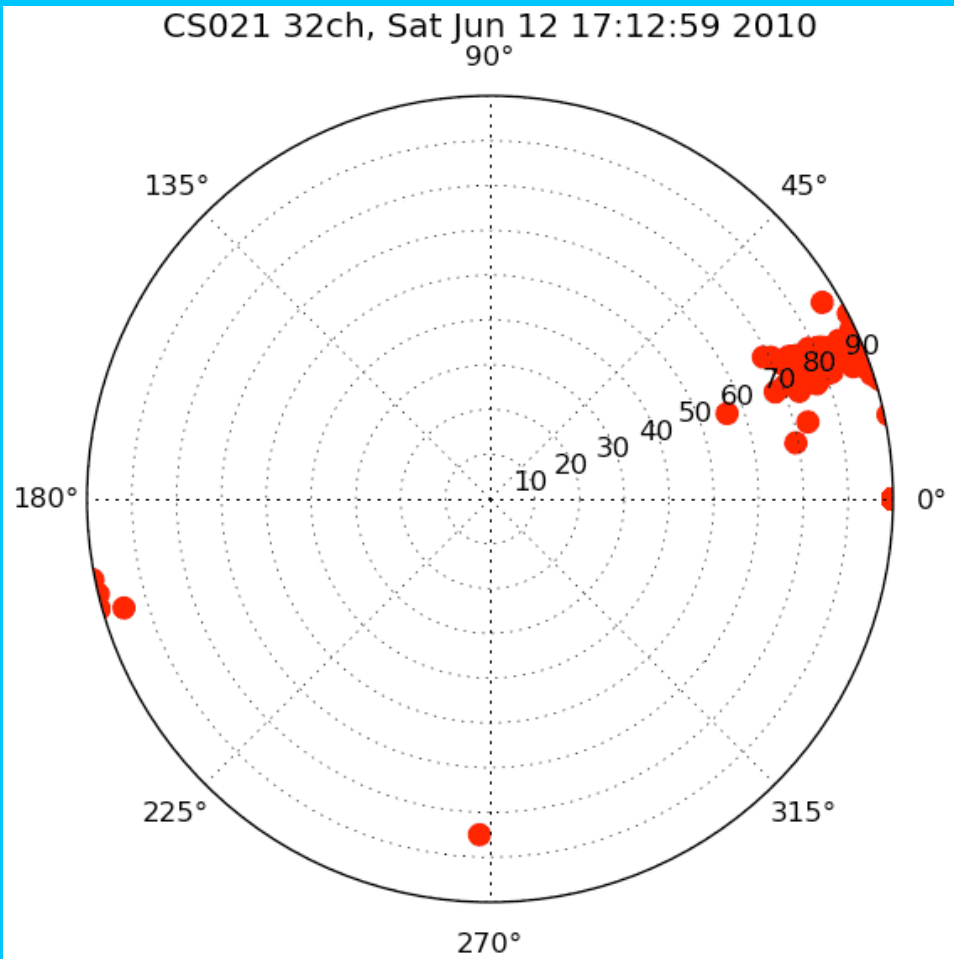
# Developments

- Simplified Network topology



# June 12, 2011

# June 12, 2011


CS021 32ch, Sat Jun 12 17:12:59 2010
90°
135°
45°
180°
0°
225°
315°
270°
10
20
30
40
50
60
70
80
90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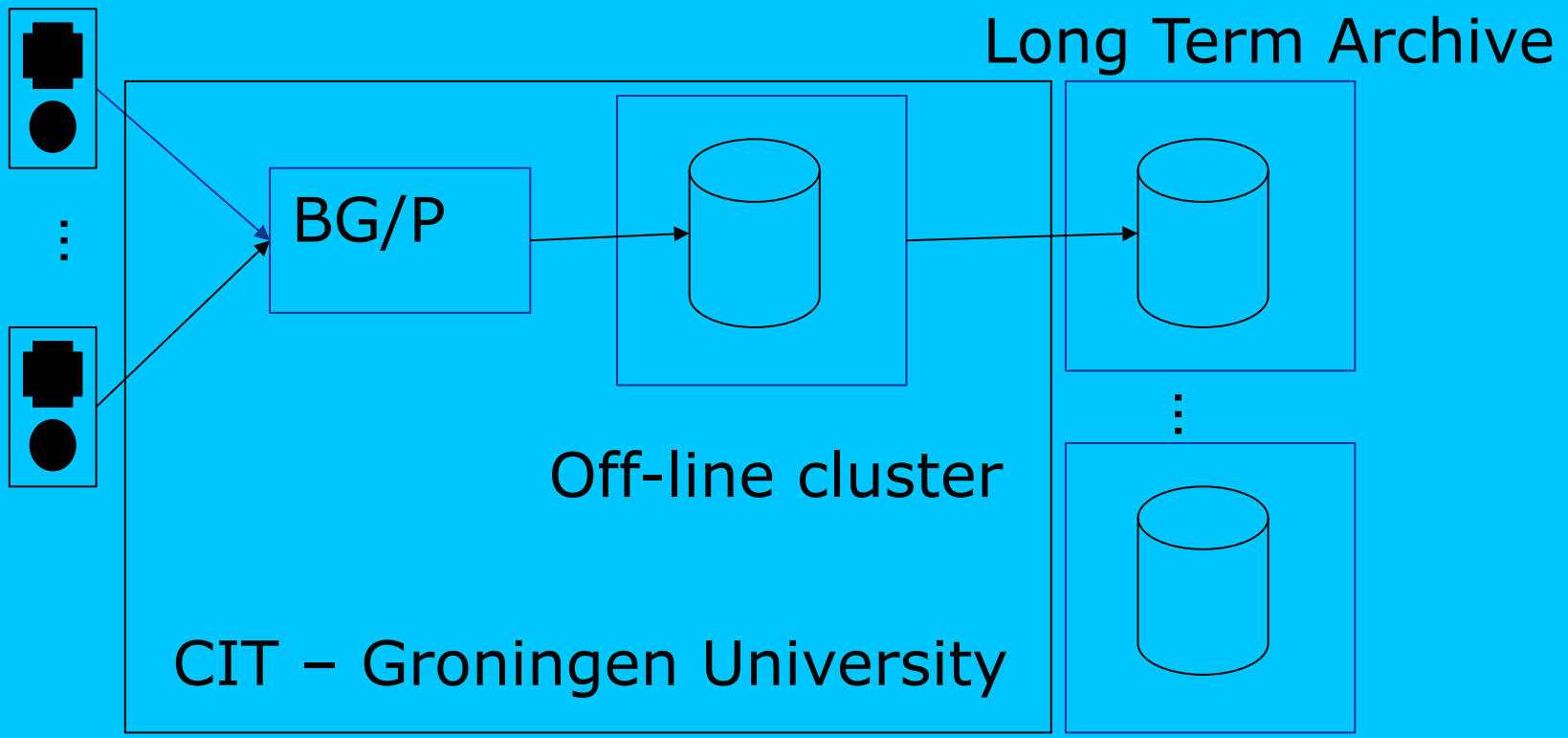
# Developments: CEP, LTA

## Simplified Central Processing setup (CEP)



# Developments: CEP

- CEP off-line cluster
  - CEP I off-line cluster
    - 24 storage node, 480 TB total
    - 72 compute nodes, 5 TFLOPS total
  - CEP II off-line cluster
    - 100 storage+compute nodes, 2 PB, 20 TFLOPS total
    - Production: expected availability April 15
  - CEP I restructuring
    - Staging area for Long Term Archive (LTA)
    - SW development

# Developments: LTA, misc.

Long Term Archive (Sky ≠ Archive)

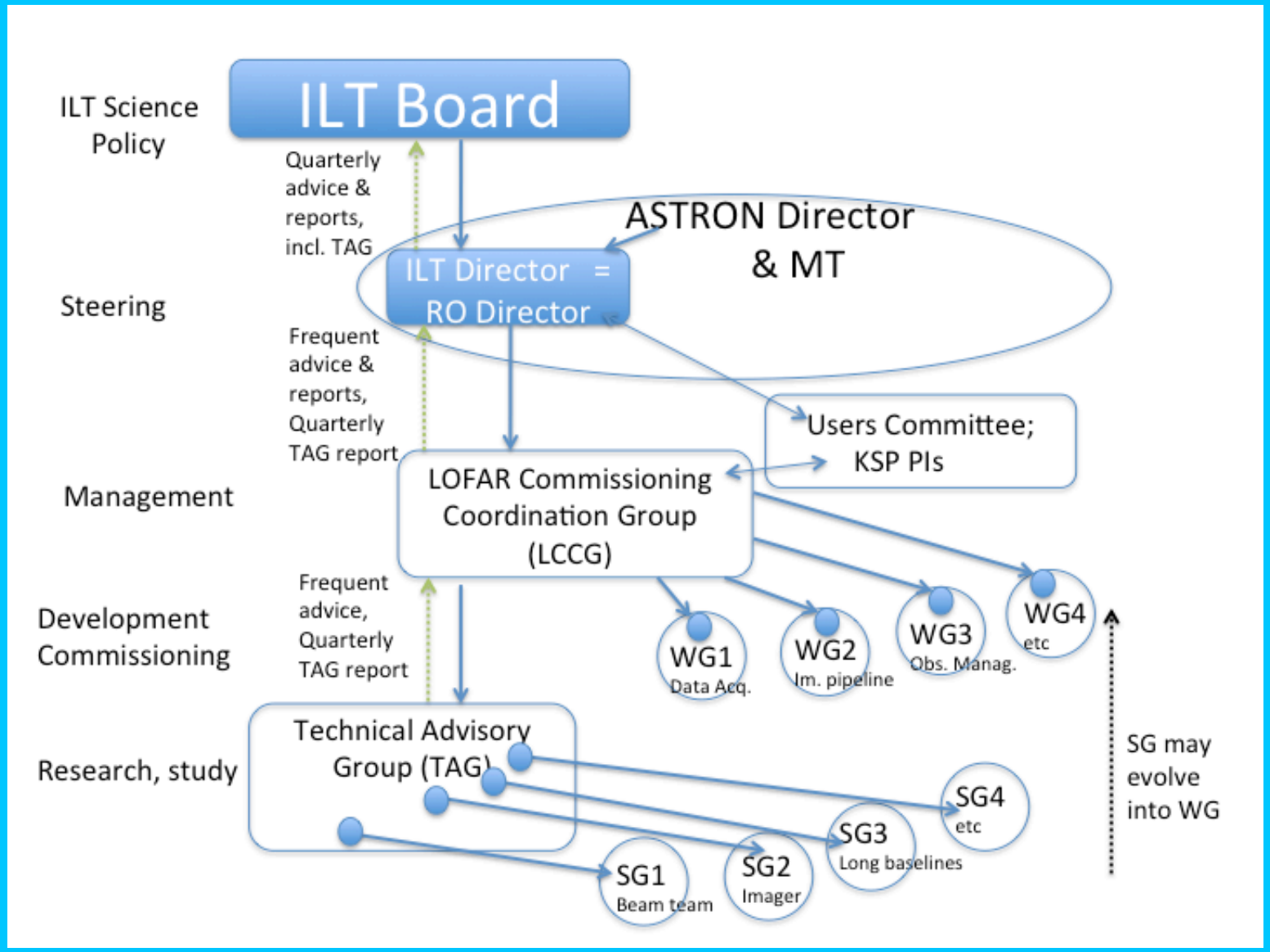
- Three sites:
  - Amsterdam (SARA: BiG Grid): 0.3/1 PB
  - Groningen (TarGet project): 1/3 PB
  - Jülich: 0.5/1 PB
- Storage and pipeline processing

- Superterp single clock
  - Plans to put all core stations on a single clock

# Organisation

- ILT
  - Partners
    - NL, DE, SE, UK, ASTRON
    - LOFAR CV (partnership with managing and silent partners)

# Organisation



# Organisation

LOFAR

ASTRON

## LOFAR Commissioning Coordination Group

Charter: day-to-day lead to ensure that in the most expedient way possible, people at ASTRON work together and with others in the community towards the long-term goal of deploying LOFAR as an observatory-style facility, with an optimal range of functionality for long-term scientific productivity

- Michael Wise (ASTRON astronomy department)
- Ronald Nijboer (ASTRON R&D, SW development group)
- Antonis Polatidis (ASTRON Radio Observatory, Science Support group)
- Harm Munk (ASTRON Radio Observatory, Technical Operations group)

# LCCG Groups

- Working Groups
  - SWIIT, OBMAN, DAC, DAQU, SYSTA, DAFO, COMUS
  - COSMICRAY, PULSAR, IMAGING, TRANSIENTS, MAGNETISM
- Study Groups
  - Polarization, Global Bandpass, Major Cycle, Ionosphere, Tied array beamforming, Long term clock, Beam Team, A-team removal, Imaging, Imager Roadmap, Sky models, Long Baselines, Cosmic Rays, Fire fighting, Solar, Transients

# Organisation: LOFAR station representatives

- Station representatives
  - organisational, day-to-day operations, technical support
- Day-to-day operations:
  - ILT TO page on LOFAR Wiki:
    http://www.lofar.org/operations/doku.php

# Organisation

| | Station | Fin. & Org. | Operations | Support |
|---|---|---|---|---|
| DE | Effelsberg | M. Kramer | James Anderson | |
| | Garching/ Unterweilenbach | | Benedetta Ciardi | |
| | Tautenburg | A. Hatzes | Mathias Hoeft | |
| | Potsdam | | | |
| | Jülich | | Meike Jahn | Enno Middelberg |
| FR | Nancay | | Jean-Mathias Griesmeier | Ivan Thomas |
| SE | Onsala | | Leif Heldner | Henrik Olofsson |
| UK | Chilbolton | | Derek McKay | Alan Doo |
| NL | Dutch stations | R. Vermeulen | H. Munk | ROCR |

# Station Maintenance

- Station maintenance NL
  - LBA damage
    - Small deer; rodents
    - Downed LBAs detectable through station test
    - Surprisingly immune to lightning (so far)

# Station Maintenance

- Station maintenance NL
  - HBA damage
    - Birds: damaged covers
    - Rodents: rubbers
    - Mice (occasionally)
    - Climatic effects
      - Moisture
      - High winds, in combination with low temperatures
  - Cable damage
  - Gras, weeds, etc

# Station Maintenance

- Outsourcing routine station maintenance and repair
  - 4 visits / station / year
  - 2 people: expert + technician
- In house specialised station trouble shooting and repair
  - Difficult problems, cause analysis
- Extra, quick inspection after adverse weather conditions:
  - High winds
  - Heavy precipitation
  - Low temperatures

# Station Maintenance

- International stations
  - Effelsberg
  - Tautenburg
  - Garching/Unterweilenbach
  - Potsdam
  - Jülich
  - Nancay
  - Onsala
  - Chilbolton

# Station Maintenance

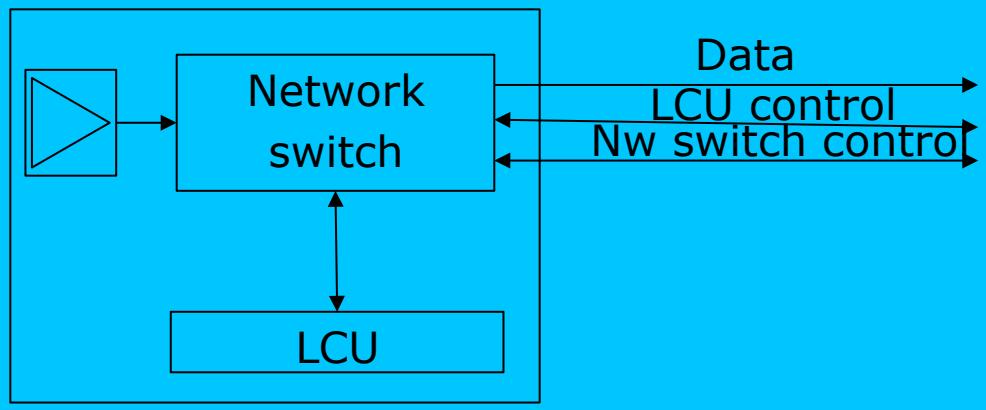
- International Stations
  - Airconditioning unit: local maintenance
  - Container RFI cabin check: COMTEST
- Spare parts
  - Four extra stations have depleted spare parts stock
  - New production run: HBA FE quality issue
  - 5% spare parts a.s.a.p.
  - New production run for International stations (Germany, Poland, Ireland): extra spare parts based on experience
- Repairs
  - ASTRON, other ILT partners?

# Station Maintenance

- Warranty
  - On electric/electronic failures
- Station Tests
  - Weekly test, international stations included
    - Waiting for test (pilot) transmitter
    - Results to be available on LOFAR web (already in ROCR for Dutch stations): http://lcs023.control.lofar/stationstatus/startup.html
- The LOFAR handbook
  - Document or Wiki?

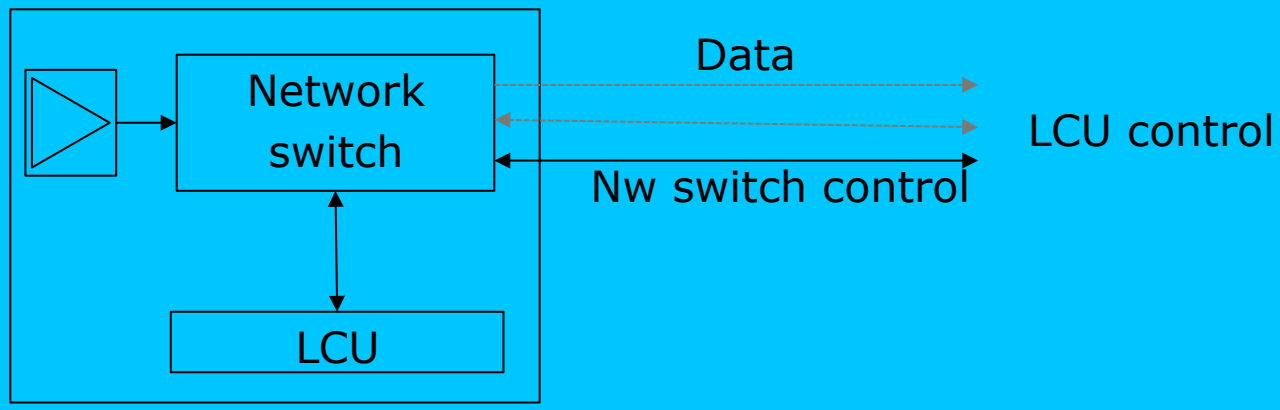
# Station Operation

- Observing : Maintenance = 90% : 10%
  - ILT mode : stand alone mode = 90% : 10% of 90%
    - Boils down to **9%** of time in stand alone mode
- Switching between stand alone and ILT mode



# Station Operation

- Observing : Maintenance = 90% : 10%
  - ILT mode : stand alone mode = 90% : 10% of 90%
    - Boils down to **9%** of time in stand alone mode
- Switching between stand alone and ILT mode: change in nw switch configuration



# Station Operation

- Switching to stand alone mode
  - LCU loses connection with CEP hosted nw control
- Switching to ILT mode
  - LCU kick starts: destroys local settings
    - Saved before kick start
  - Requires several hours for GPS-Rb clock synchronisation
- Switching is rather invasive: always send request by email to lofar-observer@astron.nl

# Station Operation

- Regular observations: end of September 2011 (MS[3])
- Scheduling stand alone mode
  - Control is always given away, never taken away
  - Stand alone mode preferably for all international stations at the same time
  - Extra time available during special observation not requiring international stations: not part of “9%”
- LOFAR observing schedule
  - On ASTRON website
  - ROCR white board:
    http://www.lofar.org/operations/doku.php

# Station Operation

- Monitoring
  - Container internal condition
    - Temperature
    - Humidity
    - Power supplies (48V)
    - Subrack fan’s
  - Available on LCU
  - Application under development
- Alarm functions; people to inform, phone numbers/email addresses on LOFAR Wiki

# Station Operation

- 62/61 beamlets
  - RSP Firmware problem: not understood
- Network
  - Bandwidth limitations
    - 8 int. station = 3 x 8 = 24 Gb/s
      - DE: 5 x 3 = 15 GB/s, 3 Gb/s eVLBI: no room
      - SE: 1 x 3 = 3 Gb/s, 3 Gb/s eVLBI: room for one
    - 30 Gb/s = 30 / 3 = 10 int. stations
    - Or use < 61 beamlets

# Organisation, meetings

- Telco's
  - Station managers
    - monthly, preceding CEP stop day: 1st in week April 25-29
    - CEP stopdays: 1st Monday of the month
  - Weekly on observation schedule
    - From July
- Wiki
  - LOFAR Wiki: ROCR whiteboard
  - LOFAR Handbook
- Email exploders