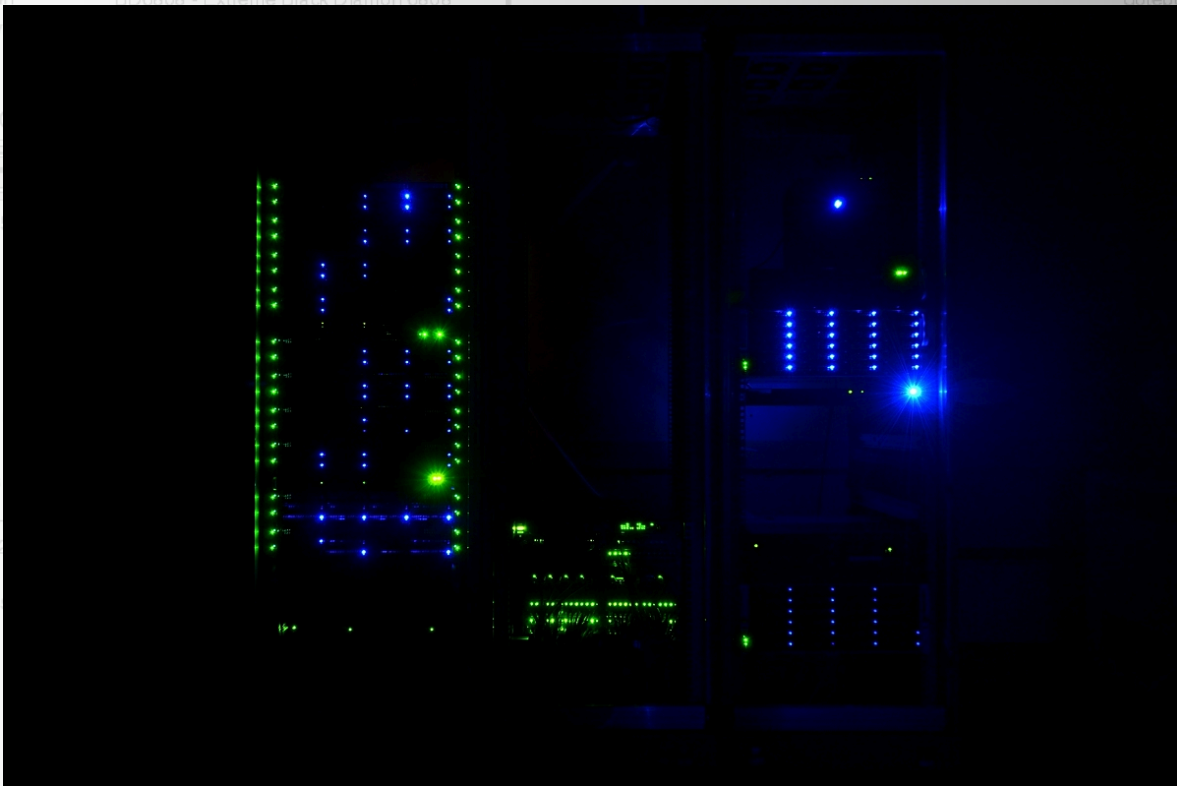
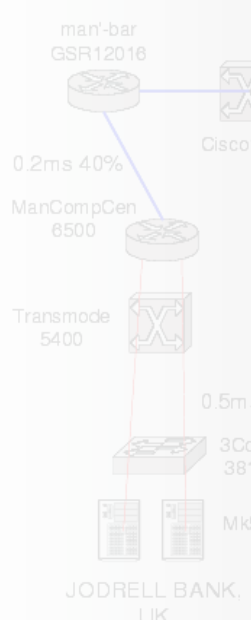


Routes across GEANT

# Technical Operations and R&D at JIVE

RTT & % load	Equipment
— STM-64 (10Gbps)	15218 - Cisco 15218 EDFA
— STM-16 (2.5Gbps)	15252 - Cisco 15252 DWDM
— Gigabit Ethernet	M160 - Juniper M160
— Unknown	T840 - Juniper T840
	1214XX - Cisco GSR 12400 series
	BD8808 - Extreme Black Diamond 8808

% load is approx daily high



Arpad Szomoru

# What do we do?

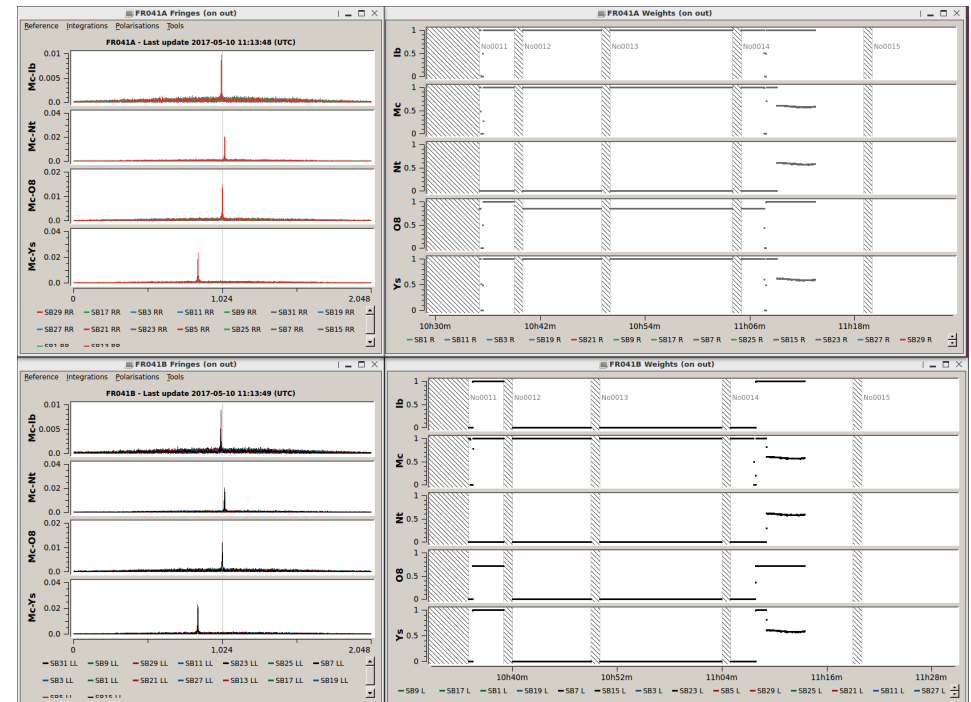
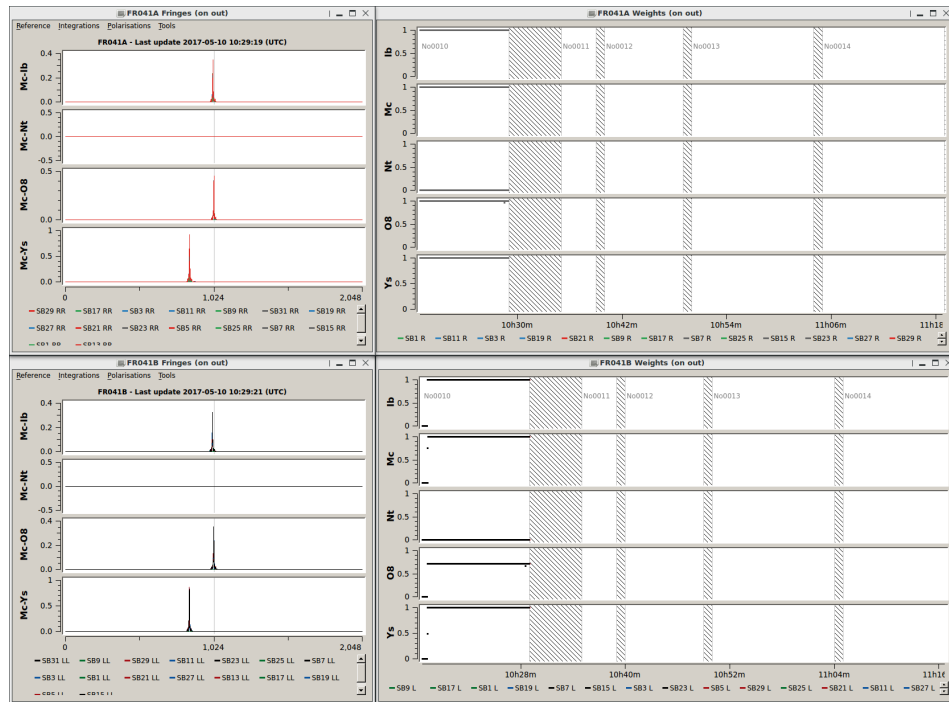


- **Correlators**
  - More capacity, new telescopes, development of AVN, new features
- **Data recording/playback/transport**
  - Real time/near-real time, higher bandwidths, 2 and 4Gbps
- **Automated operations**
  - Get rid of disk shipping
  - Monitoring, automated fringe checking
  - Triggered observations
- **SKA and mm VLBI**
  - **User software**, VLBI with CASA
  - SAT architect in SaDT consortium
  - Simulations for BHC
  - Fringe checking
- **Time and frequency transfer**
- **Jumping JIVE has kicked off**

- Continued development of Jive5AB
  - Many bug fixes
  - New release just out
  
- FlexBuff recording taking off
  - New machines received from Medicina, Noto, Westerbork
    - Although some not quite filled to capacity..
    - Wb will record directly on unit at JIVE
  - Jodrell about to send one FlexBuff
  - JIVE will purchase extra unit
  - 8TB disks now standard
  - Balancing load a bit of a challenge

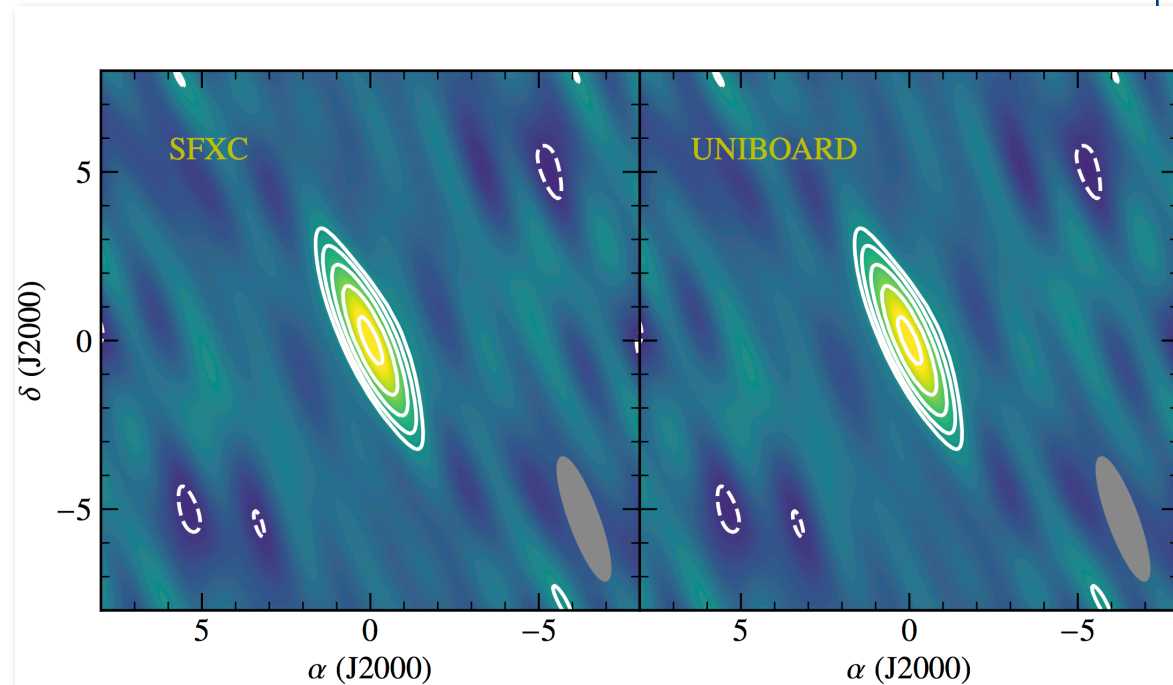


- 2 Gbps e-VLBI now standard
- 4 Gbps e-VLBI tested again after three (?) years
  - Split data stream into separate pols in Fila10G
  - Send two times 2 Gbps
  - Cheated a bit: no cross pols calculated
  - Irbene: just worked out of the box!



- Backup machine in Dwingeloo has been expanded
  - Enough expansion capacity for several years to come
- Now including experiments correlated at Bonn in central EVN archive

- JUC ready for e-VLBI
  - Detailed comparison to SFXC: excellent agreement
  - First attempts at real-time correlation
  - But, Fila10G not quite producing data streams to specs
  - Necessitated extensive re-write of control software
  - “formatter” test next
- Per board:
  - 32 stations at 64 MHz
  - Dual pol
- 16 MHz personality fully tested
- 32 MHz more or less done
- 64 MHz personality not yet tested
  - Lack of data...
- Very efficient for “simple” tasks
  - On identical data streams
- Perfect geo correlator?



- CASA fringe fitting
  - BlackHoleCam, SKA-NL, now RadioNet RINGS
  - Functional Python prototype
  - Working on C++ version, adding CASA LS solver
  - Eventually part of CASACore?
  - Workshop after summer
- Continued support for ParselTongue
- OBELICS work package in ASTERICS
  - Minimize re-calculation when changing parameters during data reduction of large data sets
  - Nice results with CASA in Jupyter



# Production correlation



- SFXC software correlator at JIVE:
- 50 nodes; 524 cores  
(Intel Xeon 5500/5600/E5-2600/E5-2630)
- At least 14 stations at 1 Gbit/s real-time
  - Probably 16-17 is possible
  - But, not enough 1 Gbit/s e-VLBI capable stations for testing
- At least 7 stations at 2 Gbit/s + 3 stations at 1 Gbit/s real-time.
  - 9-10 stations at 2 Gbit/s real-time should be possible
  - Again, not properly tested
  - Also because of bandwidth limits into the correlator
- **Doubling of number of cores in preparation**
  - Retirement of some of the first generation nodes
- **Overhaul of internal network at JIVE**
  - New switches, interconnects
  - Connectivity to outside world becomes a bottleneck?

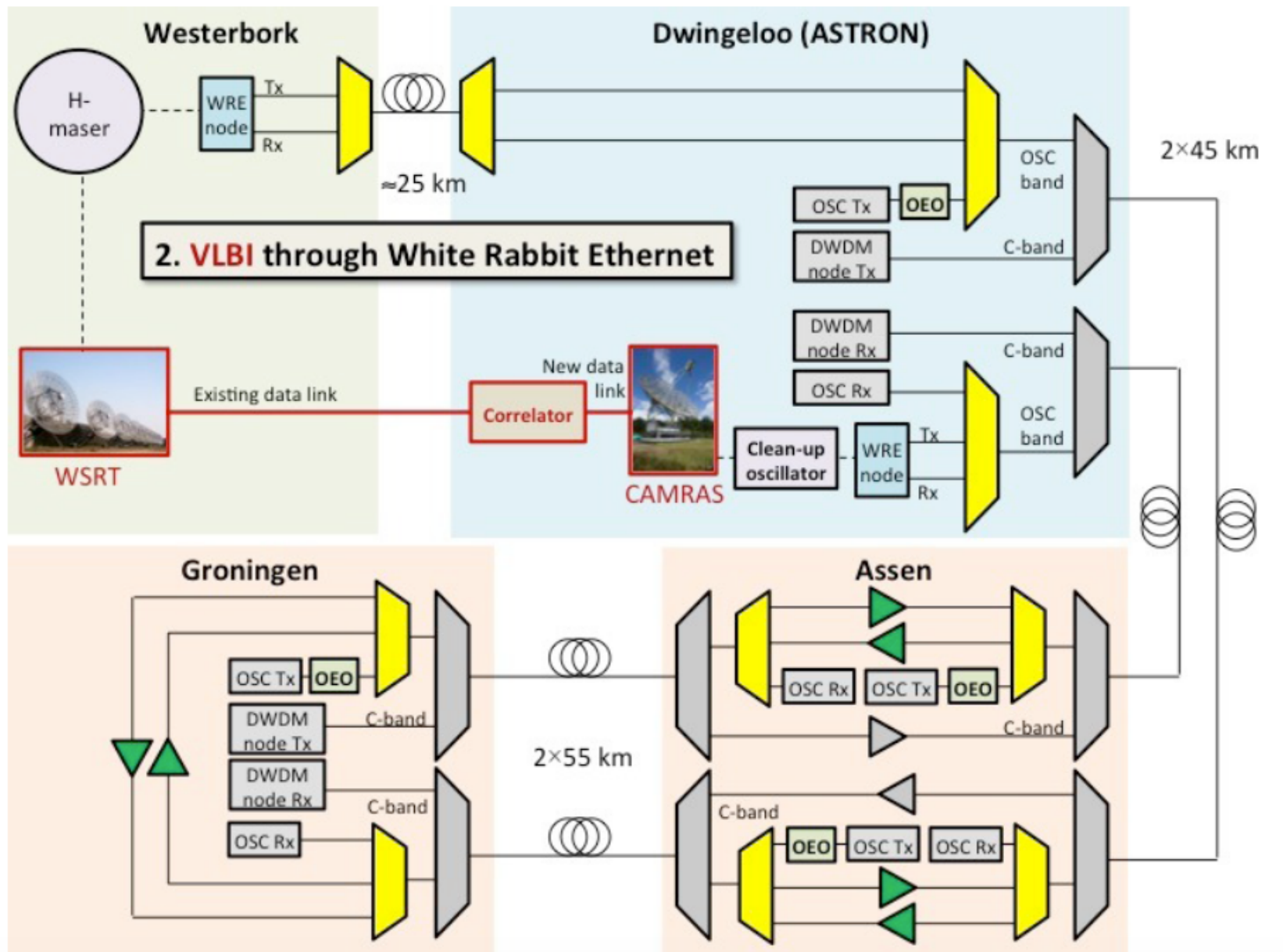




## **WP5 - CLEOPATRA: Connecting Locations of ESFRI Observatories and Partners in Astronomy for Timing and Real-time Alerts**

- Led by JIVE
- Time and frequency transfer
- relaying alerts (warning system for transient events, also in EVN)
- data streaming software (builds on Jive5ab experience)
- advanced scheduling algorithms for complex, large arrays (mainly for SKA, CTA)

# Frequency transfer demo in CLEOPATRA



## What is White Rabbit?



- Sub-ns accurate synchronization network
- Open Hardware design, project started at CERN
- Based on:
  - PTP (IEEE1588v2)
  - Bidirectional (BiDi) SFPs
  - SyncE: Syntonization of 125 MHz clock
  - 1 Gb/s Ethernet
- In use in several accelerators and astronomy instruments around the world



# KAT7 VLBI

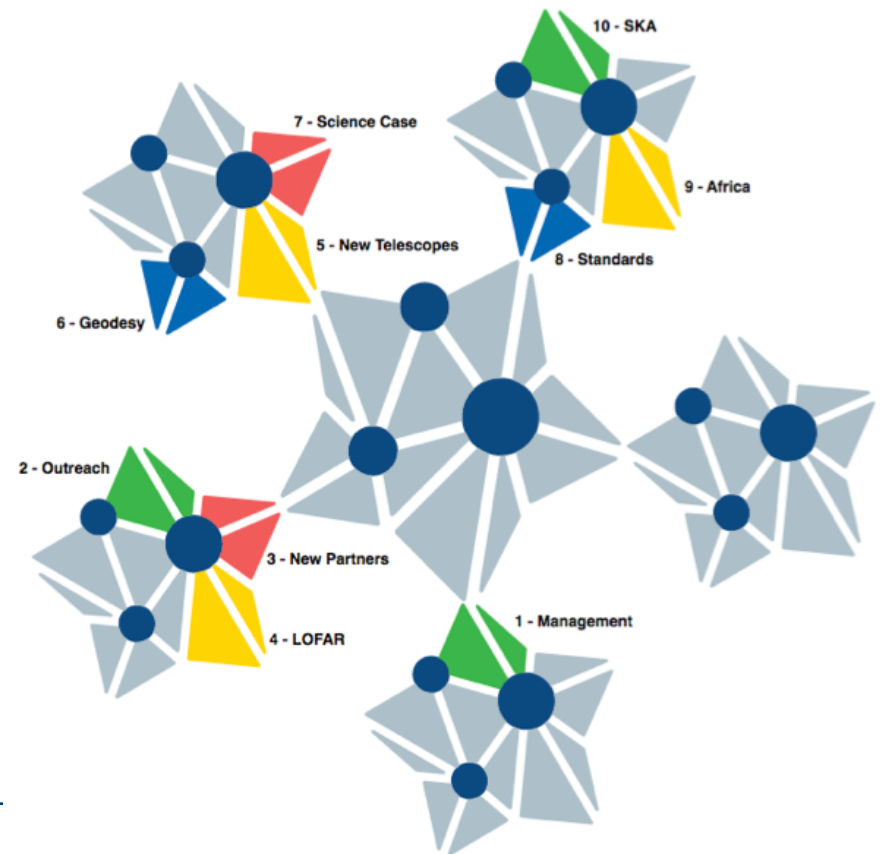


- KAT7: prototype array for MeerKAT
- Functional, and available
- Very similar to MeerKAT in many ways
  
- VLBI working group, chaired by Roger Deane
- White paper being written, position VLBI for MeerKAT
  - *And later, SKA*
- Did VLBI demo with number of EVN stations
  - *Data unfortunately no good*
- Hopefully, re-kick-start effort soon



# JUMPING JIVE I

- Call INFRADEV-3-2016
  - Joining up Users for Maximising the Profile, the Innovation and the Necessary Globalisation of JIVE
  - Call for profiling excellent Research Infrastructures
    - Enlarging its User Participation
    - Preparing for Globalisation
- Profiling JIVE ERIC
  - strengthen JIVE, advocate its services and enlarge its partnerships, in preparation for global VLBI in the SKA era
- Implemented as distributed effort
  - JIVE eligible to do this as ERIC



# JUMPING JIVE II



wp	partners	implementation
Management	JIVE	support management assistant
Outreach	JIVE, IGN, SKAO	0.5 outreach officer
New Partnerships	JIVE	0.5 policy officer
ERIC also for LOFAR	ASTRON, JIVE, ILT	policy officer, ILT management
Integrating new elements	IGN, JIVE	Tiger team, support scientist
Geodesy	CNRS/BORD, JIVE	Correlator support, postdoc
The VLBI future	INAF, JIVE, OSO	Development EVN science case
Global VLBI Interfaces	JIVE, OSO, TUM	Sched and remote telescope support
Capacity in Africa	UMAN, JIVE, DST, Leeds	Exchange programmes
VLBI with SKA	JIVE, SKAO	Liaison officers, VLBI WG support

- Geodesy
  - Produce totals from SFXC and path to geodetic software
  - Verify EVN data in geodetic comparison
- Global VLBI Interfaces
  - Re-factoring of SCHED
  - Remote telescope monitoring
- Capacity in Africa
  - Building community in SKA/VLBI countries
    - Builds on UK Newton project
- VLBI with SKA
  - Support for the VLBI WG
  - Liaison with office, focus on operational model
  - Hiring process ongoing