

The e-MERLIN Archive

Paul Harrison -
Jodrell Bank



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e-MERLIN Array



- Intermediate baselines, 12- > 217Km - i.e. between VLA and VLBI
- 6/7 Telescopes from 25m to 76m (* Lovell increases sensitivity by factor of 2)
- e-MERLIN regularly takes part in EVN

3 main observing bands:

L-Band (1.25 - 1.75 GHz)

Resolution (natural weighting)

160 mas

Sensitivity (12-hr track)

24 μ Jy/bm*

C-Band (4.5 - 7.5 GHz)

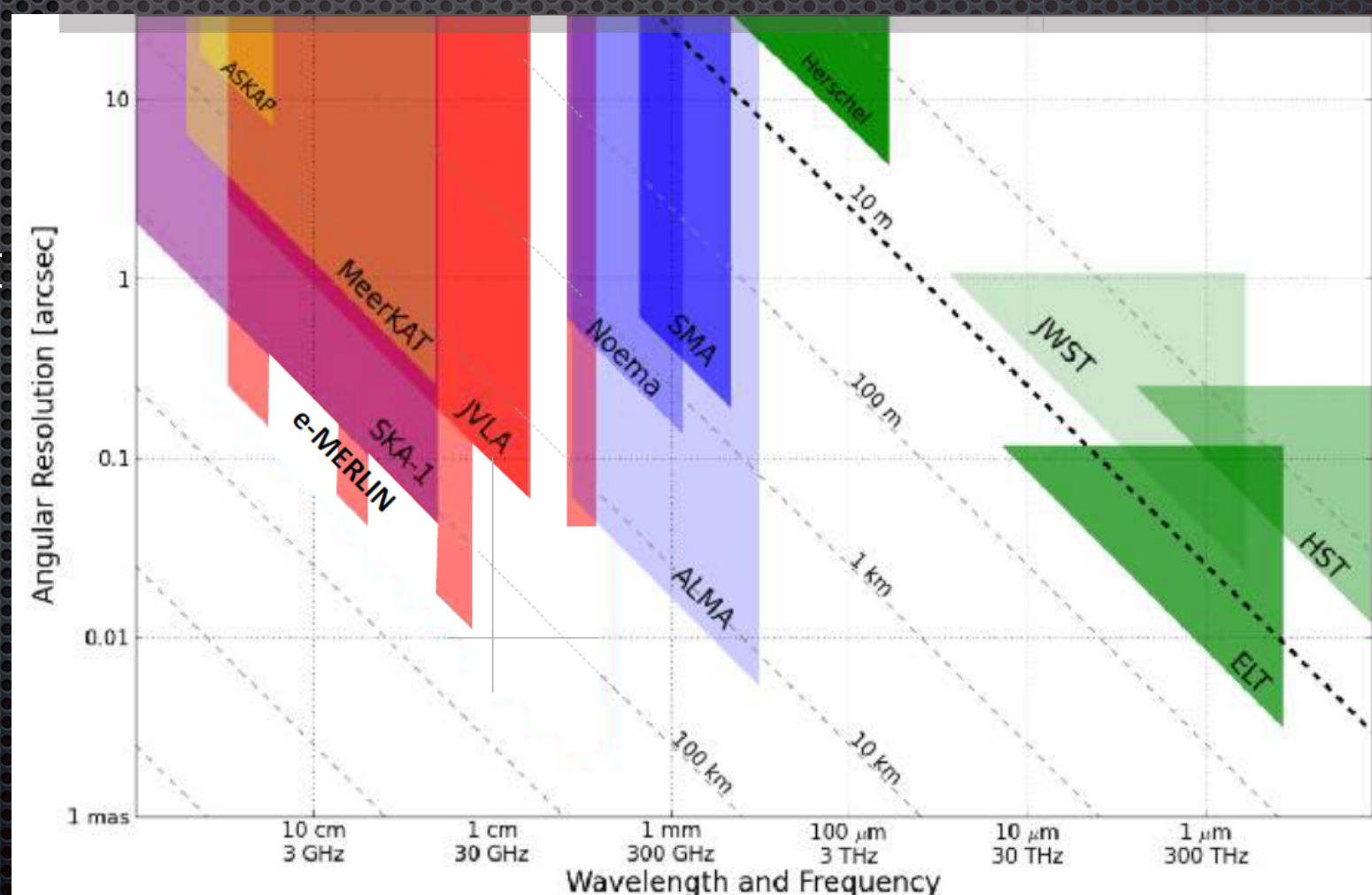
40 mas

16 μ Jy/bm*

K-Band (19 - 25 GHz)

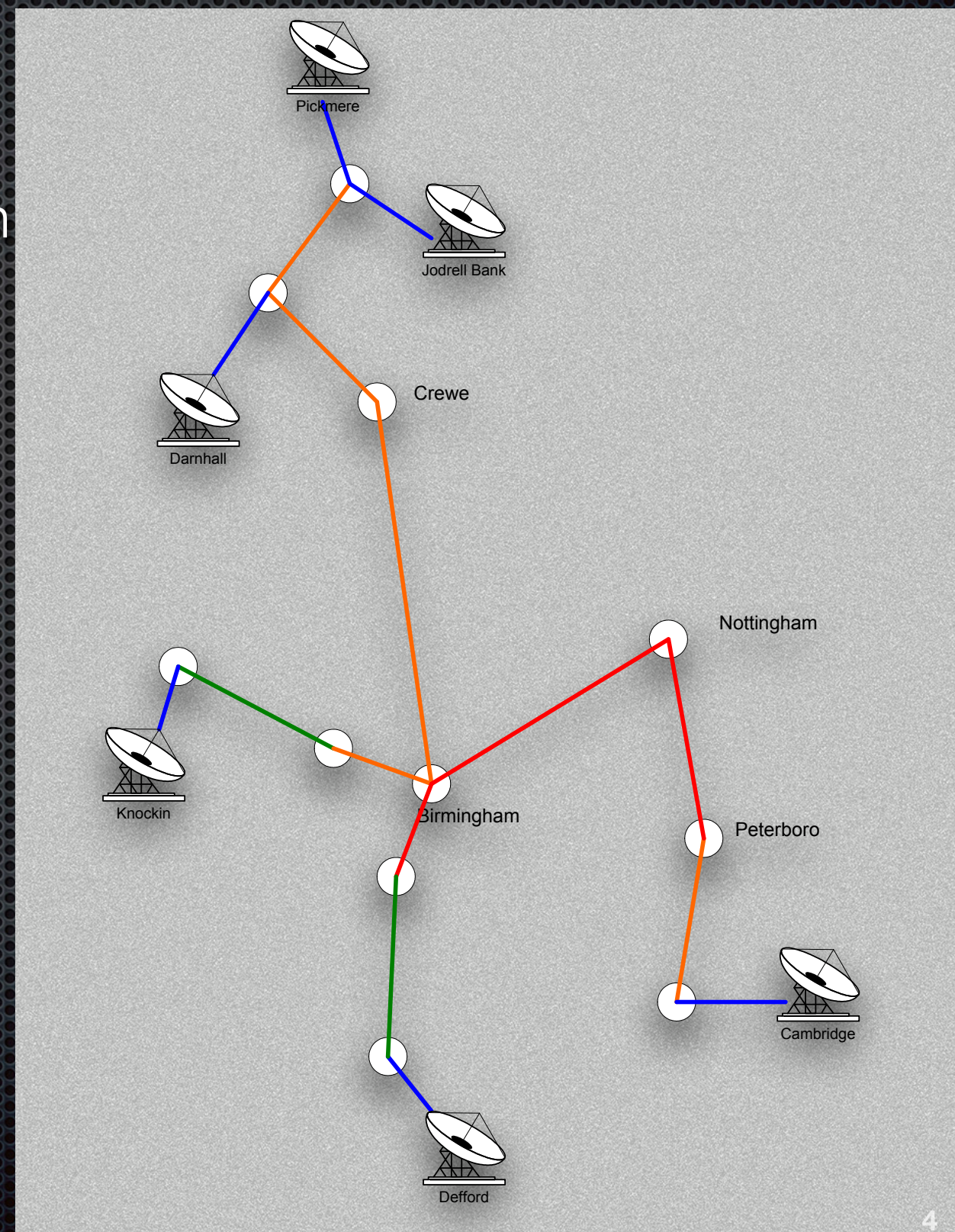
12 mas

30 μ Jy/bm



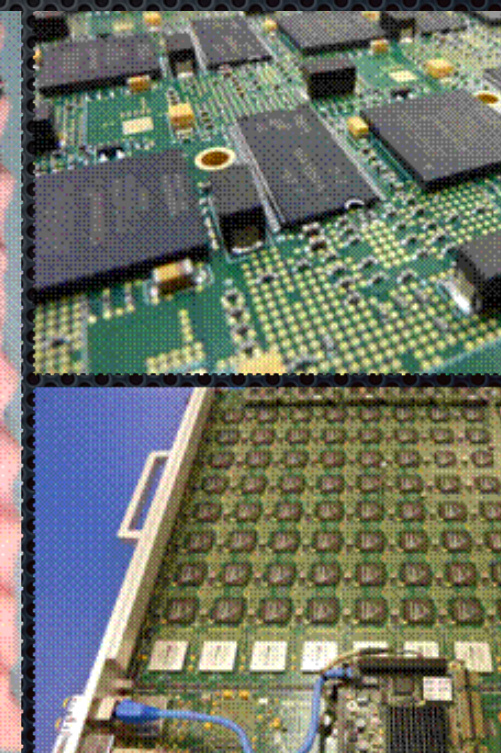
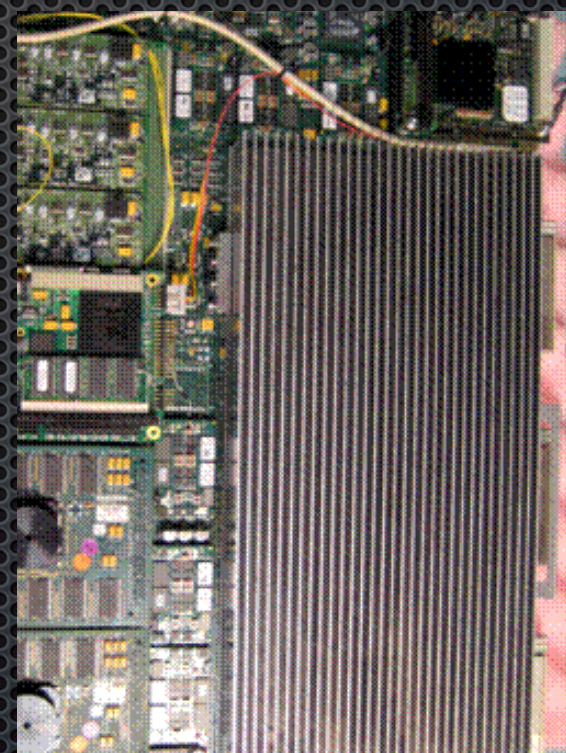
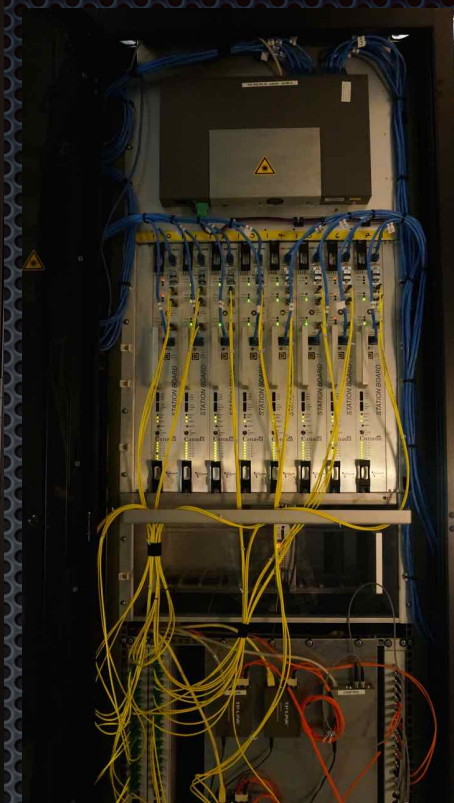
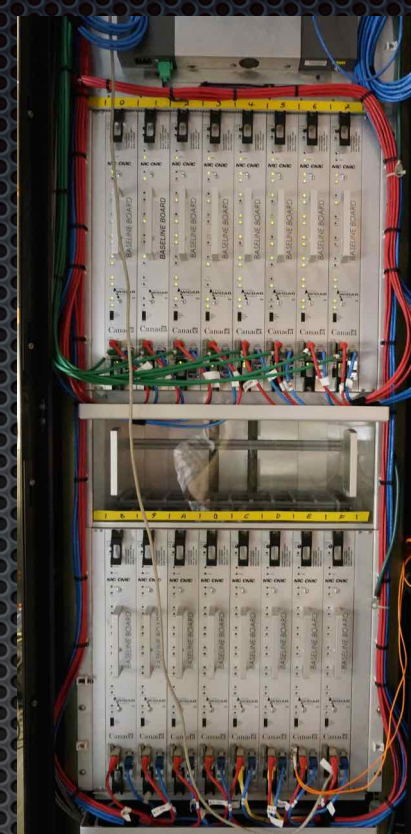
Fibre Network

- Major technical & financial challenge in 2005
 - 5 remote sites, ~30 Gb/s each
- Installed & leased 'dark fibre'
 - ~100km installed, 600km leased
- Adapted NRAO/ALMA data transmission system
 - Partners in original development
 - 3 x 10G for 4 GHz IF bandwidth
- Amplified at 4 sites on path.
- As well as data transfer, fibre used for LO/Time distribution



Correlator

- Designed & built by DRAO, Penticton + NRAO
 - Brent Carlson, P Dewdney
- 8 StationBoards + 16 BaselineBoards
 - Smaller version of JVLA (128 SB + 128 BB)
- SB 16 x 31.25kHz -128 MHz sub-bands
 - 36 FPGAs, 4 stage FIR filter
 - sub-bands, delays
- BB 64 x 2048 lags @256 kHz
 - 130nm 4Mgate ASIC
 - Cross correlation
- More channels with recirculation
 - Data in - 30Gb/s * 6 -8 Telescopes
 - Data out 5MB/s (0.5 TB/day) normal continuum operation - (8 bands of 512 channels)



Archive Figures

- MERLIN Archive - 1992 - 2011
 - 0.3GB
 - ~3000 observations
- e-MERLIN Archive 2012 onwards
 - 0.8PB - all on-line
 - ~4000 observations
- Visibility data + metadata are stored in a proprietary format



AstroGrid



- Origins in UK Long Term Science Reviews in 1999/2000
- The project existed in 3 phases from 2001-2009
- £14m spent in that time.
- Consortium of around 7 UK institutions at any one time (JBO was one)
 - Technical management infrastructure based at Leicester University.
 - 2-3 Software engineers at JBO
- Mission
 - Participate in the ongoing standardization within IVOA
 - Produce software implementing those standards to enable VO goals

AstroGrid Software Suite

- ✦ Server Side components
 - ✦ Registry - IVOA service discovery
 - ✦ Community - implemented A&A.
 - ✦ VOSpace - IVOA std implementation for shared “file store”
 - ✦ CEA - a workflow engine for executing server-side processing
 - ✦ DSA - access to data sets (TAP prototype + SIA+SCS)
- ✦ AstroGrid Client



Painless Access to Interferometry Images Comes Closer

Show affiliations

[Richards, A. M. S.](#); [Diamond, P. J.](#); [Garrington, S. T.](#); [Holloway, A. J.](#);
[Muxlow, T. W. B.](#); [Winstanley, N.](#); [Harrison, P. A.](#); [Walton, N. A.](#);
[Gonzales-Solares, E.](#); [Rixon, G. T.](#); [Venturi, T.](#); [Reynolds, C.](#)

Ready-made radio interferometry archive images usually only cover a few percent of the potential field of view in the visibility data. The next generation of instruments will achieve orders of magnitude increases in sensitivity, giving many detectable sources in any one observation. The most economical (and user-friendly) solution is to provide images or other data products on-demand at the chosen positions and resolutions. This can be driven remotely using a Virtual Observatory interface. Radio observatories are also providing software to automate most stages of data processing and form the basis of tools for specialist users. Recording and supplying metadata is vital to these processes.

Publication: Astronomical Data Analysis Software and Systems XV ASP Conference Series, Vol. 351, Proceedings of the Conference Held 2-5 October 2005 in San Lorenzo de El Escorial, Spain. Edited by Carlos Gabriel, Christophe Arviset, Daniel Ponz, and



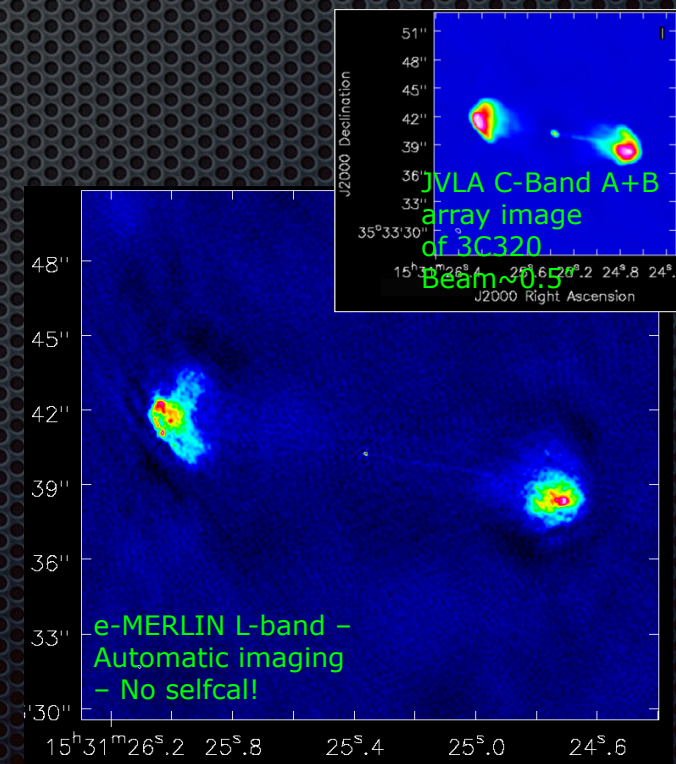
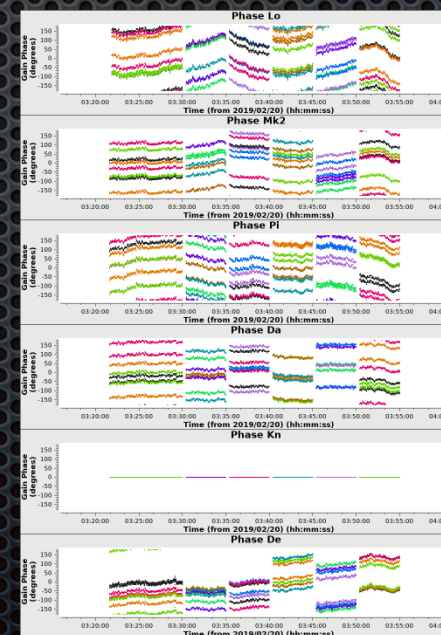
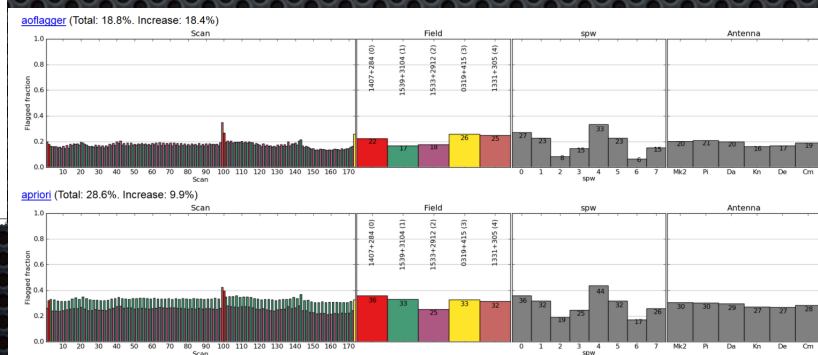
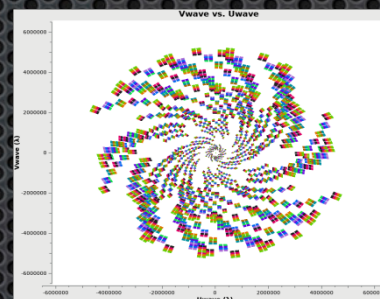
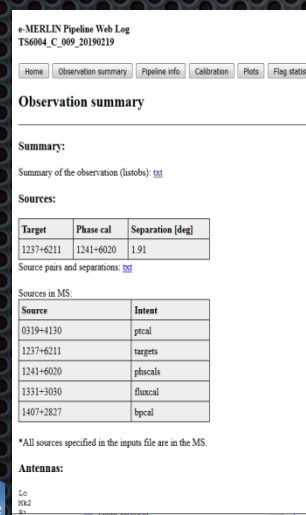
What Happened?

- AstroGrid finished 2009 - JBO effort diverted to commissioning e-MERLIN
- Services became obsolete - e.g. TAP std 2010
- Eventually even the servers died...

➡ Data access only for PIs

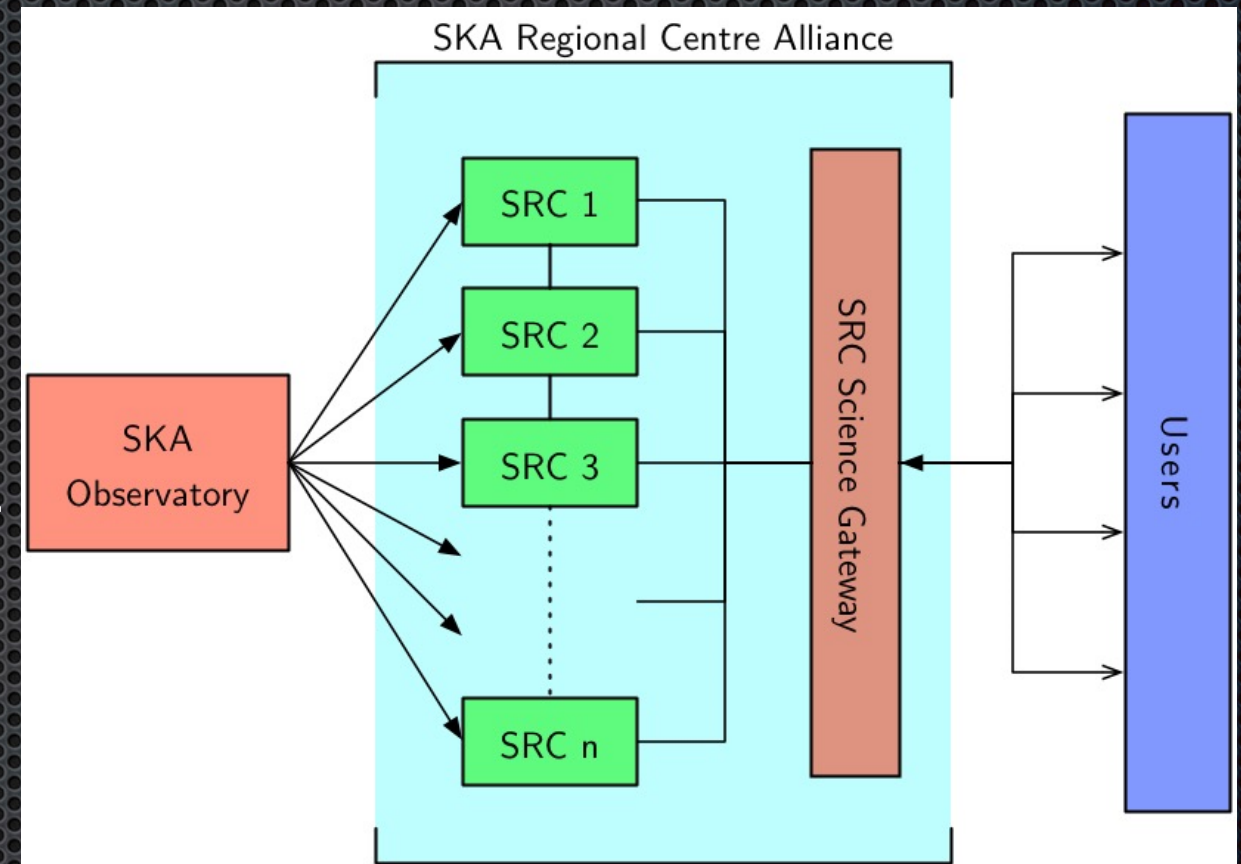
e-MERLIN pipeline

- CASA based https://github.com/e-merlin/eMERLIN_CASA_pipeline
- Enhanced advanced data heuristics, RFI excision, web interfaces, spectral line, self-calibration
- Access to high power processing facilities & grid based compute (STFC-IRIS)
- Only available to PIs



SKA Regional Centres

- by full operation - each SRC
 - online storage 700PB
 - archive grows at 0.5EB/yr
 - 35-80 PFLOPS
- 100Gb/s network to telescope.
- 0.1-1 PB individual dataset size



UK SRC

- ✦ Will use e-MERLIN as pilot project
 - ✦ VO - compliant public archive again
 - ✦ Also get a “science platform”
- ✦ STFC-IRIS to provide compute and storage hardware/services
- ✦ Software to re-use existing components - development at <https://github.com/Javastro>
- ✦ Eventually portal at uksrc.org



The End

