



# National European Perspectives on SRC Design

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# Germany – The SKA community in a nutshell



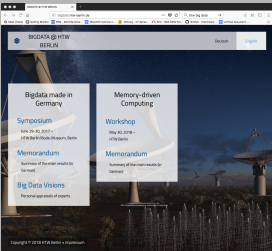
**Germany's Max Planck Society Becomes Newest Member Of SKA Organisation**

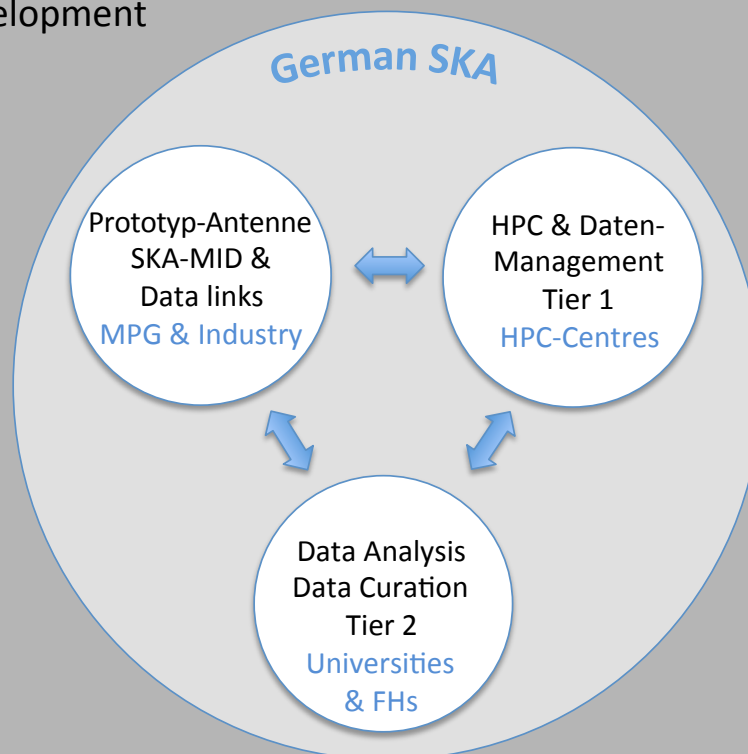
SKA Global Headquarters, 8 May 2019 – The prestigious German research organisation the Max Planck Society has become the 13<sup>th</sup> member of the SKA Organisation, following a unanimous vote by the SKA Board of Directors at its recent meeting at the SKA Organisation Global Headquarters in the UK.

## Developments

- MT-MPIfR SKA-MID prototype dish
- MPIfR S-Band System & extMeerKAT (20 dishes)
- Universal backend development
- PAF
- Calibration pipelines

## Interdisciplinary activities

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- FZJ LOFAR archive
- ALMA Regional Centre
- SAP4PULSAR
- HPE: “The machine”



## Scientific community

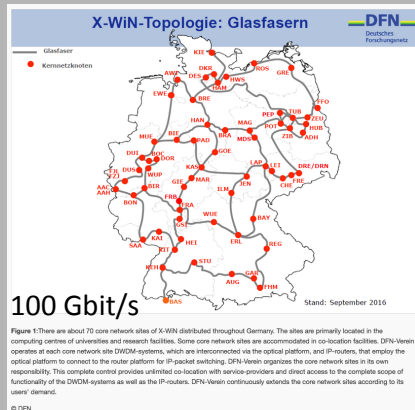
- German Proposal to the National Roadmap for Research Infrastructures
  - Support of 42 Institutions
  - 
- interdisciplinary community
- GLOW consortium
- D-MeerKAT

The Max Planck Society is a non-profit organisation with 84 institutes and research facilities. In collaboration with other German institutions and industry, it has been involved across many areas of SKA design work, including within the Mid Frequency Dish Array, Low Frequency Aperture Array, Central Signal Processor, Science Data Processor, Telescope Manager, Signal and Data Transport consortia, and research and development work within the Phased Array Feeds and Wideband Single Pixel Feeds consortia.

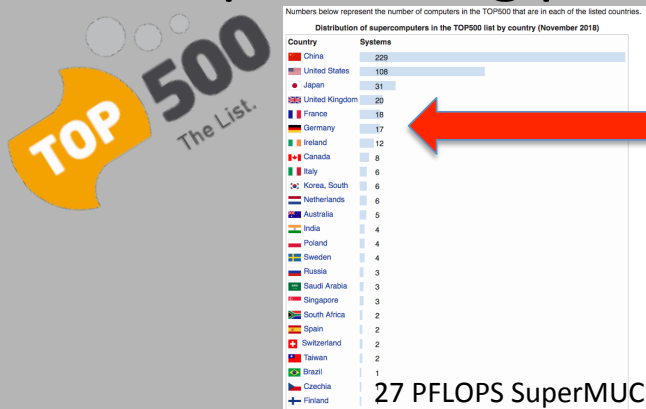


# German – compute infrastructure

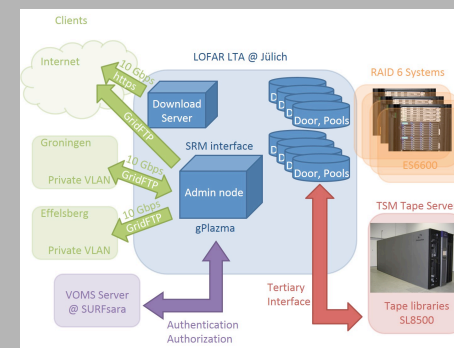
## data transport



## processing power



## data storage



FZJ LOFARE archive > 30 PB (~3 PB/yr)



# The German SRC

## No monolithic system !



VdR - society for data radio astronomy

### the German SRC (tier 1 & tier 2) – tasks

#### Competence Center

- Scientific priority program
- Support for scientific users
- Coordination of multi-wavelength astronomy
- R&D (PAFs, AIOp solutions for SDP)

#### Public outreach and education

- School projects
- Media kits
- Ask a scientist
- Citizen Science
- Roadshow

#### Observatories

- In-kind contributions
- M&O

#### Data-Infrastruktur

- National data center @ FZI
- Integration in European Science Cloud
- Datapipelines and Tools

#### Academic Program

- Modules for radio astronomy
- Data analysis methods
- Visitor program

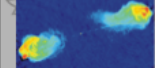
#### Letter of Intent (LoI) zur Gründung des „Verein für datenintensive Radioastronomie

- Mit dem LeZer of Intent (LoI) bekunden die unten aufgeführten Unterzeichner ihr gemeinsames Ziel, einen Verein für datenintensive Radioastronomie zu gründen. Ziel ist die Erreichung einer deutsche (assozierten) Mitgliedschaft im SKA, die Schaffung der notwendigen rechtlichen und organisatorischen Strukturen sowie die Förderung datenintensiver astronomischer Forschung in Deutschland.
- Unterzeichner (derzeit 18) – work in progress:
  1. Hochschule Bonn-Rhein-Sieg
  2. Hochschule für Technik und WirtschaftY Berlin
  3. Kiepenheuer-Institut für Sonnenphysik (KIS)
  4. Leibniz-Institut für Astrophysik Potsdam (AP) 5.
  5. Ludwig-Maximilians Universität München (LMU)
  6. Max-Planck-Institut für Astrophysik (MPA)
  7. Max-Planck-Institut für extraterrestrische Physik (MPE)
  8. Max-Planck-Institut für Gravitationsphysik (Albert-Einstein-Institut, AEI)
  9. Max-Planck-Institut für Radioastronomie (MPIfR)
  10. Max-Planck-Institut für Sonnensystemforschung
  11. Ruhr-Universität Bochum
  12. Technische Universität Dortmund
  13. Thüringer Landessternwarte Tautenburg
  14. Universität Bielefeld
  15. Universität Bremen
  16. Universität Hamburg – angekündigt!
  17. Universität Heidelberg
  18. Universität Würzburg

- society founded in May 2019

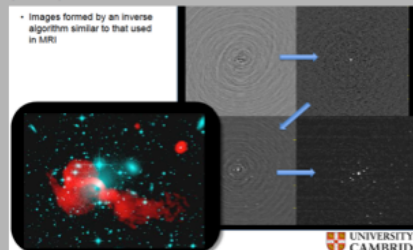
- NFDI program  
“Nationale Forschungsdaten Infrastruktur”

### SKA - Square Kilometre Array



Science Data Processor – Imaging pipeline & functions

gridding / Fourier transform / de-convolution



receive visibilities

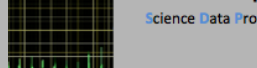
real time pipelines

- pre-process fast
- calibrate real-time
- image fast
- detect image transient candidates

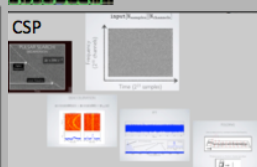
buffered pipelines

- buffer data
- pre-process data
- calibrate and image

### SKA - Square Kilometre Array



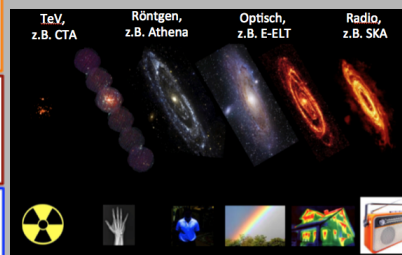
Science Data Processor – Non-imaging pipeline & functions



4 non-imaging pipelines

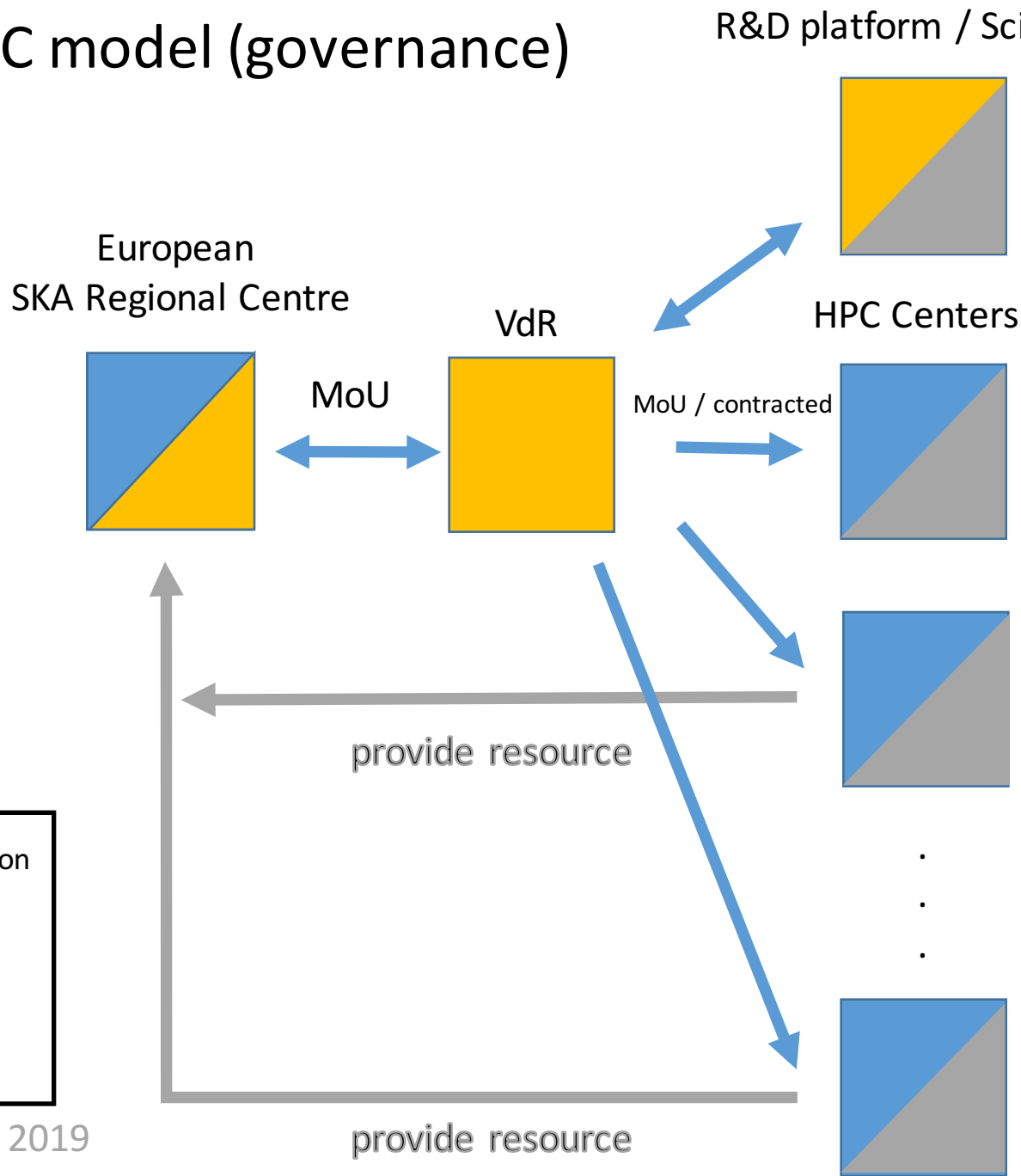
- 3 of these are Pulsar post-processing pipelines
  - Pulsar search
  - Fast Transients / Single Pulse
  - Pulsar Timing
- Transient buffer pipeline

### multi-messenger cross matching





# The German SRC model (governance)



	fiscal and governmental contribution
	infrastructure contribution
	inkind or 3 <sup>rd</sup> party

- VdR responsibilities:
- assumption: ticket system for accessing resources of SKA Regional Centre
  - provide funding (annual defined)
  - own funding model
  - serve community only
  - 
  - 
  - 
  - ESRC responsibility for non-SKA members and archive miners need to be covered by the ESRC buissness model



The SKA community does not have enough resources (money, man power, etc..) to store, analyse, and operate the entire data

... need for dynamic data curation

