Progress in South Africa

Rob Adam

Project Director: SKA South Africa

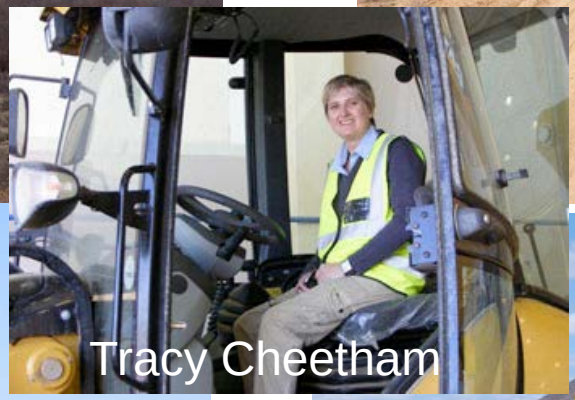
MIDPREP/AAMID Workshop – SAAO – 7th March 2016

“Green Field” site (2005)

Karoo Infrastructure

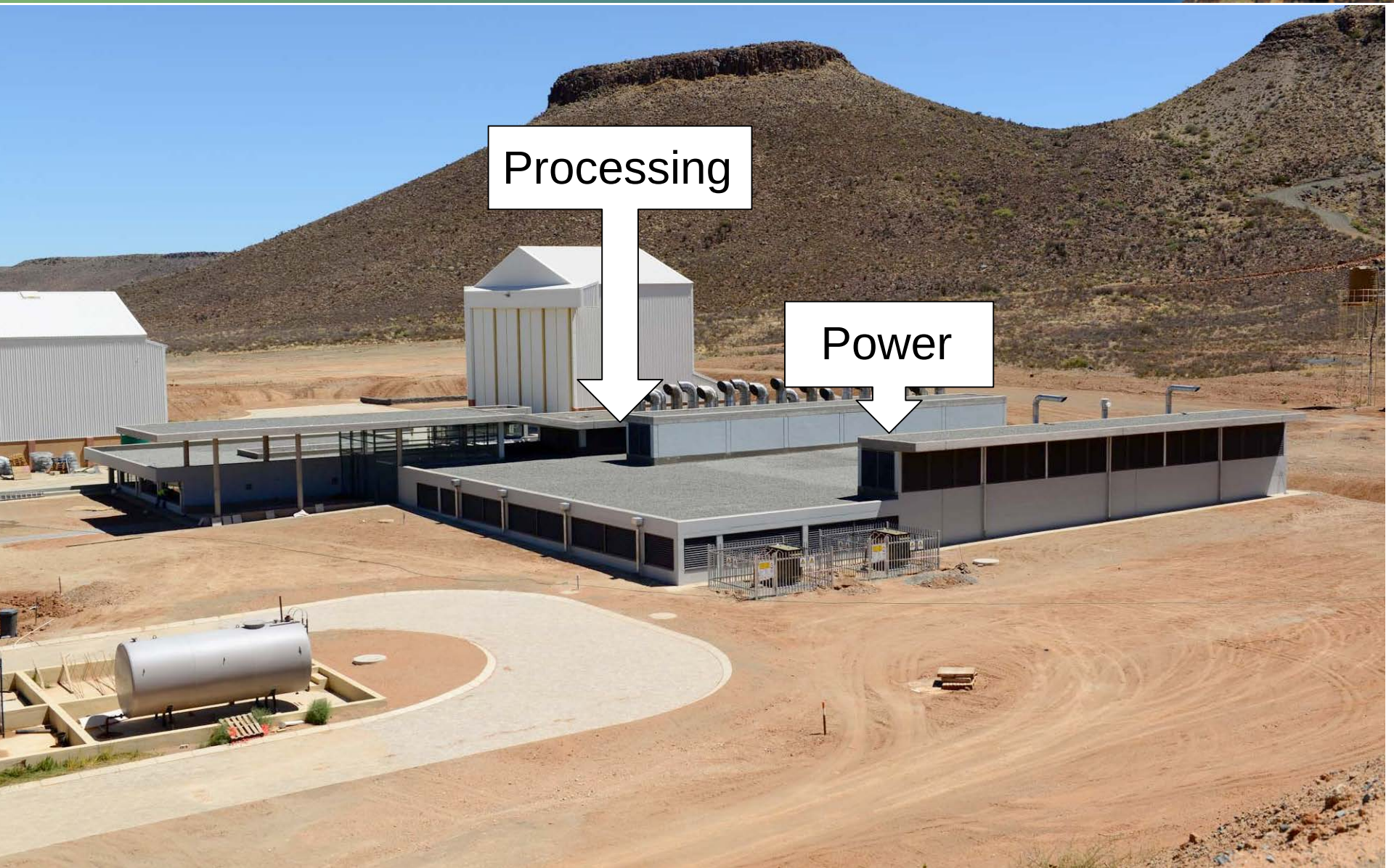
- **Designed** to accommodate SKA-1 MID from the start.
  - Land, roads, offices, stores & workshops
  - ~6 MVA grid power line
  - Electrical substation & power conditioning
  - Power reticulation and transformers on site
  - Data rack area
  - Maser time and frequency reference
  - Operations centres
  - Data link to site
- **Fitted** for MeerKAT requirements
  - 3 DRUPS units (+ space for 2 more for SKA-1 MID)
  - Air conditioning and power distribution in data rack area (+ space for more units for SKA-1 MID)

Establishing the Karoo site



MeerKAT Array

Bunker – RFI & temperature

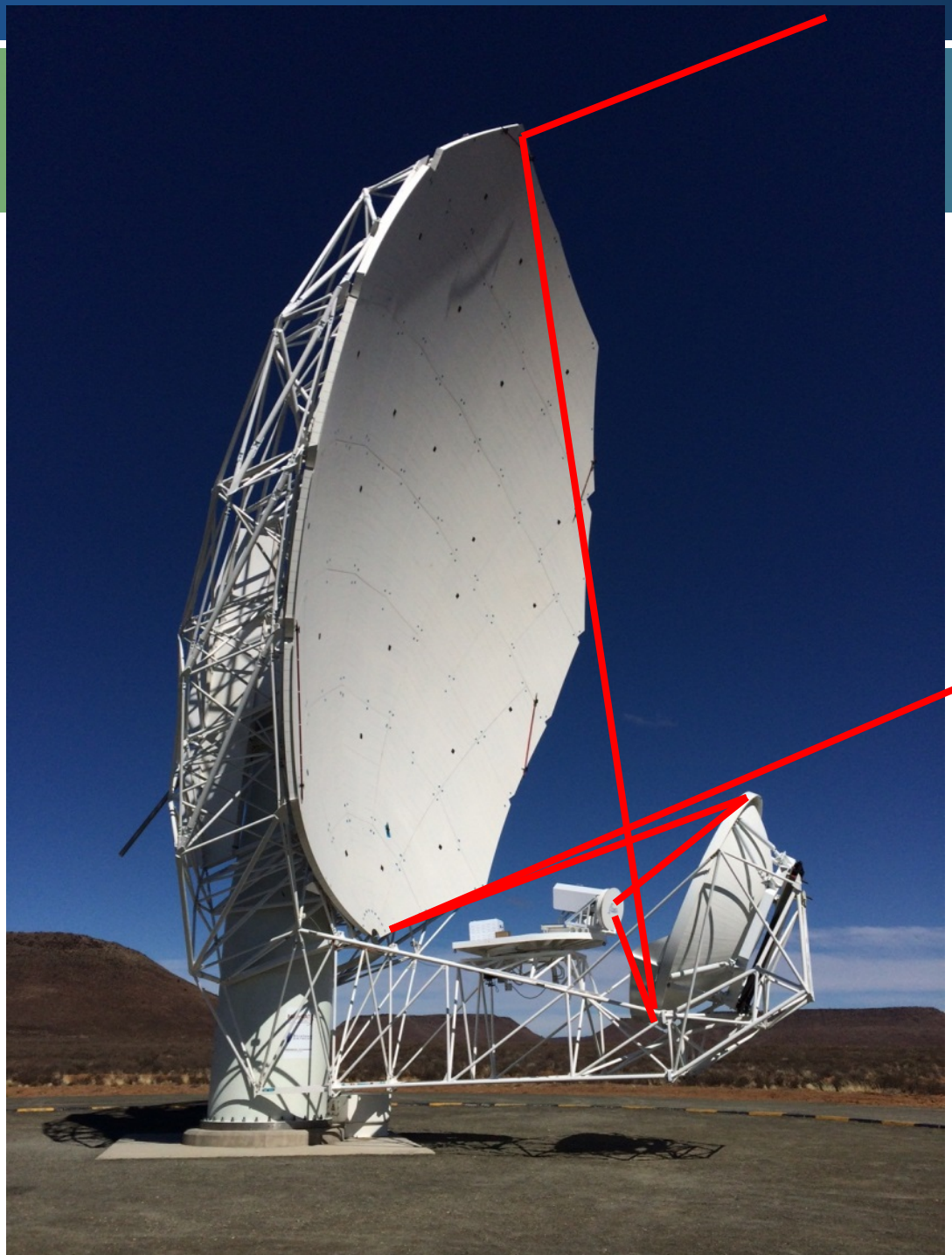


The MeerKAT Programme

- Africa must have a legacy of a large radio telescope
  - Irrespective of the outcome of the SKA site competition
  - But not independent of the SKA
- MeerKAT is an SKA “precursor”
  - Engineering prototype
  - Early science (SKA “Phase 0”)
  - Largest array radio telescope in the world
    - 64 13.5m dishes
- Build up a science and engineering team
  - To build MeerKAT and SKA, and use them
  - Over 200 engineers and scientists currently employed
- Phased development
  - XDM, KAT-7, MeerKAT, SKA_1, SKA_2
- MeerKAT will be make up 30% of SKA_1
  - The strategy was successful

Schedule

- 16 structures installed, #6/7 being integrated
- 31 Mar 2016 – 21 structures installed
- 30 June 2016 – 16 Antenna Array (AR1)
- 31 Mar 2017 – 64 structures installed
- 31 Mar 2017 – 32 antenna array (AR2)
- June 2017 – shared risk science 32 dishes
- Dec 2017 – 64 antenna array (AR 3 +)



Unblocked Aperture, high effective aperture

Large volume for multiple receivers and associated services

Low ground spillover

Pedestal fabrication & integration

Dish panel factory

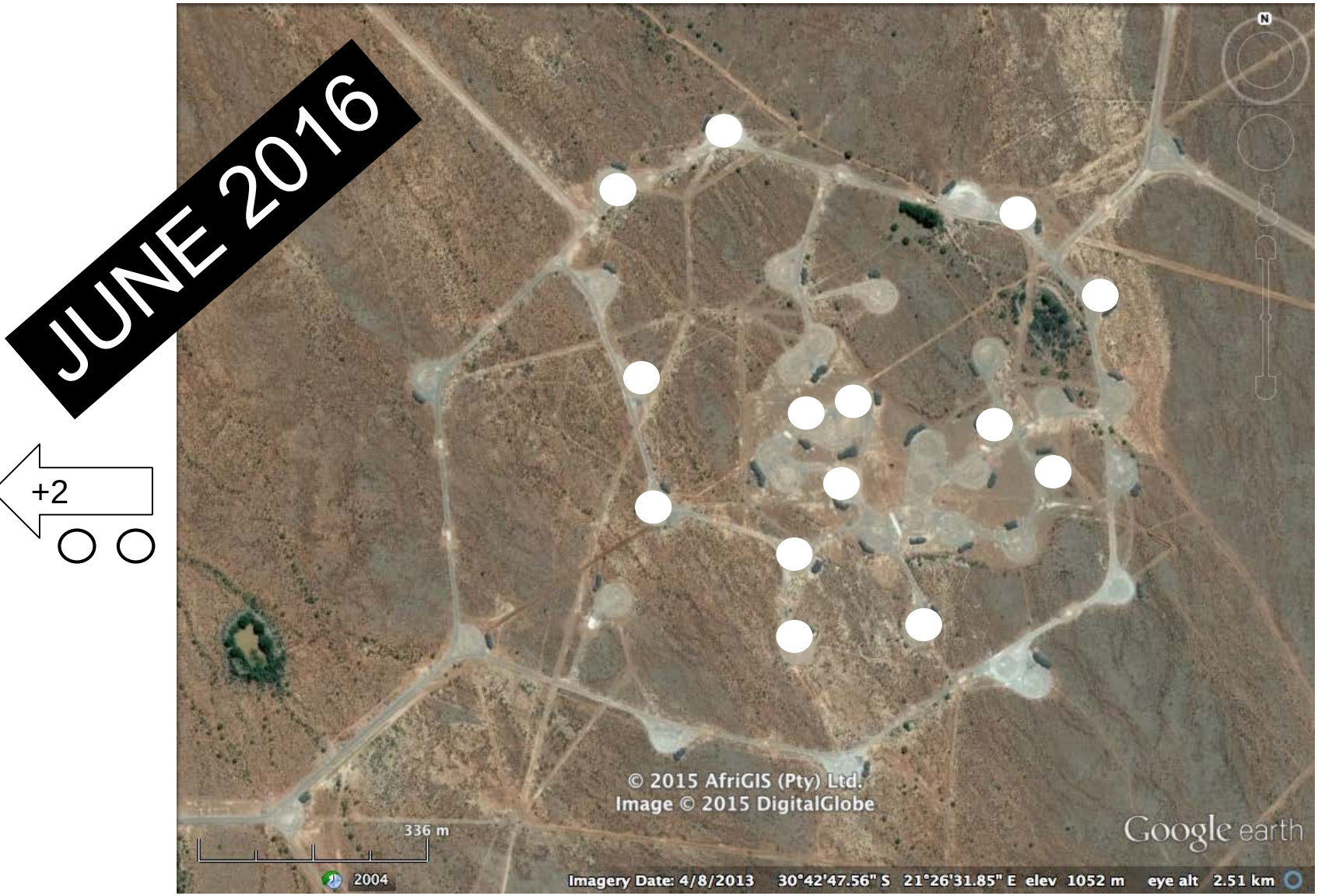
Carbon-fibre Subreflector

On-site Production Line

“Traditional” paneled dish


2014/06/06

Array Release 1 (14 core + 2)



EMSS Rx Production Facility

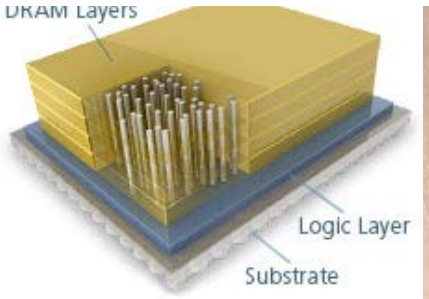
Digitizer Production

SKARAB Production

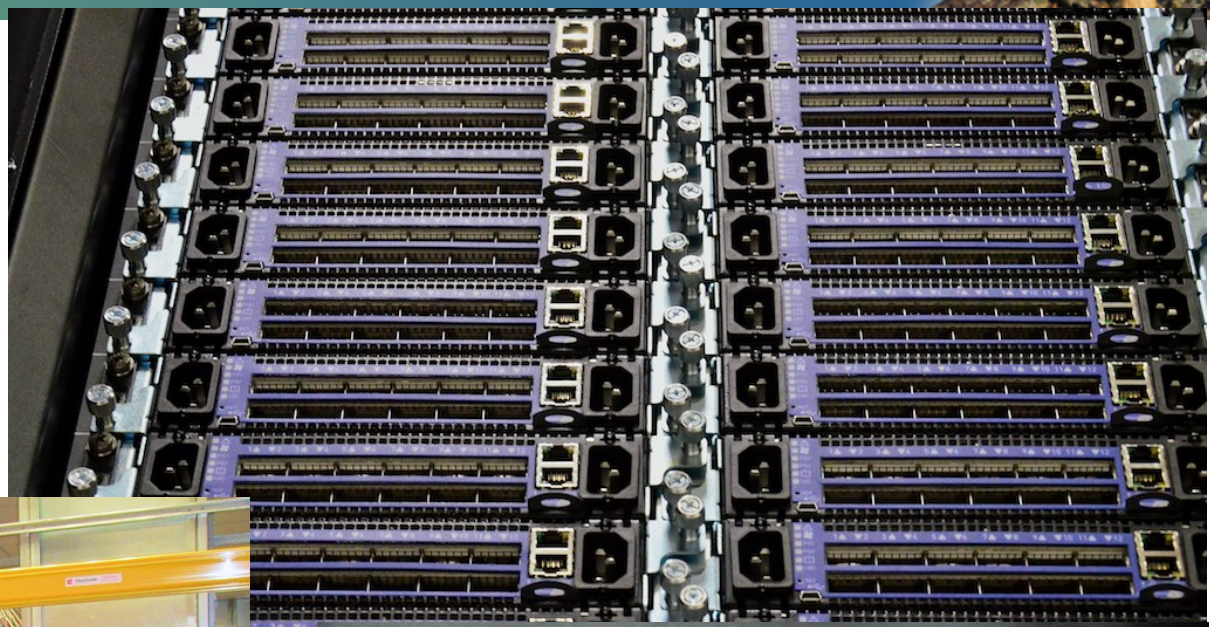
40 GbE mezzanine

HMC mezzanine

(Micron not providing production chips yet)



CBF Switch Installed

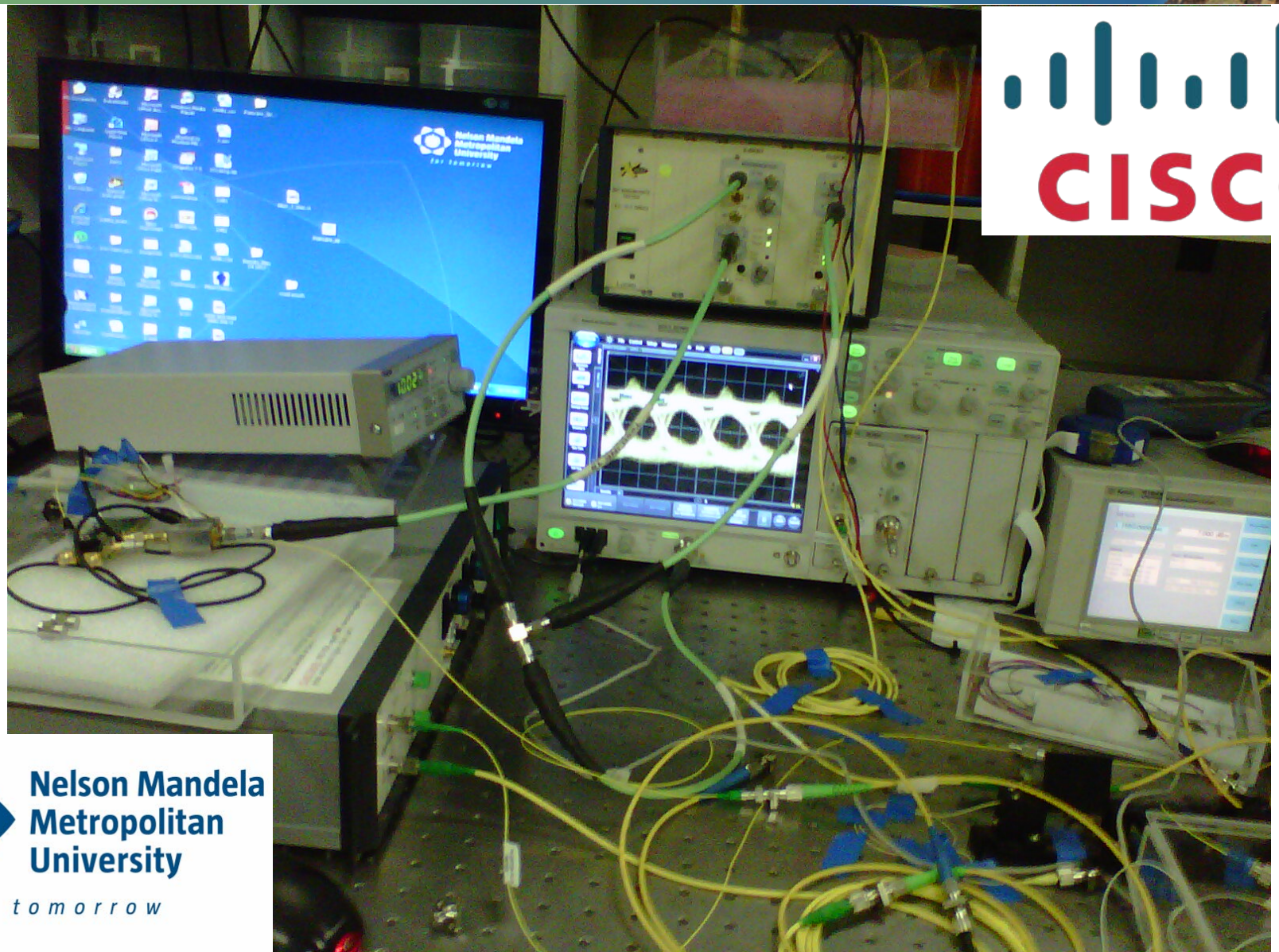


Science Data Processing

Storage

Micro-servers

Optical Fibre Research



Nelson Mandela Metropolitan University
for tomorrow

AR-1 core antennas (13+1/2)

S-band Rx from MPIfR

Contact

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News

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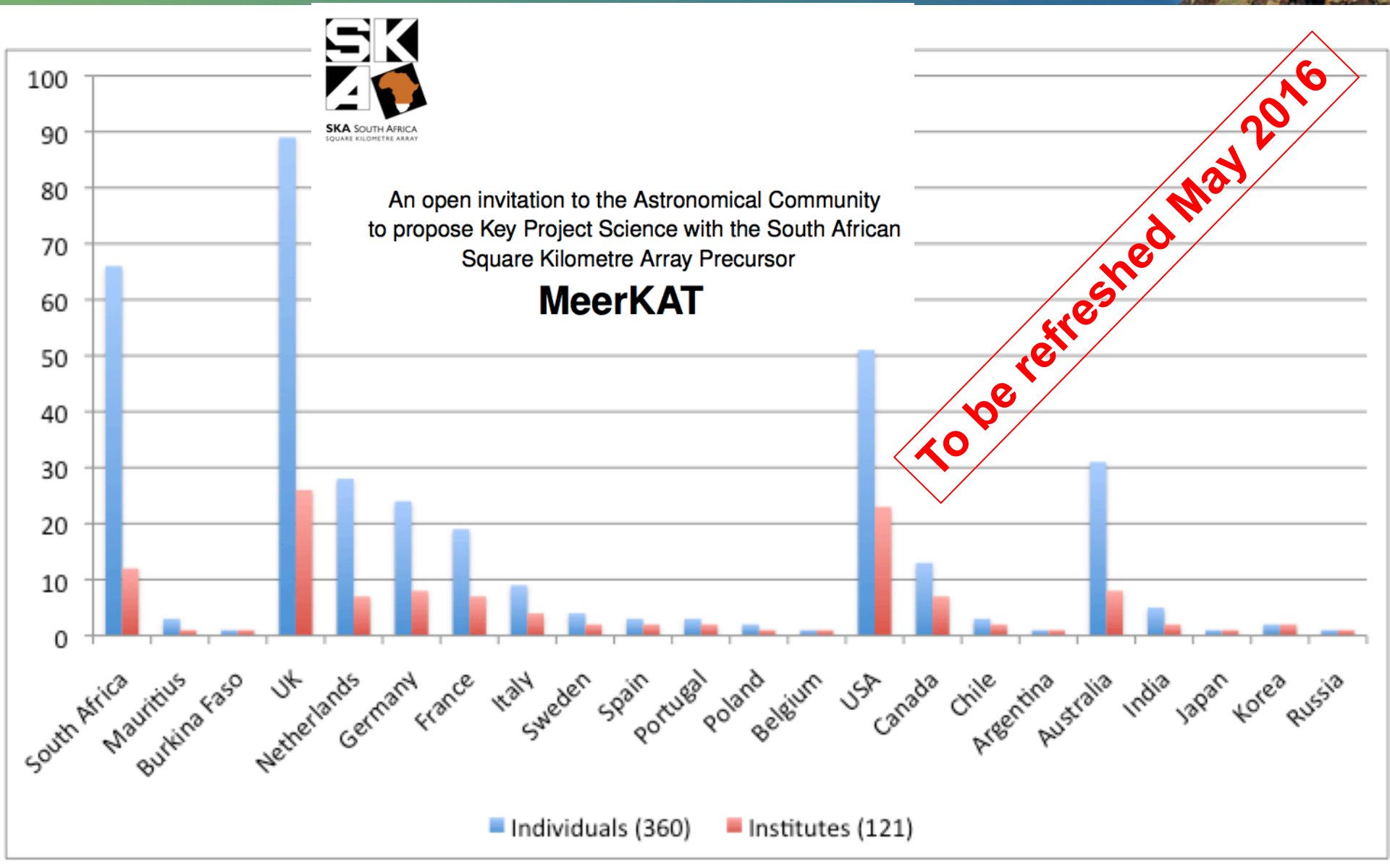
Opening the African Sky

Max Planck Institute in Bonn builds new receiver for the MeerKAT telescope in South Africa

December 02, 2014

A new radio astronomical receiver project of the Max Planck Institute for Radio Astronomy has received full funding by the Max Planck Society. The scientific defined frequency range from 1.6 to 3.5 GHz can only be observed under significant sensitivity losses with the 100-m Effelsberg radio telescope due to man-made radio emission, the so-called Radio Frequency Interference. Thus the MeerKAT observatory, currently under construction in South Africa, has been chosen as a host for this receiver system. MeerKAT, will be the most sensitive observatory of the southern hemisphere in the centimetre wavelength regime. Thanks to its unique location at the Karoo semi-desert in South Africa, MeerKAT is hardly influenced by interference. The 11 Million Euro receiver project will not only grant the Max Planck scientists access to a world-class facility and its unique unrestricted view on our galaxy but also extend the frequency range for all MeerKAT scientists and thus empower MeerKATs scientific potential even further.

MeerKAT Large Surveys



Human Capital Development

SKA SA Scientists

10% of invited scientists have SA affiliation

SKA SA Scientists (cont)

Total of 135 Chapters
12 with SA lead authors
49 with SA co-authors

SKA Preconstruction Consortia

TELESCOPE MANAGER

LOW-FREQUENCY APERTURE ARRAY

ASSEMBLY, INTEGRATION & VERIFICATION

CENTRAL SIGNAL PROCESSOR

MID-FREQUENCY APERTURE ARRAY

INFRASTRUCTURE SOUTH AFRICA

SIGNAL AND DATA TRANSPORT

DISH

INFRASTRUCTURE AUSTRALIA

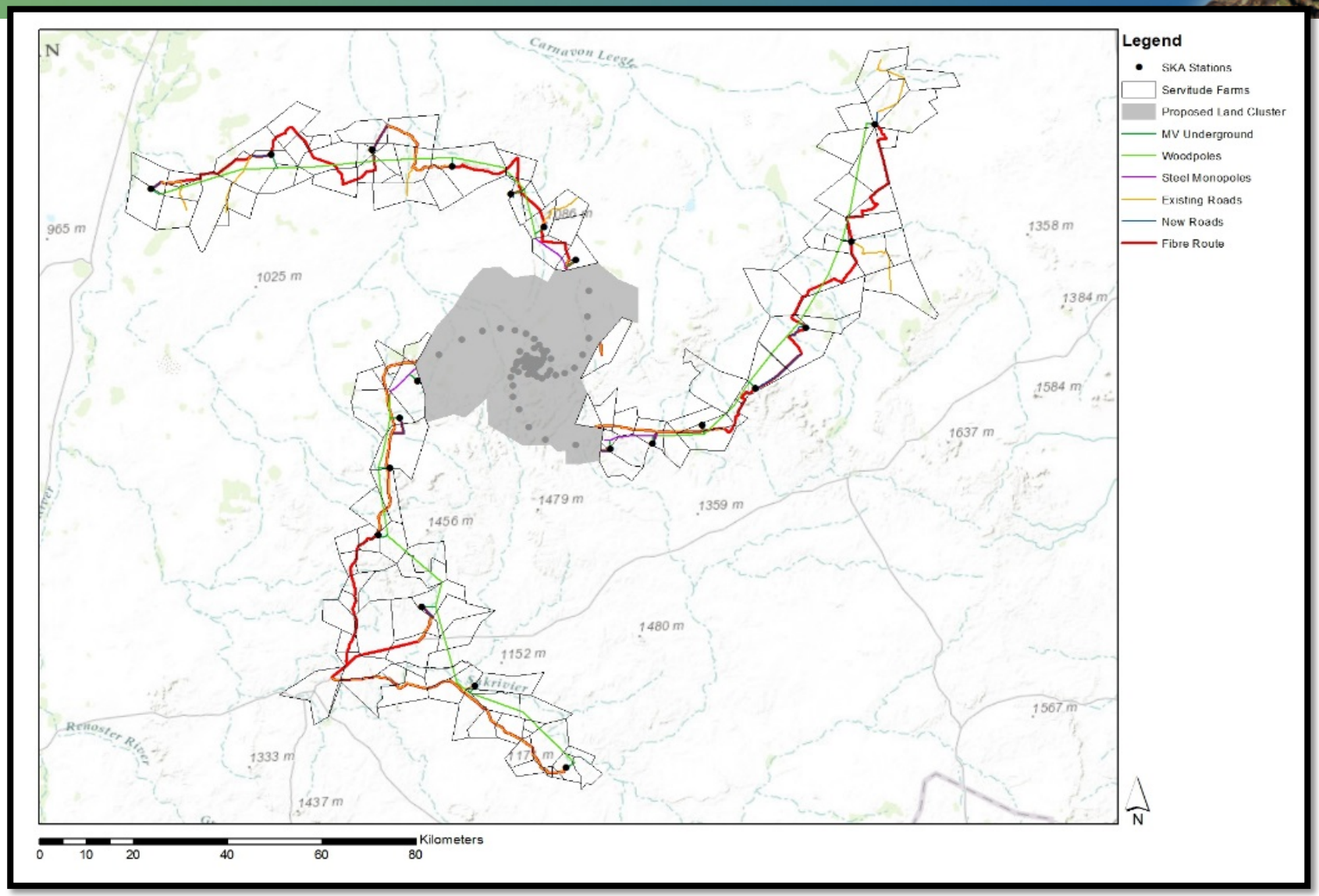
SCIENCE DATA PROCESSOR

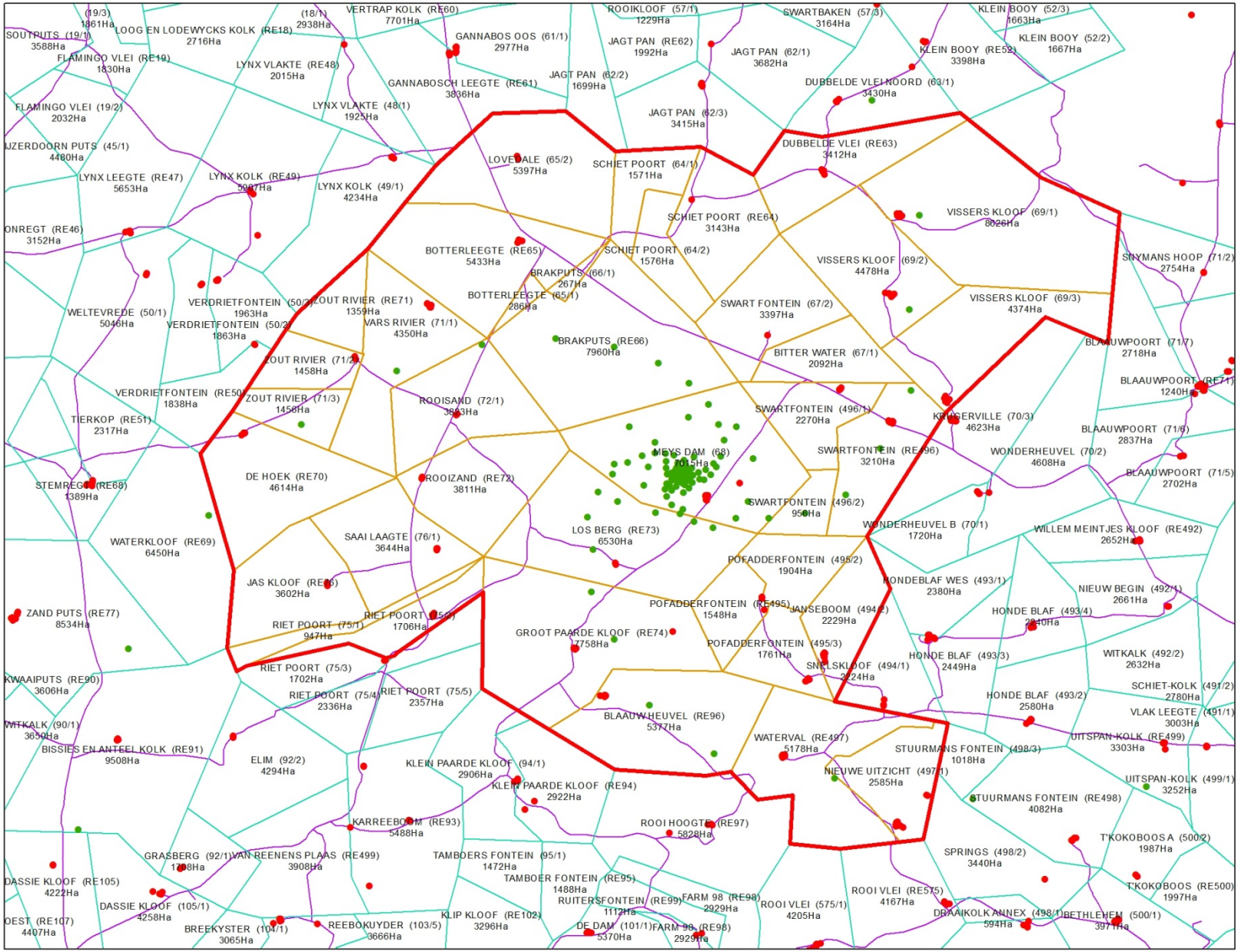
WIDE BAND SINGLE PIXEL FEEDS

Lead

Participate

SKA1_MID Physical Configuration




Legend
SKA Phase 1
Farm Buildings
Option 7
Option 7 Farms
Other Farms
Roads
Kilometers
0 3 6 12 18 24
N

2015 SKA Engineering Meeting

24 out of 230 (~10%) participants from SA

5 plenary talks by SA

AVN - Ghana

AVN - Zambia

AVN - Madagascar

HERA

C-bass

Guest Instrument Policy

- Three categories of guest instrument:
  - Stand-alone instruments (e.g. HERA, C-BASS)
  - MeerKAT add-ons (e.g. receivers, digital back-ends)
  - SKA prototypes (e.g. DISH prototype foundation & antenna)
- A proposal with detailed supporting documentation is required, e.g.:
  - Scientific objectives
  - Involvement of (South) African scientists and engineers
  - Funding streams and project plan/schedule
  - Infrastructure and logistical requirements
  - Technical details: **RFI**, power, footprint, data, heat, etc.
- Proposal will be scrutinized by SKA SA engineers and scientists, including the SKA SA Science Advisory Committee, and a recommendation made to the Project Director.
  - A fatal flaw would be an aspect of a proposal that compromised MeerKAT or SKA in any way.
- SKA SA Project Director makes the final decision.

THANK YOU

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SQUARE KILOMETRE ARRAY

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