Use of VO standards at IDIA

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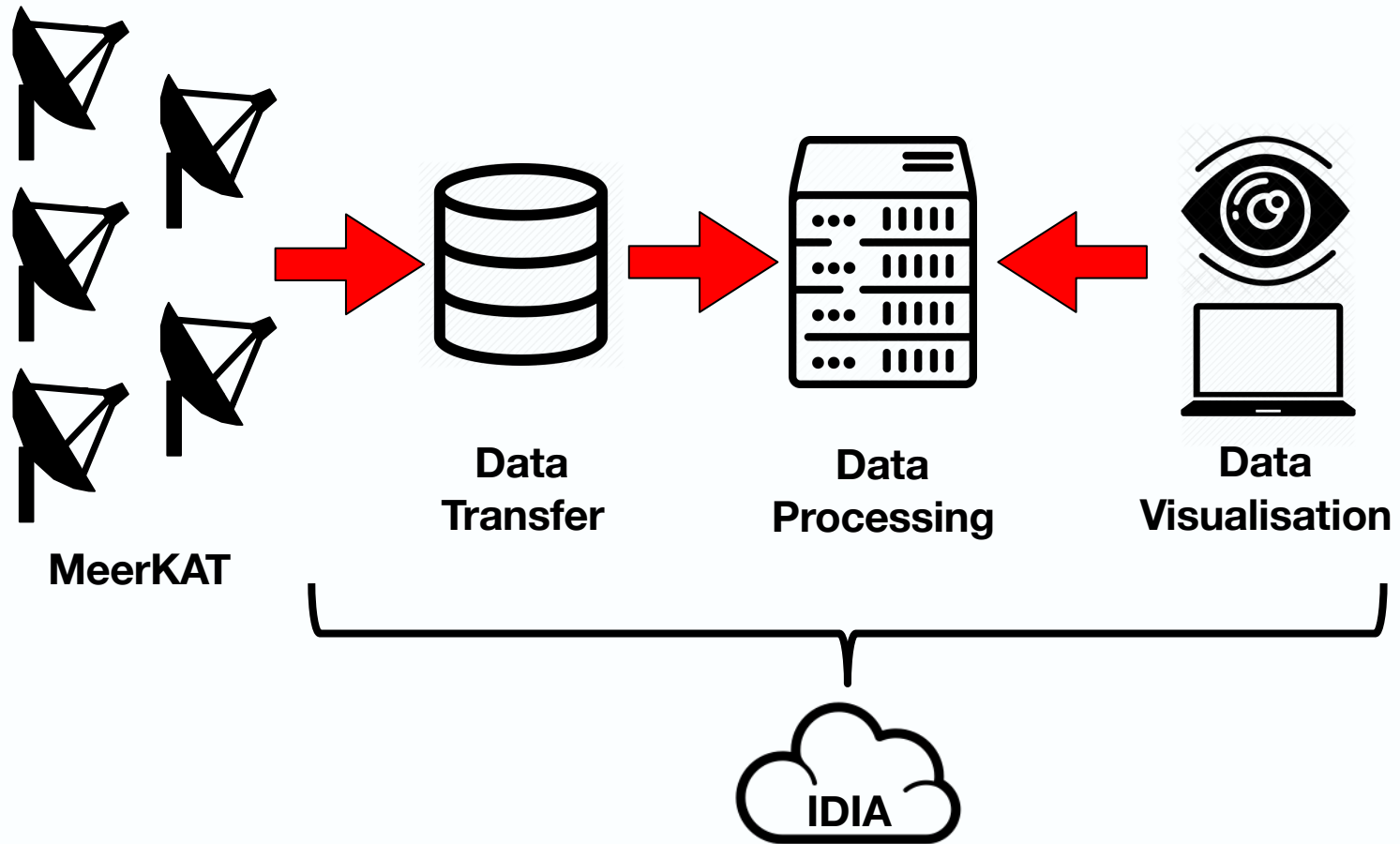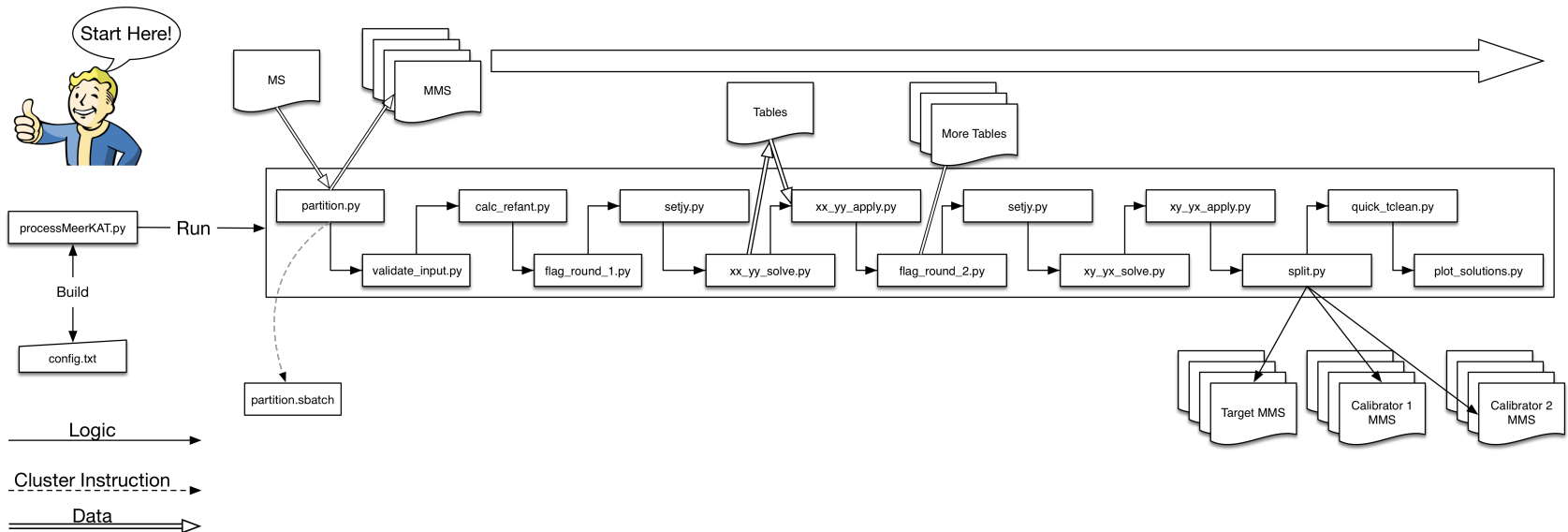
ilifu and the MeerKAT toolbelt

# IDIA MeerKAT pipeline (processMeerKAT.py)

MeerKAT LSP Data Products

- ## Short term
  - Full (32k channel) frequency resolution
    - In MeasurementSet (MS) format: ~10 TB / obs
  - Calibrated data in multi-MS (MMS) format
    - Data, model and corrected columns (~24 TB / obs)

- ## Long term
  - Self-calibrated visibilities (frequency-averaged)
    - In MMS format: ~300 GB / obs
  - Calibration tables and flags in CASA table / MS format
  - Full-Stokes continuum images and cubes (MIGHTEE, others)
  - Continuum-subtracted cubes and moment maps (LADUMA, MHONGOOSE, Fornax, MALS, others)
  - Multi-Epoch images (ThunderKAT)

MeerKAT SDP

- Flow chart of MeerKAT observations and SDP real time calibration ("cal") pipeline
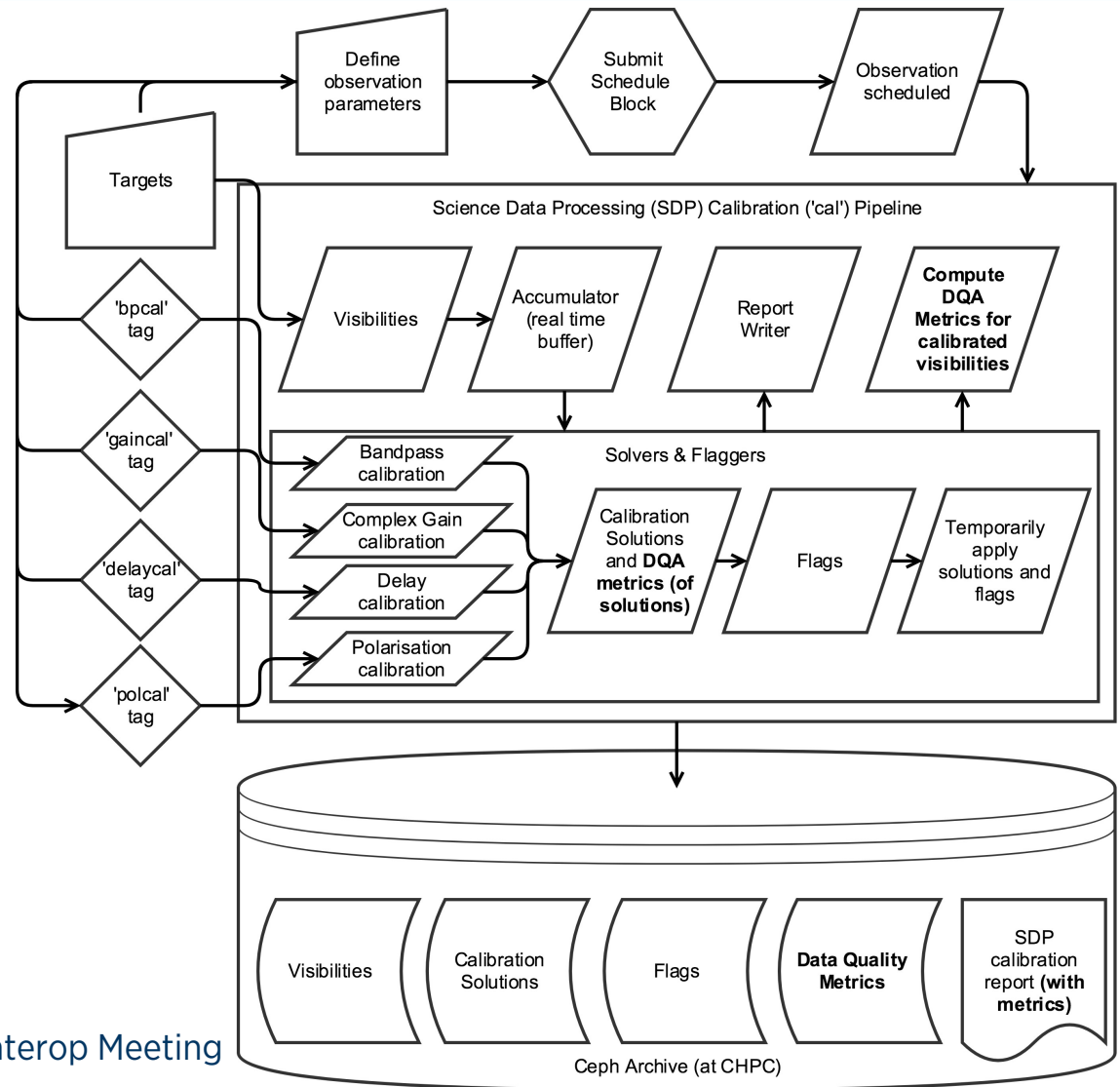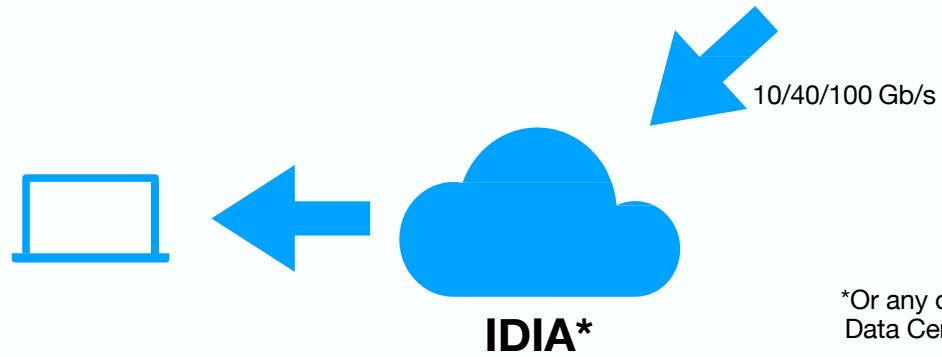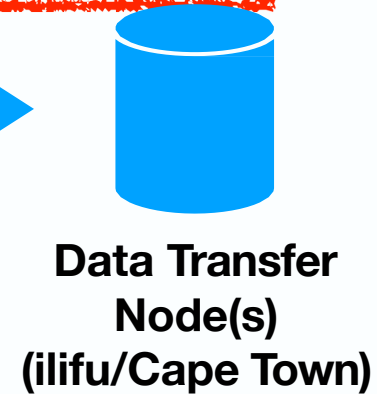
Data Transfers: SARAO archive

- PI checks archive interface for data.
- IDIA-affiliated PI can *Push-To-IDIA* (it's a button).
- MS data is transferred directly to appropriate IDIA directory.
- Transfer progress can be monitored on archive dashboard.
- Notification email sent informing IDIA and PI if transfer succeeds / fails

100Gb/s

**Correlator
SDP Cal (L0)
(Site/Karoo)**

**Archive (L0+L1)
(CHPC/Cape Town)**

**Data Transfer
Node(s)
(ilifu/Cape Town)**

MeerKAT

10/40/100 Gb/s

IDIA*
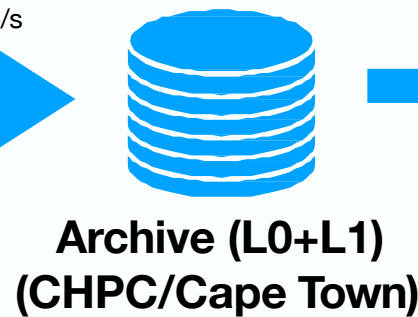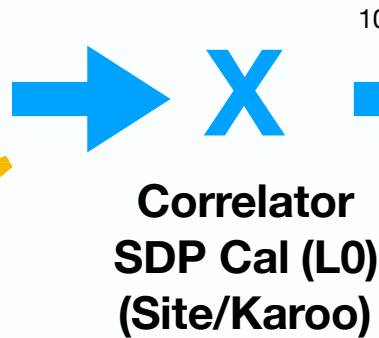
*Or any other 3rd-Party
Data Centre (in theory).

IDIA

University of Cape Town · iYunivesithi yaseKapa · Universiteit van Kaapstad

ilifu

WESTERN SYDNEY
UNIVERSITY

Filter Search

HELP

Newest First

Observer

Proposal ID

Target

Schedule Block

Frequency

Start Date

End Date

Location (RADEC)

Location (AZEL)

CONFIGURE MVF TO MS

MOUNT

Search

53 matching observations

Download	Observer Proposal ID	Schedule Block Capture Block	Target/s	Description
32KW	Marisa Geyer SCI-20180516-KH-01	20200404-0009 1586016787	J0408-6545 J0521+1638 J1037+0223 J1008+0740 ...	MIGHTEE COSMOS_10 856 MHz to 1712 MHz Run at 2020-04-04 16:13:27 UTC
32KW	Ian Heywood SCI-20180516-KH-01	20200325-0013 1585928757	J0408-6545 J0521+1638 J1037+0223 J1008+0740 ...	MIGHTEE COSMOS_9 856 MHz to 1712 MHz Run at 2020-04-03 15:46:14 UTC
32KW	Ian Heywood SCI-20180516-KH-01	20200325-0012 1585844155	J0408-6545 J0521+1638 J1037+0223 J1008+0740 ...	MIGHTEE COSMOS_8 856 MHz to 1712 MHz Run at 2020-04-02 16:16:15 UTC
32KW	Ian Heywood SCI-20180516-KH-01	20200325-0011 1585671638	J0408-6545 J0521+1638 J1037+0223 J1008+0740 ...	MIGHTEE COSMOS_7 856 MHz to 1712 MHz Run at 2020-03-31 16:20:53 UTC
32KW	Ian Heywood SCI-20180516-KH-01	20200325-0010 1585498873	J0408-6545 J0521+1638 J1037+0223 J1008+0740 ...	MIGHTEE COSMOS_6 856 MHz to 1712 MHz Run at 2020-03-29 16:21:28 UTC
32KW	Ian Heywood SCI-20180516-KH-01	20200325-0009 1585413022	J0408-6545 J0521+1638 J1037+0223 J1008+0740 ...	MIGHTEE COSMOS_5 856 MHz to 1712 MHz Run at 2020-03-28 16:30:37 UTC
32KW	Sharmila Goedhart SCI-20180516-KH-01	20191230-0018 1578317762	J1939-6342 J0201-1132 XMMLSS_12 J0521+1638	MIGHTEE first 32K observation: XMM_LSS_12 856 MHz to 1712 MHz Run at 2020-01-06 13:36:45 UTC
4KW	Marisa Geyer SCI-20180516-KH-01	20190823-0005 1566542621	J0408-6545 J0521+1638 J1008+0740 COSMOS_1 ...	MIGHTEE June COSMOS: COSMOS_1 - Reobservation copy 856 MHz to 1712 MHz Run at 2019-08-23 06:43:49 UTC

| 1K | 4K | 32K |

DEFAULT UNCALIBRATED   DEFAULT CALIBRATED

| Description	Parameter	Value
Produce a full polarisation MS	-f	true
List of online flags to apply	--flags	cam,data_lost,ingest_rfi
Range of frequency channels to keep	-C	
Output time averaging interval in seconds	--dumptime	
Bin width for channel averaging in channels	--chanbin	
Discard the first N dumps	--quack	
List of calibration solutions to apply	--applycal	
Tar-ball the MS	-t	
Use W term to stop fringes for each baseline	-w	
Select polarisation products	-p	
Exclude autocorrelation data	-a	
Keep spaces in source names	-s	
Flag elevations outside range	-e	
Add MODEL_DATA and CORRECTED_DATA columns to the MS	-m	
If a single element in an averaging bin is flagged, flag the averaged bin	--flagav	
Create calibration tables from gain solutions	--caltables	

For more information on the MVF to MS parameters please visit the MVF to MS cookbook

For more information on the flags please review Ludwig Shchwardt's presentation Fun with SDP flags

CARTA

- Cube Analysis and Rendering Tool for Astronomy
  - IDIA (South Africa) – NRAO (US) – ASIAA (Taiwan)
  - Cloud-based Visual analytic of remote large image cubes
  - Supports many image formats: FITS, CASA, Miriad, and HDF5
  - v1.3 released March 31, 2020, available online: https://cartavis.github.io
  - To be deployed at ALMA Regional Science Centres
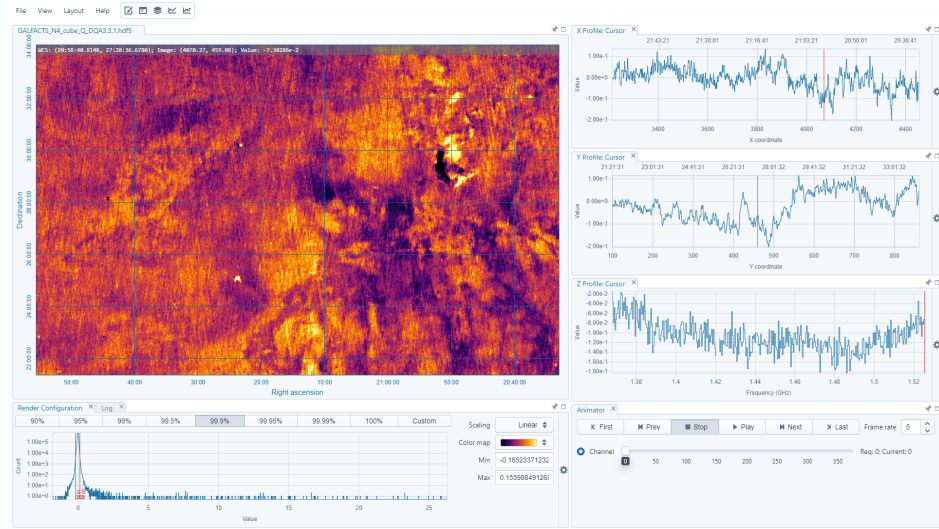
CARTA HDF5 format

- Purpose-built HDF5 schema developed at IDIA
  - Efficient FITS to HDF5 converter tool developed at IDIA

- Files go through an "ingestion process"
  - Rotated dataset (XYZ -> ZYX) cached for spectral profile generation
  - Pre-calculated statistics & histogram for image loading (slides & cubes)
  - Pre-calculated tiles for image loading (v1.4)

THANK YOU

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