

MWA Phase III

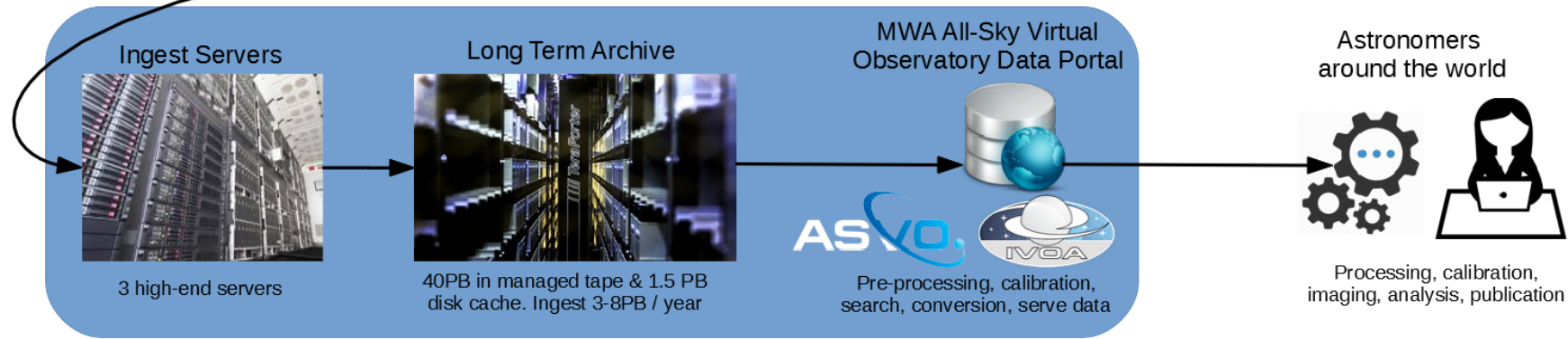
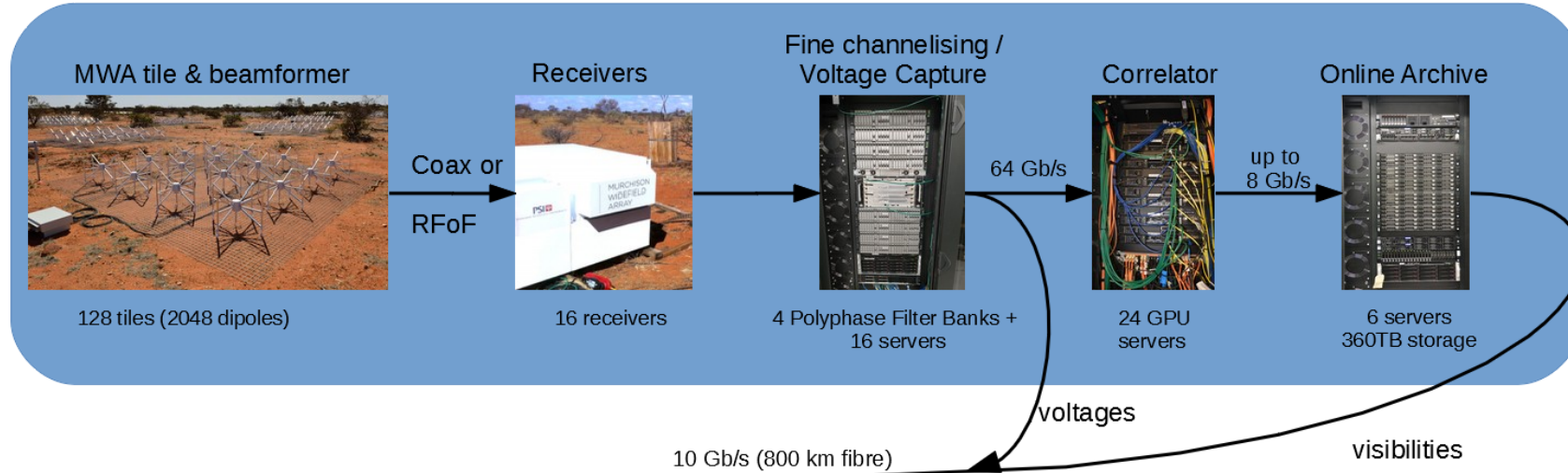
Mia Walker, MWA Program Manager

Virtual Project Meeting, June 2020



MWA Phase II (Now) – Data Flow

Tier 0: Murchison Radio Astronomy Observatory (MRO), Western Australia



Tier 1: Pawsey Supercomputing Centre, Kensington, Western Australia

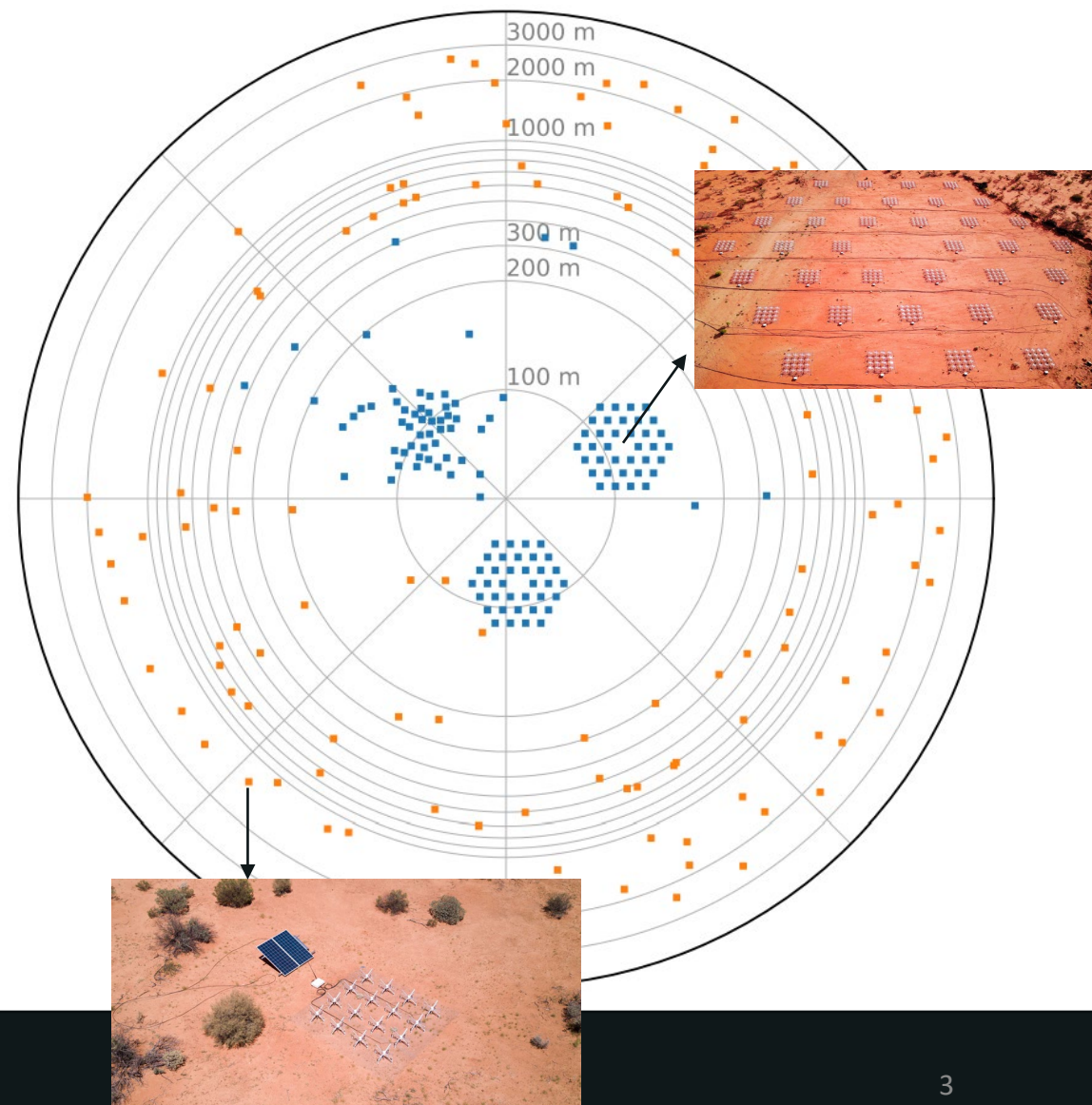


MWA Phase II (Now)

- 256 tiles on site
- Correlator can handle 128 tiles
- Different configurations
 - **Compact**
 - **Extended**
 - Switched every observing semester

Upgrading MWA will:

- Allow correlation of all 256 tiles
- Increase availability and quality of data

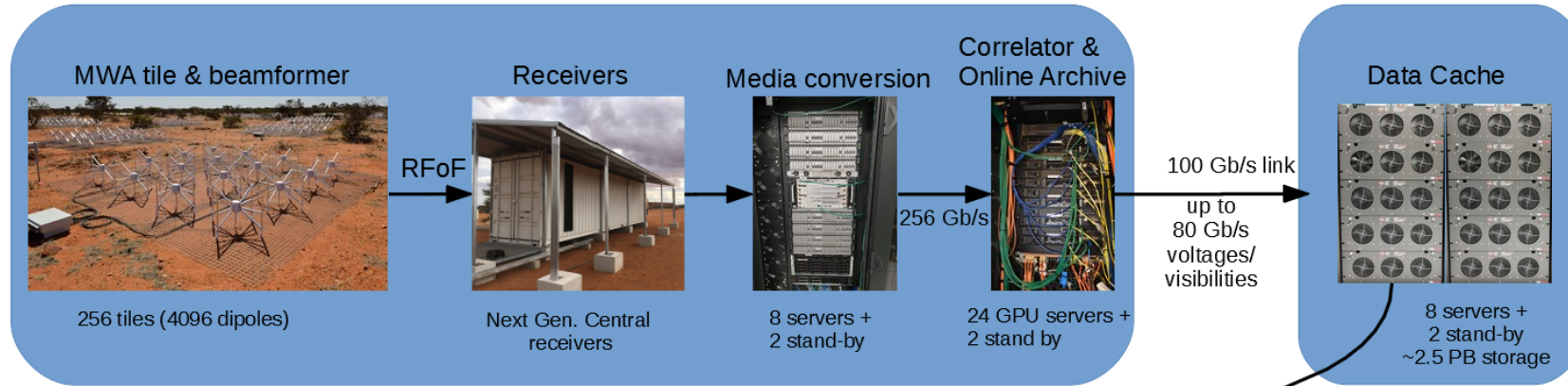




MWA Phase III (Future) – Data Flow

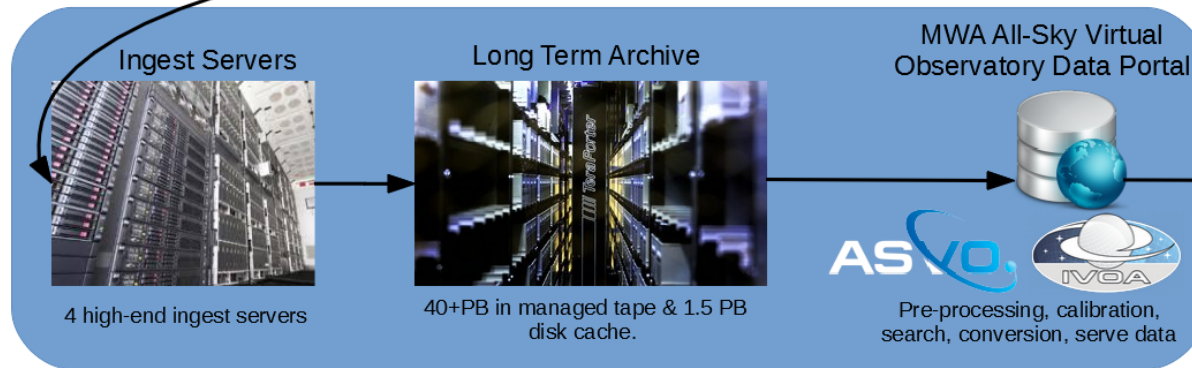
Tier 0: Murchison Radio Astronomy Observatory (MRO), Western Australia

 Curtin University



Tier 1: Curtin University, Bentley, Western Australia

100 Gb/s link



Tier 2: Pawsey Supercomputing Centre, Kensington, Western Australia



Processing, calibration, imaging, analysis, publication



Antenna tiles (256T)

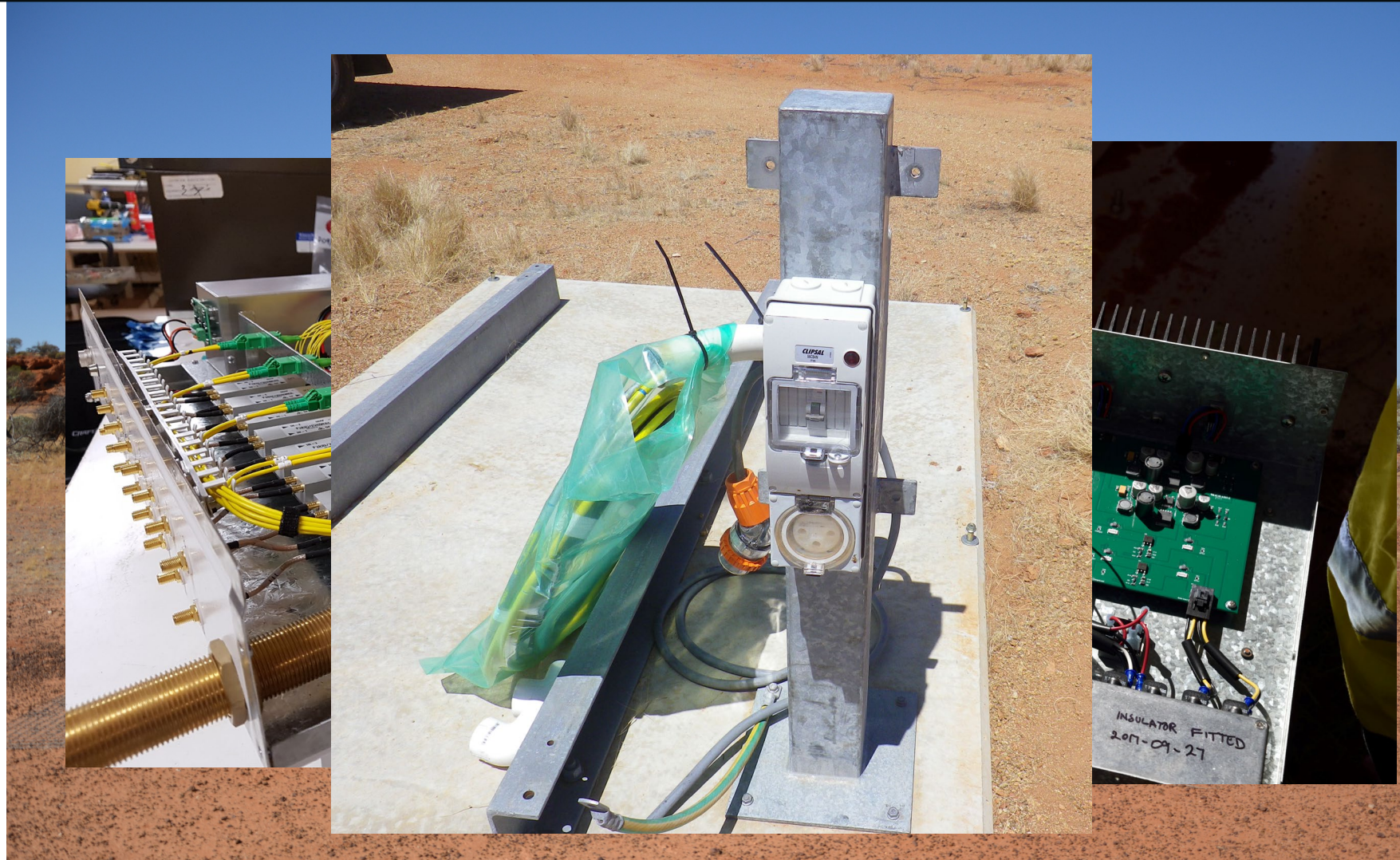
- Already have 256 tiles in field- no more installation required
- More maintenance
- Beamformer upgrades





Radio Frequency over Fibre (RFoF)

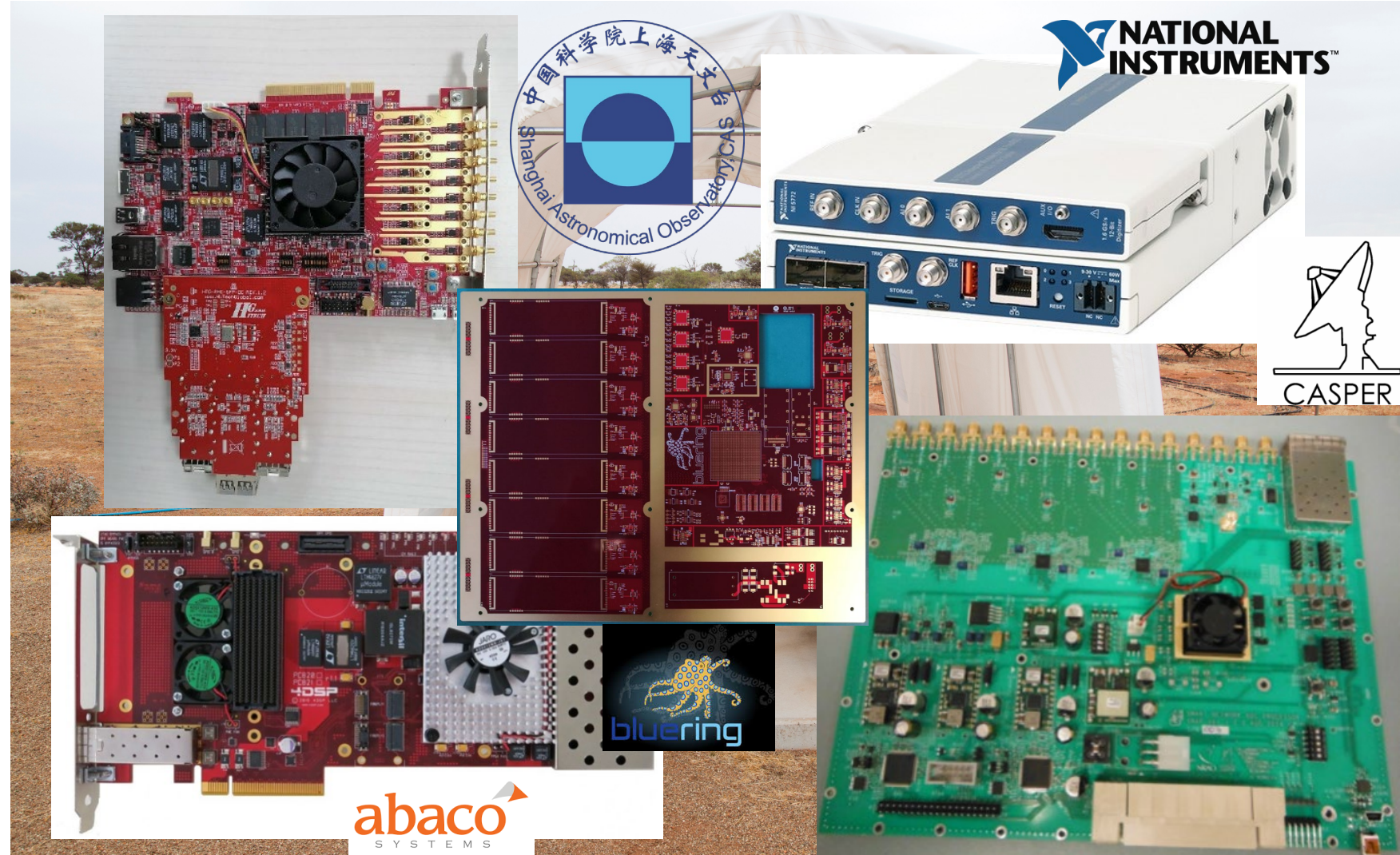
- Additional upgrade path
- Retrofitting coax-cabled tiles with fiber
- Depends on number and type of new receivers
- New hardware, development required





Receivers

- Phase III bottleneck
- Develop 16 new receivers AND replace 16 old ones
- Hardware options
 - SHAO
 - National Instruments FlexRIOs
 - Casper SNAP
 - Abaco PXi
 - Bluering/CSIRO RFSoc
- ASC module
- EMC testing, shielded enclosure





Media Conversion (medconv)

- Provide a consistent data format for correlator input
- Repurpose existing VCS servers
- Required if we use both old and new receivers, or if new receivers can't perform 'corner-turn' operation





Correlator (MWAX)

- New 'MWAX' correlator replaces current 'legacy' correlator
- FX architecture on 24 GPU nodes
- More flexible frequency and time resolution options
- Multicast voltages
- 90% development work complete





Data pipeline & cache

- Bigger data pipeline installed between MRO and Curtin to support new correlator
- Cache at Curtin running NGAS, 2.5PB storage
- Possible upgrade path to increase link size further (300Gbps)





Archive at Pawsey

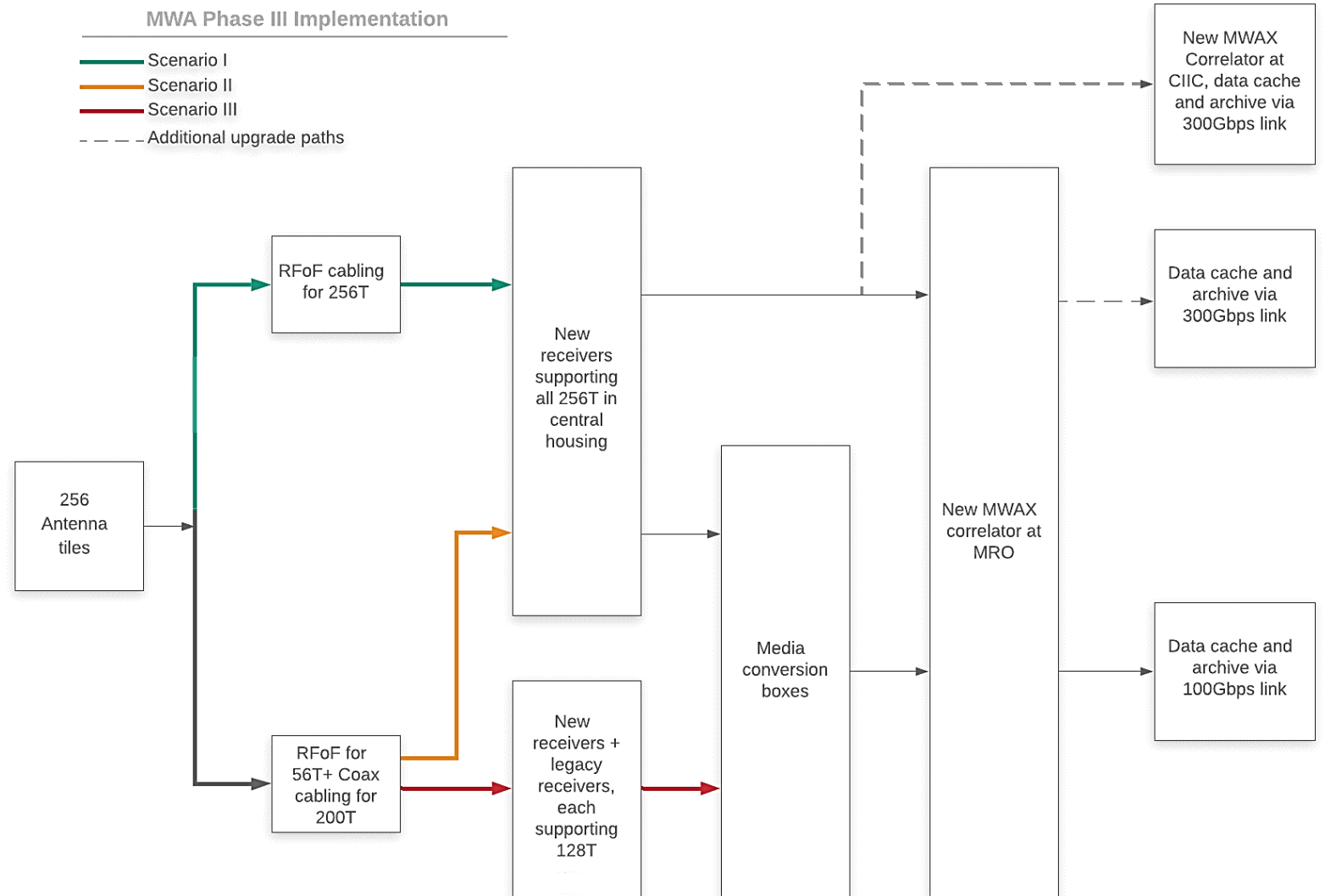
- Data forwarded from cache boxes at Curtin
- Archive growth rate increases
- 2 new front-end (FE) nodes
- Data Life Cycle policy
- Requested increase in archive size





Implementation

- Multiple possible upgrade paths, new MWAX correlator common to all
- New receiver procurement largest impact factor in Phase III
- Additional upgrades dependent on funding and science cases





Timeline

Phase II



- December 2020: MWAX development work complete
- June 2021: New receiver prototype tested and design finalised
- July 2021: MWA Phase III starts, more receiver units purchased
- December 2022: Array fully operating in new regime

Phase III

2021-2026



- June 2026: MWA Phase III ends
- Dec 2027: All MWA-ASVO observations become public, support ends

ASVO





MWA Partner Institutions

