ATUC ASKAP Update

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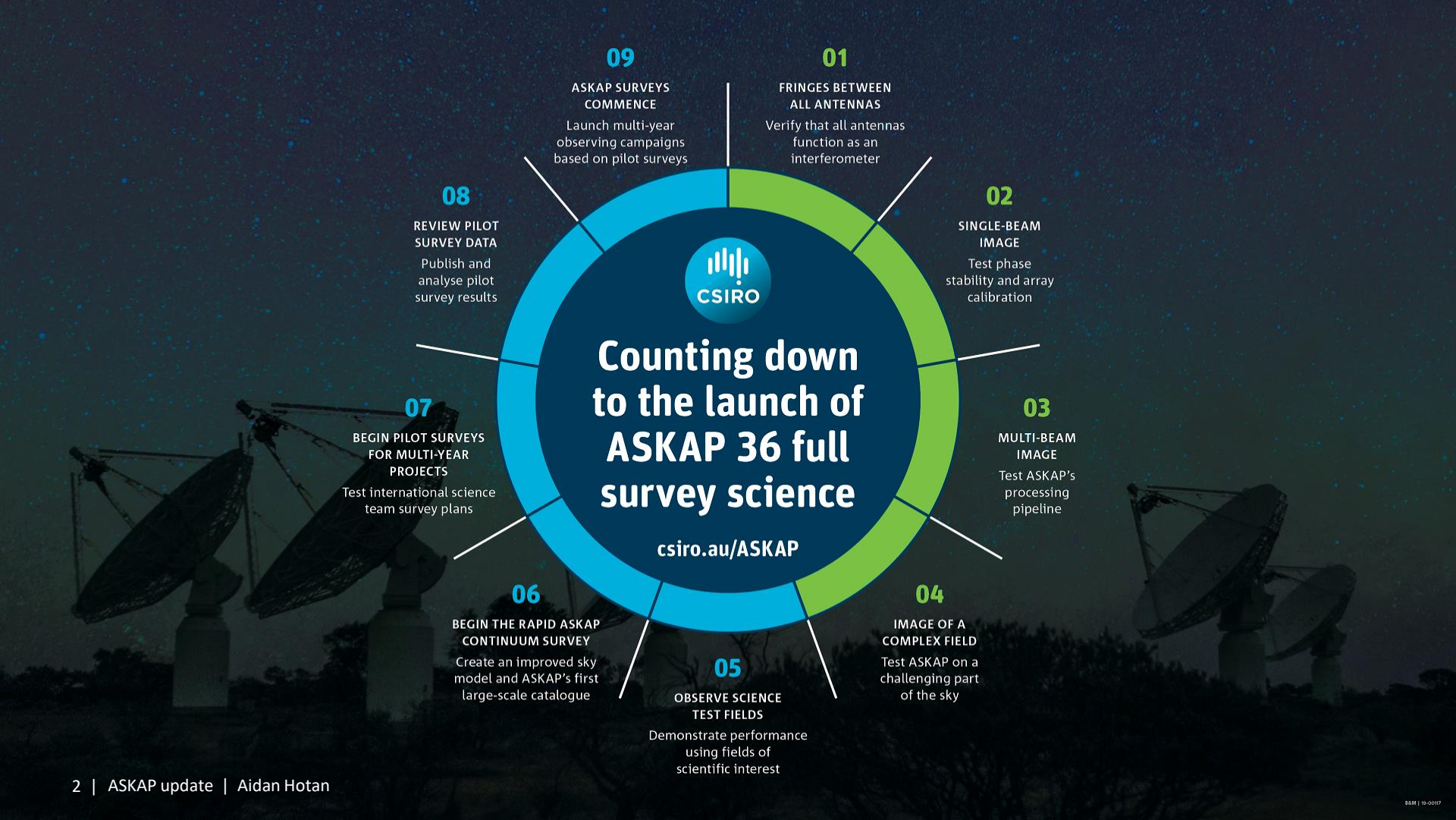
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Launch multi-year observing campaigns based on pilot surveys
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Verify that all antennas function as an interferometer
08
REVIEW PILOT SURVEY DATA
Publish and analyse pilot survey results
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SINGLE-BEAM IMAGE
Test phase stability and array calibration
CSIRO
Counting down to the launch of ASKAP 36 full survey science
csiro.au/ASKAP
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BEGIN PILOT SURVEYS FOR MULTI-YEAR PROJECTS
Test international science team survey plans
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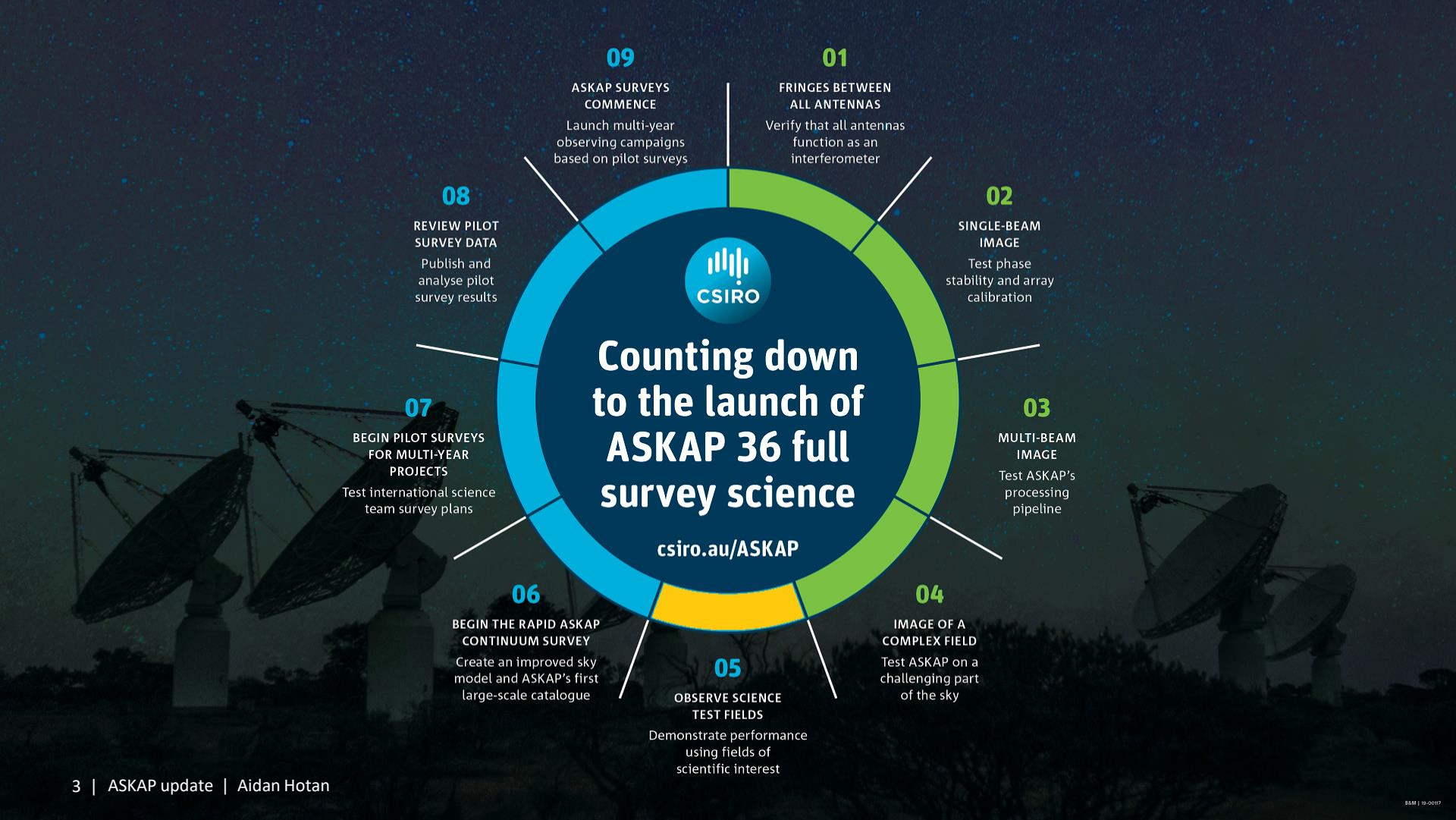
OBSERVE SCIENCE TEST FIELDS
Demonstrate performance using fields of scientific interest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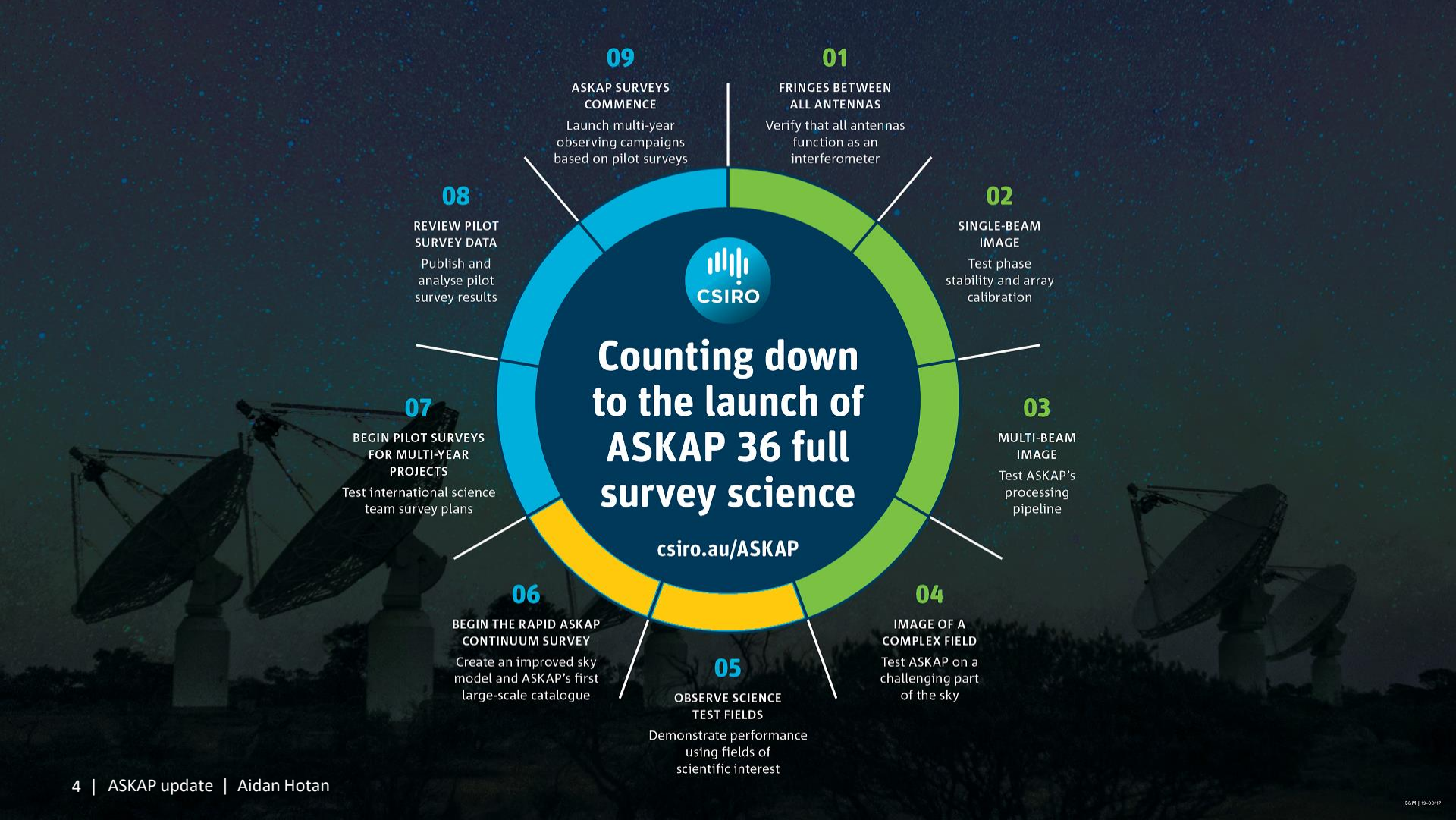
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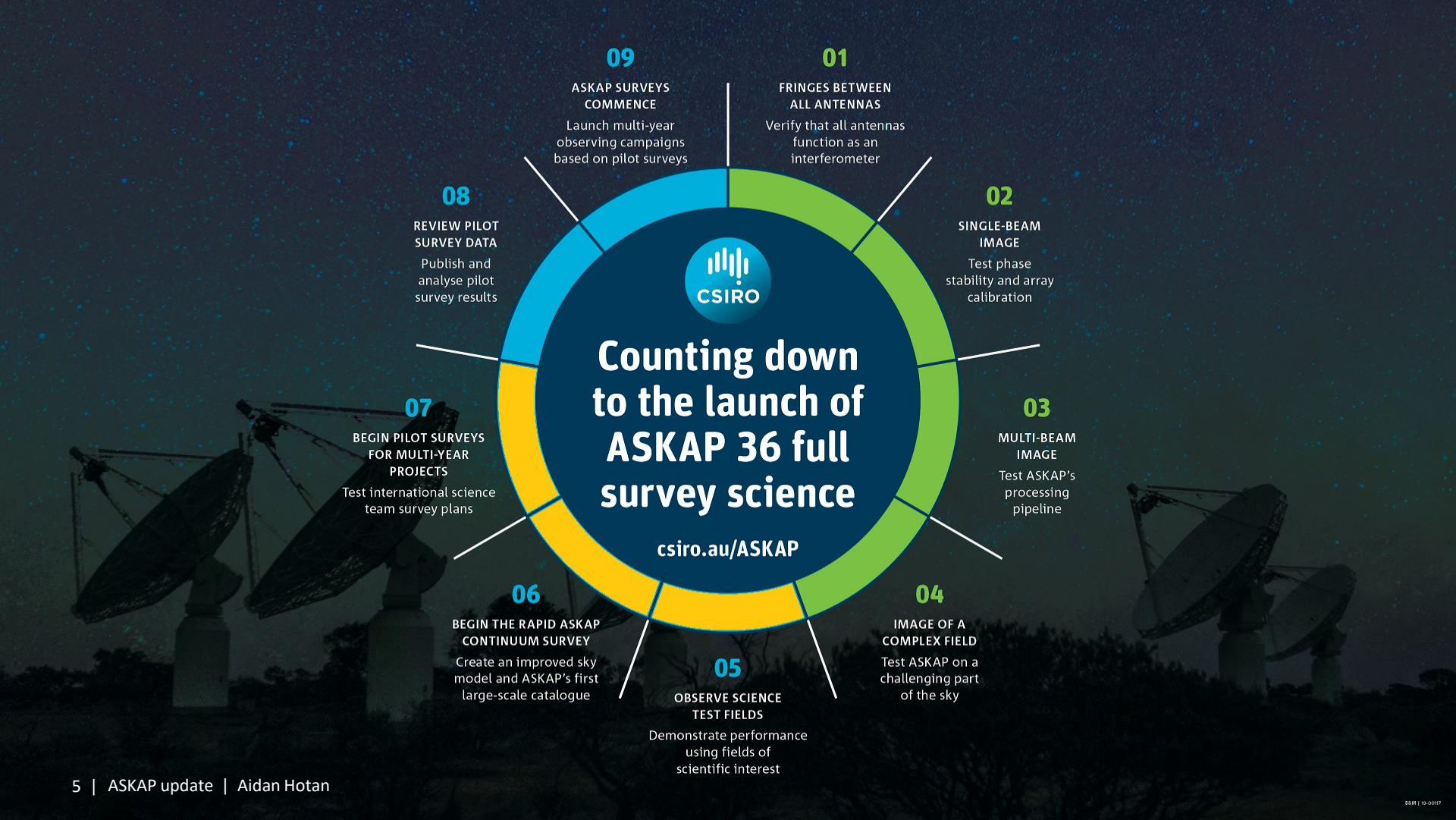
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ASKAP observatory update summary

- Carefully ramping up towards survey operations
  - Pilot surveys are testing the telescope, survey strategies and processing
    - See slides from Vanessa, Matt and science team talks yesterday
  - Development work underway to improve system reliability and data quality
  - Development of operational procedures and automation still required
- Rapid ASKAP/All-sky Continuum Survey, eROSITA projects
- Planning further pilot surveys and full survey scheduling

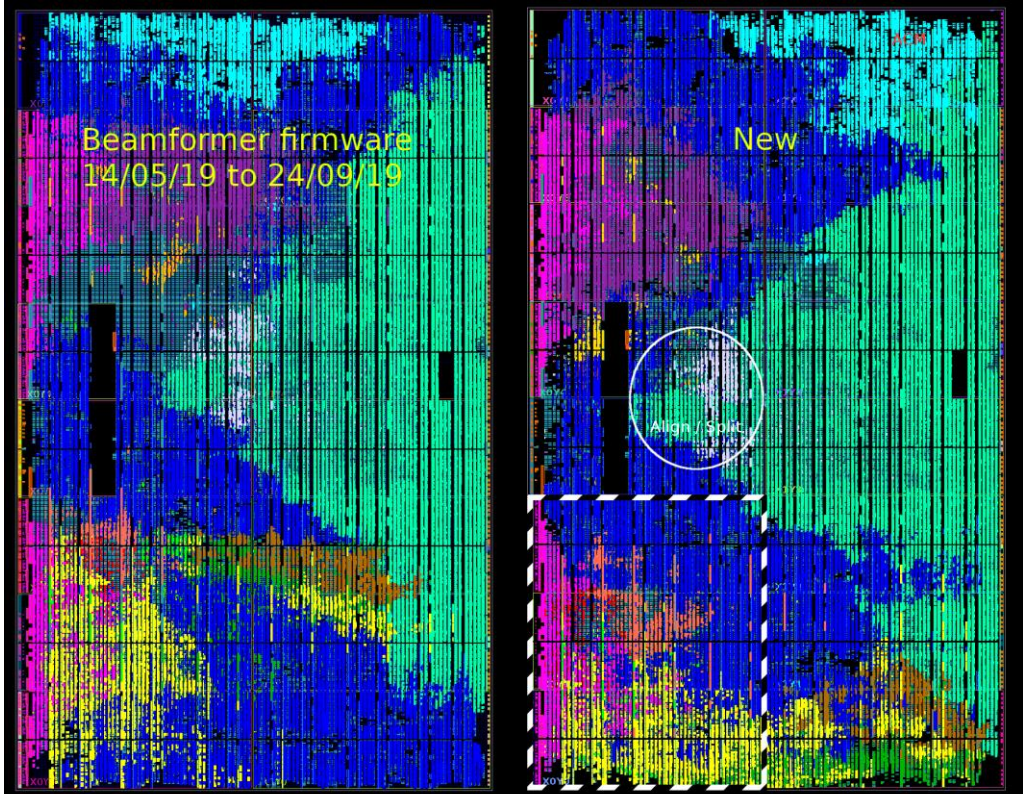
ASKAP upgrade project (ASKAP-X)

- 3-year project to improve and update ASKAP systems
  - Priorities set by operations through product owners (team leaders)
- Managed using the Scaled Agile Framework
  - Emphasis on cross-team communication and knowledge building

- Priority on issues impacting reliability and data quality
- Once reliable operation is achieved, enhancements follow
  - Split band mode, bandwidth vs beams, rapid imaging mode, etc.
    - ATUC feedback on enhancement priorities welcome

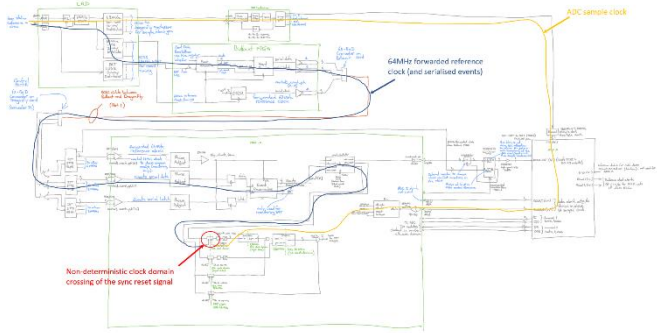
Correlator stability

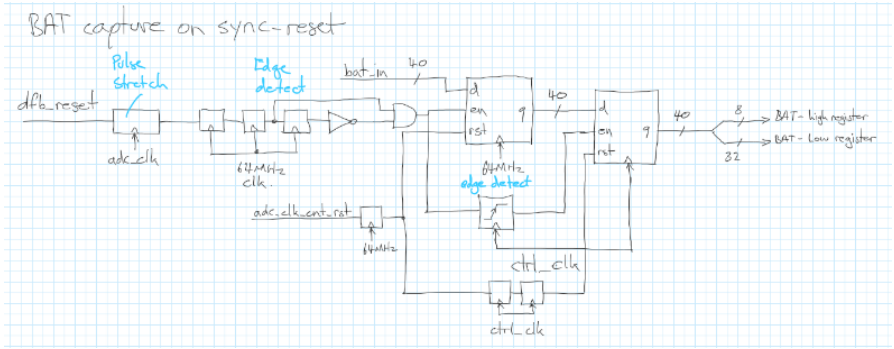
- Loss of data from many channels, up to ~40% after 12 hours
  - Particularly bad for spectral line mode
- Problem found in output from the beamformer fine filter-bank
- Fixed in new beamformer firmware
  - SBIDs > 10000 show dramatic improvement
  - Hopefully transferrable to all future builds



Reproducible digital synchronisation

- Synchronisation across all digitisers introduces random delays
  - This invalidates the beam weights and forces re-calibration
  - Cause found in the way digitisers latch to synchronisation event
- Workarounds provided, cannot eliminate entirely
  - This makes the on-dish calibration system critical for band changes





ASKAP data processing disk buffer

- Achieving data quality targets = multiple processing passes
  - At least for the first observations in any new mode
- Intermediate data products can be very large
  - Must work on one project at a time

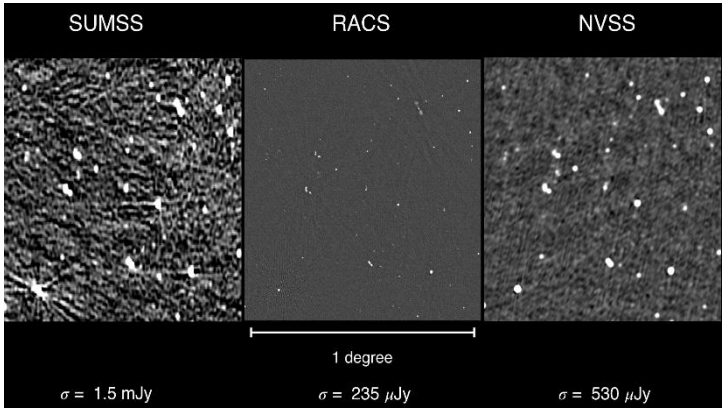
- New, dedicated disk space for ASKAP ingest and processing
  - Same ingest space (1 PB), 10 times more processing space (3 PB)
  - Available, used for observing as of 21/10/2019
    - Not operating to requirements yet!

ASKAP-X challenges and opportunities

- Maintaining ongoing engineering effort has been a challenge
  - Tracking down problems in a complicated system requires dedicated time
- Investigating and testing often requires use of the array
  - Difficult to reproduce most issues in simulation or the workshop
- Operations must co-exist with development (DevOps)
  - Availability of people with multiple roles is hard to estimate
  - Unplanned, reactive work is a big drain on resources
  - Opportunities for distributing system knowledge more widely

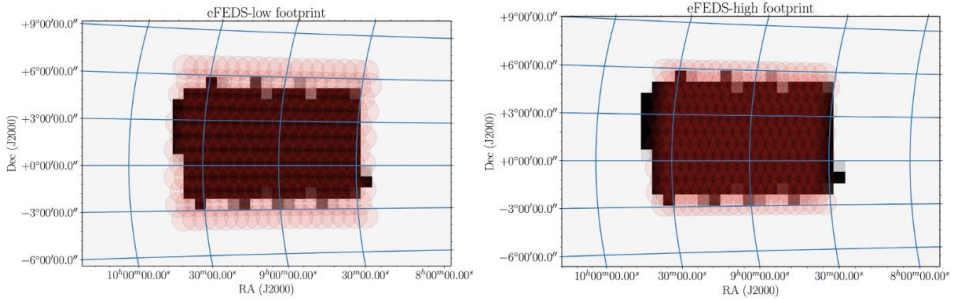
RACS data release imminent

- 3rd (and final) processing pass underway
  - Planning to begin loading data onto CASDA this year
- Full science catalogue construction in progress
  - This will be released after the first images are available



eROSITA observatory project

- MoU between AAL and the eROSITA-DE collaboration
  - ASKAP is currently planning to observe the GAMA-09 equatorial field, the main target field for eROSITA performance verification
- Widespread interest in GAMA-09 from ASKAP SSTs
  - Obtain a wide range of data products as an observatory project
- Provide a public resource for multi-wavelength comparison



Pilot survey review and consolidation

- ASKAP-X already has a long list of improvements to deliver
  - Many improvements need dedicated time for testing and development
  - Need a few months of consolidation once current observations finish

- We will be seeking feedback from pilot survey data analysis
  - Collect and prioritise improvements needed for full surveys

- Shift priority back to engineering for some time after pilots
  - Still possible to conduct time-critical observations

The path to beginning full surveys

- Priority is currently on finishing the existing pilot survey plans
  - This may take several more months as observing efficiency is very low
  - Consolidation time will follow, roughly 3 months with minimal observing
- The first pilot surveys have been very instructive
  - A further round will be considered if needed before time allocation review
- Pilot survey experience will inform a Combined Survey Strategy
  - This should optimise the science/time ratio for the full survey projects
  - Must clearly identify resource requirements for each survey

ASKAP survey project review

- Current project ratings and approvals were assigned a decade ago
  - They do not provide enough detail to assign time or schedule survey projects
- There will be a review by an international panel of experts
  - Likely to happen mid-late next year (2020)
- The goal will be to create an observing plan that we can schedule
  - Detailed scheduling should be automated, with priorities defined weekly

Terms of reference for the review process

- ASKAP's survey projects are huge investments of time
  - Every effort should be made to schedule efficiently
    - This depends heavily on commensality and technical feasibility

- The 8 active projects will get time, no new full-scale projects
  - Existing projects can modify their science case and observing strategy

- Input to the panel will be the suggested Combined Survey Strategy
  - If projects conflict, the panel will assign priority based on science case
  - The panel may provide recommendations for staggered project commencement
  - The panel may identify resource gates for some projects (e.g. Pawsey refresh)
  - There should be internal progress reviews yearly after surveys commence

Conclusions

- Pilot surveys are progressing and producing exciting results
- RACS will be the new benchmark survey at 1 GHz
- eROSITA observatory project will encourage collaboration

- ASKAP-X is addressing reliability and efficiency issues
- Current operations practices don’t scale to full surveys
- Consolidation time needed after the current pilot surveys

- Terms of reference for survey project review panel taking shape