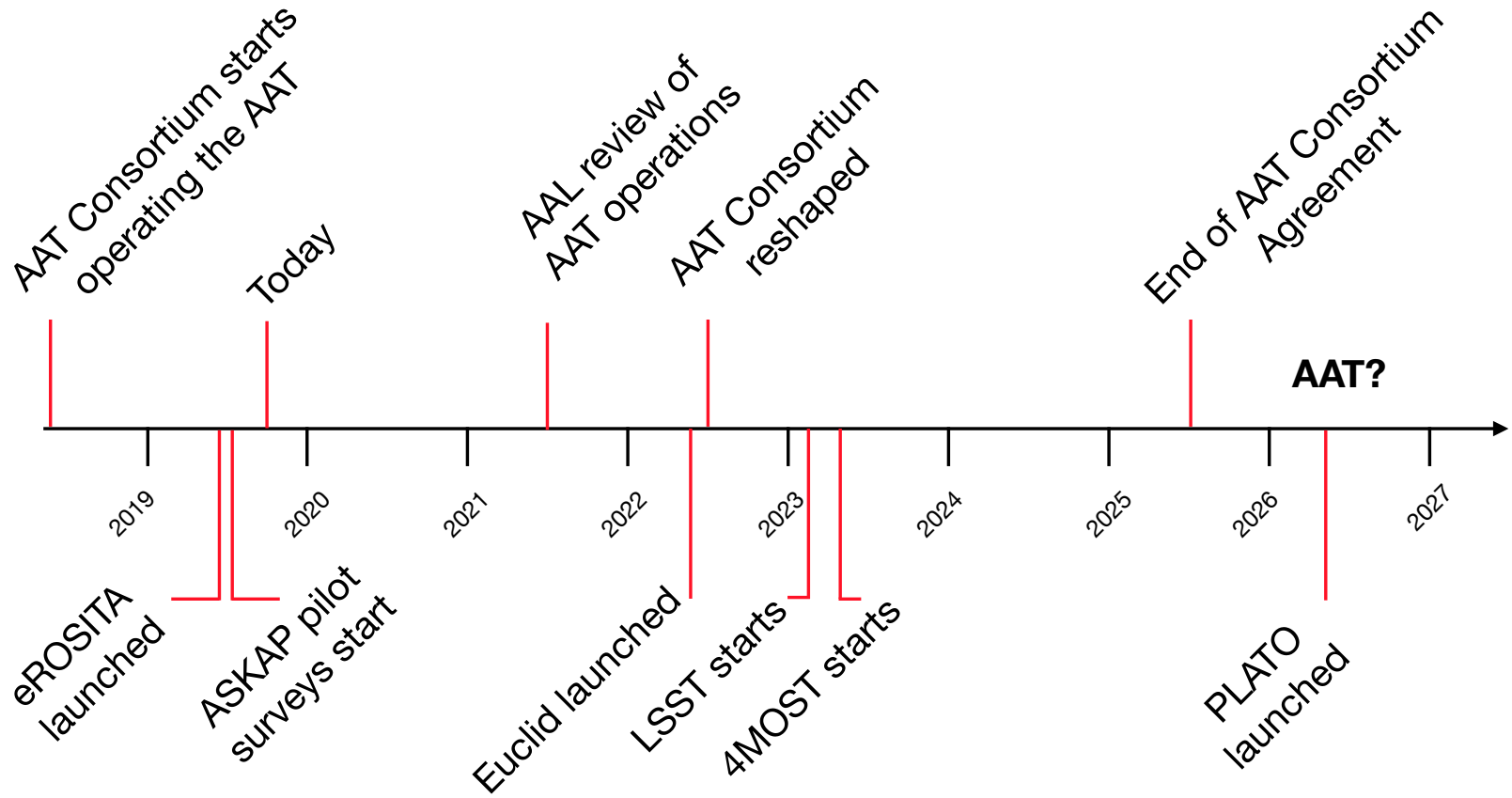


# Anglo-Australian Telescope



Chris Lidman

October 2019



2dF, KOALA, HERMES, Veloce



Hector



?

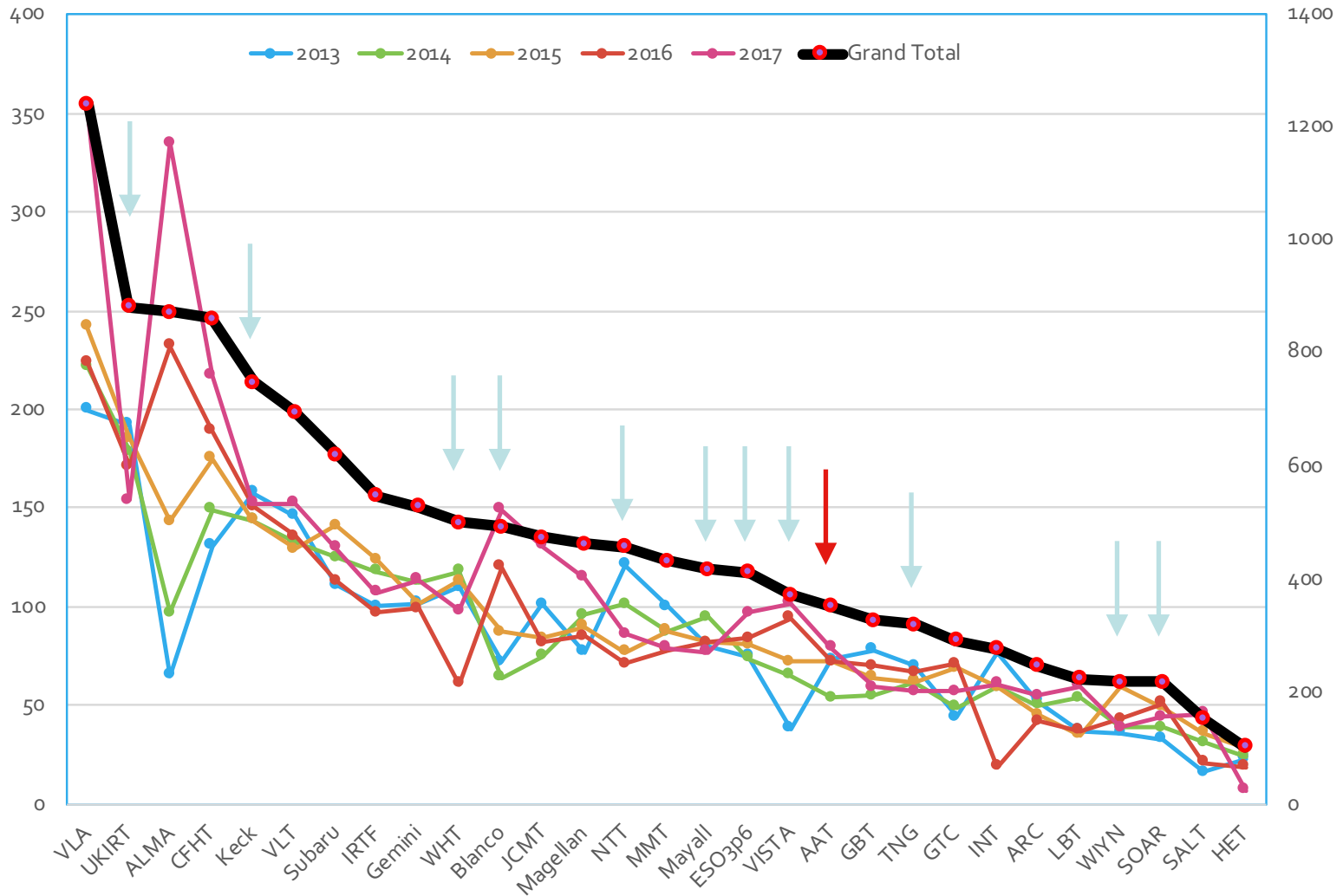
## Six science questions from the decadal plan

1. How did the first stars and galaxies transform the Universe?
2. What is the nature of dark matter and dark energy?
3. How do galaxies form and evolve across cosmic time?
4. How do stars and planets form?
5. How are elements produced by stars and recycled through galaxies?
6. What is the nature of matter and gravity at extreme densities?

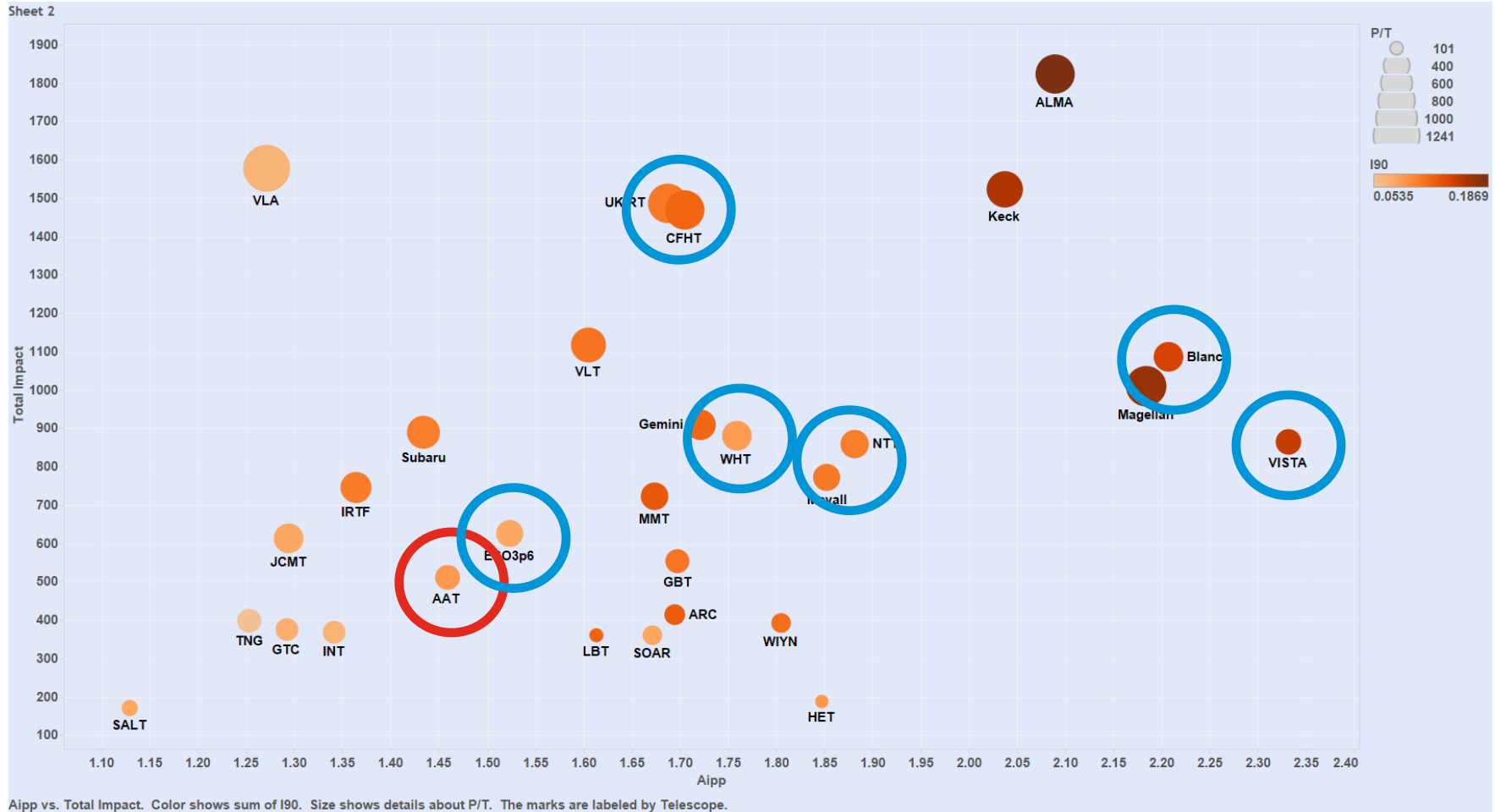
*Over the first four years of the 2016-2025 Decadal Plan, data collected at the AAT have been used to address all six of the fundamental scientific questions that form the focus of the Plan, and it will continue to make contributions to these questions over the lifetime of the Plan.*

Credit: Dennis Crabtree

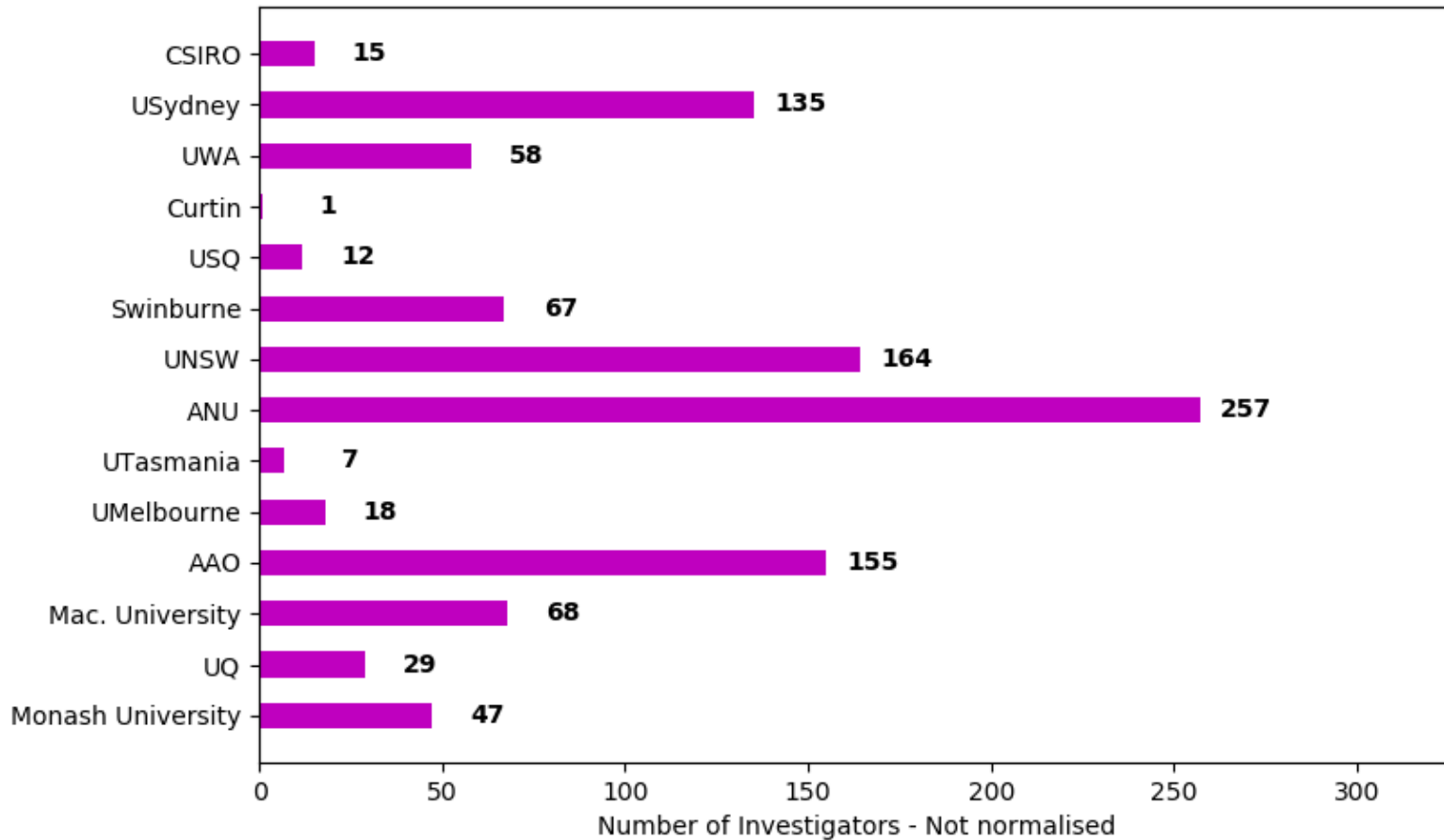
Telescope Productivity: 2013 - 2017

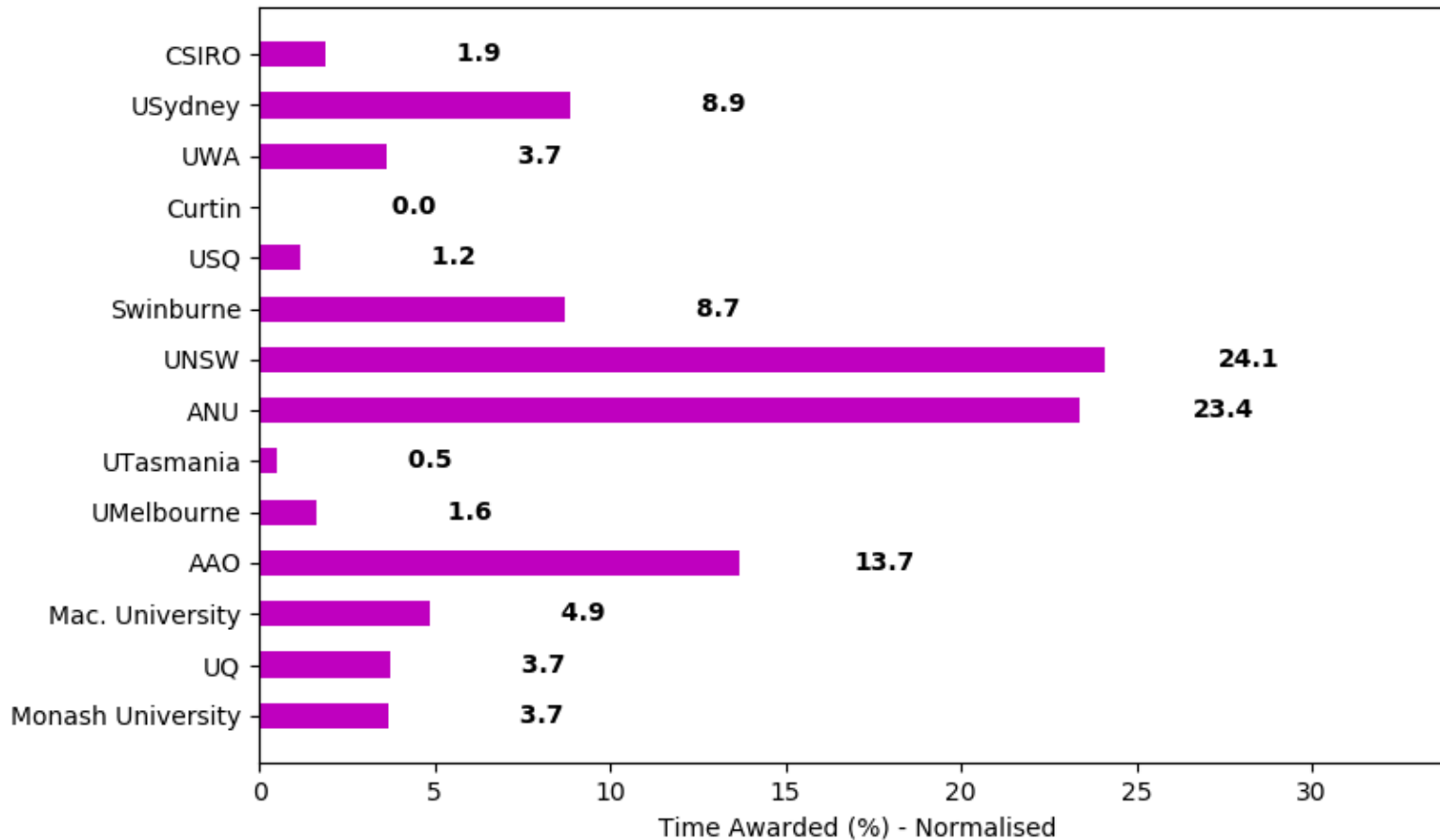


Credit: Dennis Crabtree

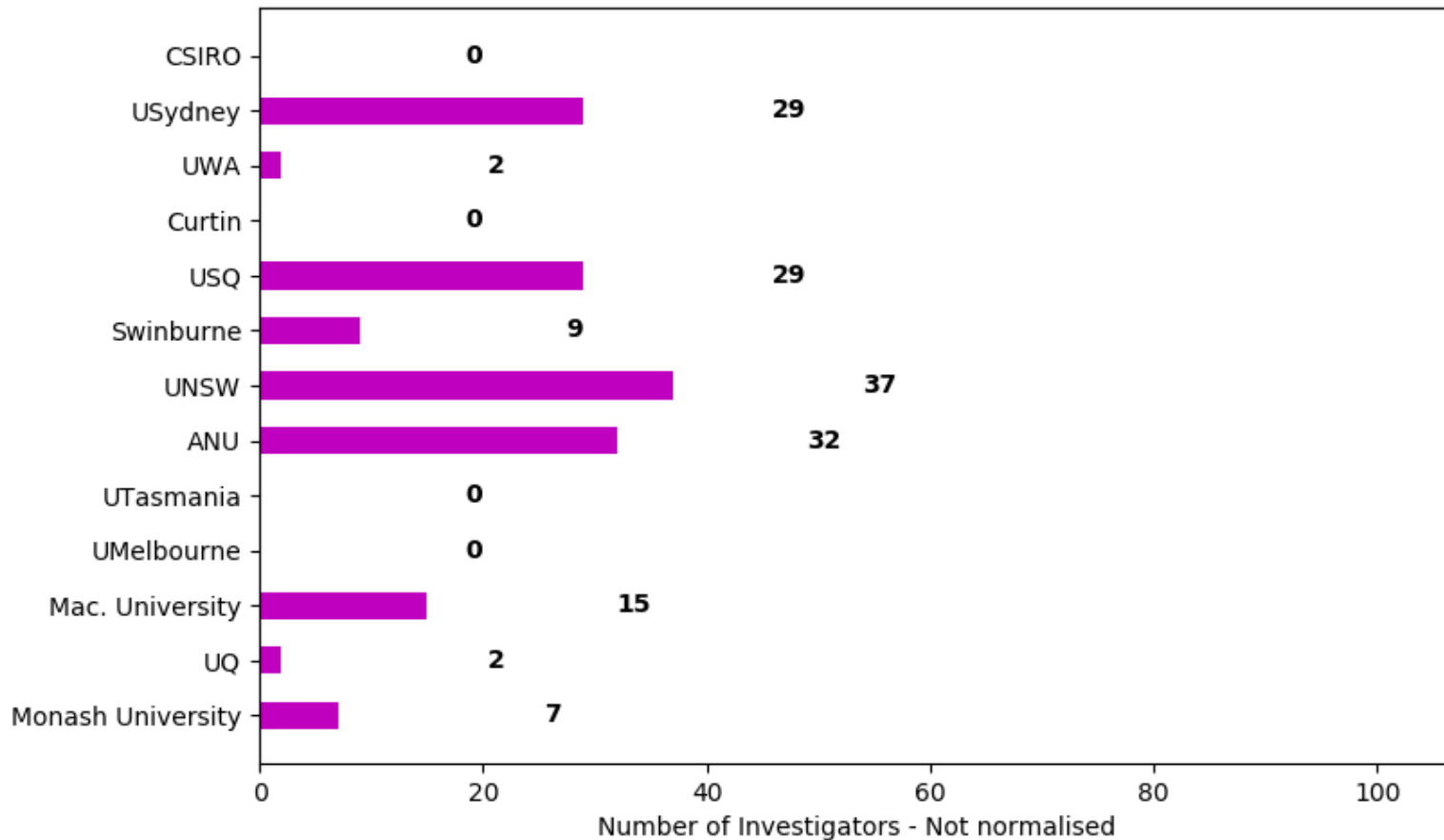


*It is anticipated that without new, or refurbished instruments, the user base will narrow, interest in using the AAT will diminish, funds for operations will be more difficult to source, and the scientific productivity of the facility will decline at an accelerating rate.*

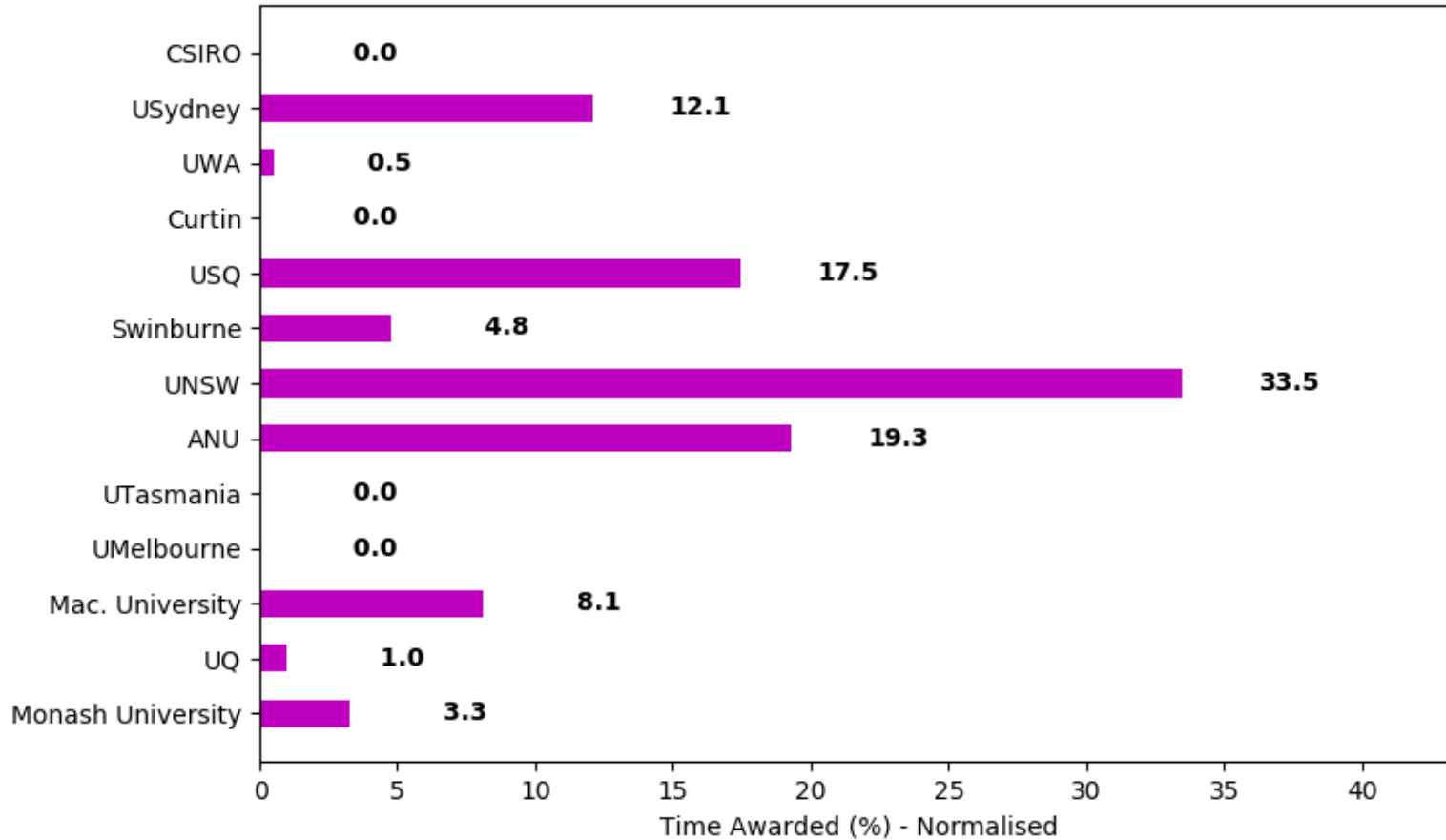








Caution: One year of data



Caution: One year of data

*The challenge moving forward will be to identify the right mix of funding (national, international, and/or non-traditional sources) and access (to those who provide the funds) to ensure that the AAT continues to have a productive scientific future beyond 2025 and is seen to provide good value-for-money in the broader context of other Australian astronomy facilities.*

Telescope	Operator	Comment
AAT	ANU (funded by consortium of Australian universities)	Owned by Commonwealth; open access for Australian-based astronomers
2.3m	ANU	Owned by ANU; open access for Australian-based astronomers
SkyMapper	ANU	Owned by ANU; early access to survey data for Australian-based astronomers
UKST	ANU (funded by Taipan/Funnelweb teams)	Owned by ANU; Australian-based astronomers can join survey teams
<b>Faulkes</b>	Las Cumbres Observatory	LCO
<b>LCO 1m</b>	Las Cumbres Observatory	2 telescopes
<b>LCO 0.5m</b>	Las Cumbres Observatory	2 telescopes
<b>KMTNet 1.6m</b>	Korean Astronomy and Space Science Institute	
<b>PROMPT</b>	University of North Carolina at Chapel Hill	Several telescopes in a single dome
<b>HAT South</b>	HAT South Collaboration	2 telescope arrays
<b>Project Solaris</b>	Nicolaus Copernicus Astronomical Center	
JAXA	Japan Aerospace Exploration Agency	3 telescopes
Huntsman	Macquarie University	Telescope array
iTelescope	iTelescope NET	Commercial organisation with 20 telescopes
bRing	ANU	
<i>Veloce-RAPTOR</i>	<i>Macquarie University</i>	<i>Operational in 2020</i>

86% of site costs  
\$700k / annum

Global Networks

~ 40 telescopes

- Due to its longitude, SSO will continue to operate into the foreseeable future

*... , decisions on the future scientific use of the AAT need to consider other facilities available at Siding Spring Observatory (SSO) and elsewhere. The need for rapid follow-up of sources discovered by LIGO, LSST, and SKA precursors and continuous monitoring of other sources is an area where SSO has a natural advantage, due to its geographical location.*

- 67% of site costs are covered by the AAT (this will come down to ~40%, gradually)

~~**Scenario #1:** The status quo up until 2025: no new instruments, no refurbishments to existing instruments, and no changes to telescope operations.~~

**Scenario #2:** As in scenario #1, but with a refurbished 2dF and selling a larger fraction of time on the telescope to fund operations (recalling that at present around 10% is sold to external consortia).

**Scenario #3:** No new instruments, no refurbishments to existing instruments, decommission 2dF. Visitor instruments are still accepted. KOALA, Hector and Veloce available.

**Scenario #4:** A new instrument delivering the capabilities of the SOXS facility on NTT (or even a clone of that instrument) is built and commissioned for use by 2023. 2dF and KOALA decommissioned. SOXS, Hector, and Veloce are available for use and visitor instruments are still accepted. Time on the AAT (and potentially other facilities at SSO) is used as an in-kind contribution to an external facility, such as LSST.

## Post 2025

~~**Scenario #5:** The AAT ends its life as a scientific facility. This option received little support at the town hall meetings.~~

**Scenario #6** One or more new instruments are added to the telescope, while 2dF, HERMES and KOALA are decommissioned. Operations costs decrease by 20%.

- Multiple failures with the instrument since the LSST meeting in May
- Three cancelled 2df runs
- Unresolved intermittent hardware fault with gripper PMAC card. Leads a cascade of failures that lead to a catastrophic failure of the instrument
- 2dF Software has been revised to tested to overcome the chain reaction that occurs when the hardware fault occurs
- Hardware fault still persists, but is simple to recover from. 2dF will be placed on the telescope next week.
- Instrument is old, some components are well beyond their use-by date (look up lead, zinc and cadmium solder whiskers )
- Few or no spares for critical components (e.g. PMAC cards)
- Some critical components difficult (impossible?) to source
- Requires refurbishment - replace obsolete systems
- Strong support from community for the refurbishment
- A plan being prepared, will be submitted to AAT Council

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## Questions?