4. Performance

Telescope operations

Strategies

The AAO is committed to listening to the astronomical community, especially its user community, to assess and anticipate its needs. There are several avenues available for this. Principally, the time assignment committee, the AAO Users' Committee and the AAT Board (all representatives of the wider astronomical community in their own right) have a strong influence on the strategic directions of the AAO.

It is in the AAO's own interests to stay abreast of world best-practice, and AAO staff are encouraged to observe at or visit major telescopes overseas. Participation in conferences, seminars and colloquia are also important ways of staying in touch.

Another vital strategy is to ensure that the needs of users are met. This is achieved through maintaining and consolidating existing instrumentation and associated software; providing excellent support in setting up the instruments, operating the telescope, and observing; soliciting users' comments; continuing to develop first-rate, innovative new instrumentation; and achieving ever-greater efficiency in operating the telescopes.

AAT organisational statistics

It is the high standard of AAO facilities and the continuing instrumentation development program that have traditionally ensured that observing time on the AAT is over-subscribed. Figure 4.1 shows the oversubscription rate for the AAT over the past four years, sorted by lunar phase requirement.

It will be seen that the oversubscription for dark time has surged, as foreshadowed last year, due to the commissioning of AAOmega, and the special calls for Large Observing Programs, most of which involve AAOmega. It is comparable with the spike in the oversubscription rate generated by IRIS2 when it was introduced during 2002–03 bright time.

AAT users come from a wide range of institutions in Australia, the UK, the USA and many other countries.

Figure 4.1 Oversubscription rates for the AAT

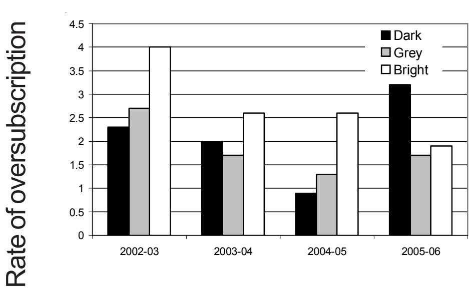


Figure 4.2 The use of observing time at the AAT in 2005–06

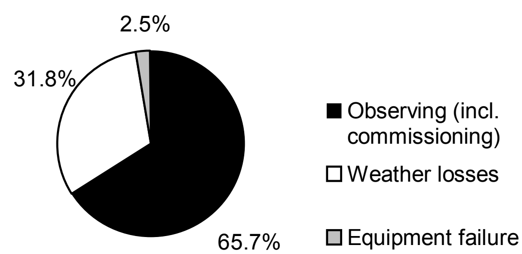
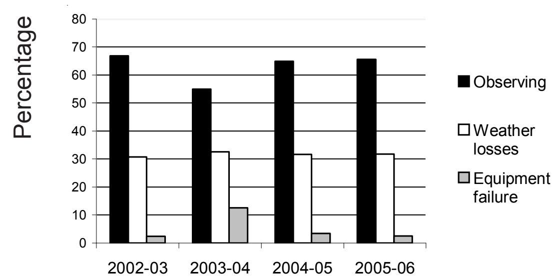


Figure 4.2 shows the use of observing time during the period 1 July 2005 to 30 June 2006. A total of 3,125 dark hours were available, and an additional 166 hours of commissioning time were used. The continuing trend of good weather conditions associated with the drought experienced in eastern Australia is evident in Figure 4.3, which compares the use of observing time over the past four years. A critical metric of user satisfaction is the fraction of available observing time lost through equipment failure. It will be seen from Figure 4.3 that this is now within the AAO's target level of 3%. The higher rates of time loss in the previous two years were largely due to specific causes: the catastrophic failure of a dome shutter drive shaft during 2003–04, and recurring 2dF robot problems during the first half of 2004–05.

Figure 4.3 The use of observing time at the AAT over the last four years



User Feedback

All AAT and UKST observers are encouraged to complete the web-based feedback form, which asks how well the AAO has fulfilled its obligations under its Client Service Charter (see Appendix C). The responses are ranked in five steps ranging from well below (1) acceptable to well above (5) acceptable. Users are also asked to flag key items and to comment on any issues of concern.

During the period 1 July 2005 to 30 June 2006, 60% of users completed feedback forms for the AAT. This response is at the upper end of the average range (50–60%). Users are actively encouraged to submit feedback forms at the end of their observing runs.

The average scores over the year are shown in Table 4.1, together with those for the previous two years. The statistical errors on these mean grades are ~0.2. They show that the level of satisfaction is generally high, and fairly consistent over the three years.

The AAO Corporate Plan sets a goal of a score of at least 3.5 in all categories. All performance areas have met that target in 2005–06. General computing, traditionally the weakest area in the reply categories, has responded well to strategic IT initiatives. The disappointing score for Data Reduction Software resulted primarily from UCLES observers having to cope with the inherent complexity of the échelle wavelength format early in the reporting year. Library Facilities has been discontinued as an area for comment as most users of the telescope now look at the literature on-line rather than in the AAT library. Many of the feedback reports contain suggestions for improvements, most of which have been acted upon. Usually they involve small, instrument-specific changes to improve ease of observing. All comments, both positive and negative, are followed up through appropriate management channels and acknowledged.

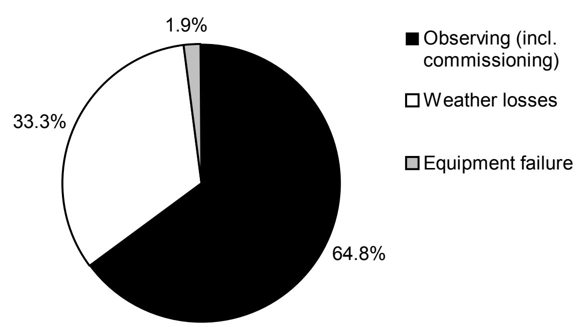
Table 4.1 User Feedback at the AAT

	2003–04	2004–05	2005–06
Night Assistant support	4.7	4.8	4.7
Staff astronomer before	4.3	4.5	4.7
Staff astronomer during	4.5	4.6	4.8
Other technical support	4.1	4.2	4.3
Instrumentation & related software	3.7	4.0	3.9
General computing	3.4	3.7	3.8
Working environment	3.9	3.9	3.9
Travel & administrative support	4.1	4.0	4.0
Data reduction software	3.9	4.1	3.6
Instrument manuals	3.9	4.1	3.9
Library facilities	3.7	3.7	n/a
AAO WWW pages	4.0	4.1	3.9

UK Schmidt Telescope Organisational Statistics and Performance Indicators

Figure 4.4 shows the use of UK Schmidt Telescope

Figure 4.4 The use of observing time at the UKST in 2005–06



In Figure 4.5, the use of observing time over the past four years is shown, revealing once again the effect of continuing good weather.

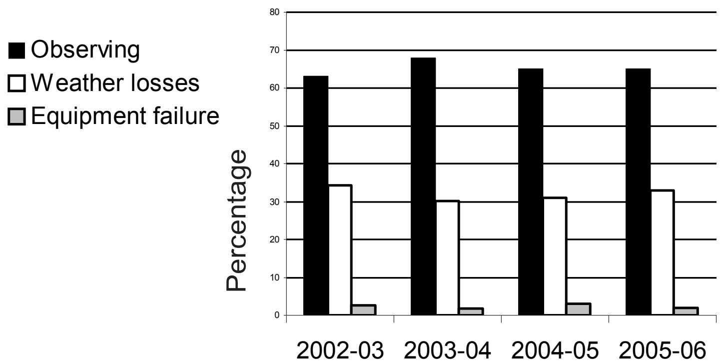


Figure 4.5 The use of observing time at the UKST

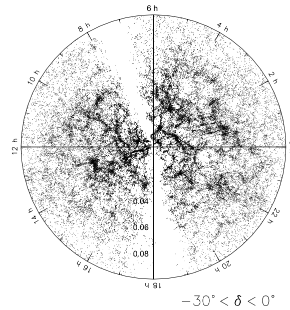
System-loss statistics were normal. The 6dF instrument, now five years old, has attained a very stable operating mode with only fibre breakages presenting problems of reduced efficiency. These are rectified by means of an ongoing maintenance program, which removes one or the other of the two field plates from service for short periods while fibre repairs are effected.

The 6dF program has occupied all UKST observing time since the beginning of 2003, and Table 4.2 summarises the data obtained for the principal observing campaigns since 6dF operations started.

Table 4.2 Total 6dF observations (hrs)

	2001-02	2002-03	2003-04	2004-05	2005-06
6dFGS fields	261	351	392	383	94
RAVE fields	-	47	320	407	726
Non-survey fields	124	162	118	112	2
Total fields	385	560	830	902	822
Total exposure	713	1078	1219	1288	826

Observations for the 6dF Galaxy Survey (6dFGS) were completed during the reporting year, with the final observations being made on the night of 5 January 2006. Despite some trading of nights with the RAVE survey (see below), there remained ~50 fields outstanding at the end of the survey due to poor weather during the second half of 2005.



A view of the 6dF Galaxy Survey

From 11 April 2003, seven unscheduled bright-of-moon nights per month were allocated to the international RAVE survey of stellar radial velocities and metallicities, which funded the time externally. On 1 August 2005, however, responsibility for funding all UKST operations was taken over by the international RAVE consortium, although the telescope continues to be managed by the AAO.

With new funding arrangements in place for the UKST, the AAO-supported non-survey program came to an end. The final observations were made during the August 2005 bright-of-moon period for the Kuiper belt occultation program (Saunders, AAO, et al.)

The new funding arrangements allow 25 nights per lunation to be used by RAVE, with 20 of those supported by AAO observers and the remainder by visiting RAVE observers. By the end of the reporting year, a total of 1500 RAVE fields (telescope pointings) had been observed, yielding 131,863 spectra for 120,165 stars. A total of 11,698 spectra are repeat observations, obtained either as part of the data validation process for the first data release, or as test samples for the detection of variability or spectroscopic binaries. (RAVE exposure times are shorter than those for the 6dFGS, resulting in the fall in the total hours seen in Table 4.1.)

The RAVE First-Year Data Release (DR1) was announced at the AAS meeting in Washington in January 2006, and in February became publicly accessible on the RAVE website (www.rave-survey.org). It consists of 25,274 radial velocity measurements of 24,789 stars obtained during the first year of operation (11 April 2003–3 April 2004). The mean velocity accuracy is 2.7 km/s, and the dataset is unique in stellar astronomy in having been obtained with a consistent instrumental set-up.

The new funding arrangement will continue for the duration of the RAVE project (which has set a target of one million stars, and is expected to continue for at least five years). The UKST is no longer available to external users, except by special arrangement with the AAO and the RAVE consortium.

Research

Research and organisational statistics

There were 11 research astronomers on the staff of the AAO at 30 June 2006. Five of them, while spending about half of their time on Observatory duties such as supporting visiting astronomers, spend the rest of their time on research. Three are members of the Instrument Science group and spend the majority of their time on research activities related to new instrumentation technologies. The other three, including the Director, the Astronomer-in-Charge and a shared position with Macquarie University, have significant responsibilities not directly related to their own research. The full-time equivalent astronomical research effort is about four people. In addition, there are three externally funded research fellows, and one emeritus astronomer. AAO research staff also co-supervise 16 PhD students from institutions including Sydney University, Macquarie University, and the ANU.

The total number of AAT observing programs for the past five years is shown in Figure 4.6. This continues the long-term trend for a decreasing number of observing programs as a consequence of AAT Board policies to promote large survey-style programs at the AAT, with the average length of an observing run now approaching six nights.

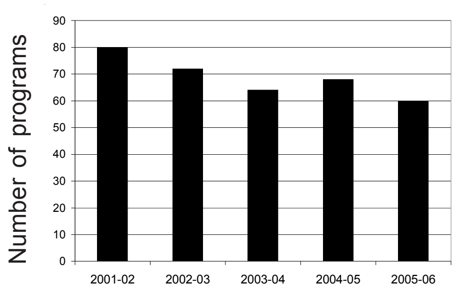


Figure 4.6 Total number of scheduled AAT observing programs. Note that long-term proposals are counted for each semester they are scheduled

Figure 4.7 shows the distribution of AAT observing programs by location of the Principal Investigator (PI). The proportion of successful proposals from UK PIs is now approximately even with that of Australian PIs and is likely to continue dropping as the UK's share of AAT observing time is further reduced.

Figure 4.7 Number of scheduled AAT observing programs by location of Principal Investigator

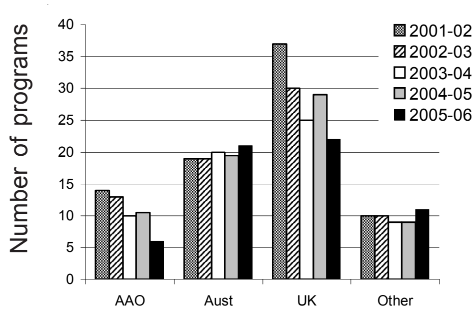


Figure 4.8 shows the total number of research papers published in refereed journals and conference proceedings using data from the AAT and the UKST. Also shown are the total number of AAO papers, published by AAO staff, students and visitors. In total, 95 AAT data papers, 29 UKST data papers and 92 AAO papers were published. While down slightly on the record levels achieved in the previous couple of years, this may just signify the ramping-down of studies utilising the 2dF redshift survey data, and preparation for the next generation of surveys utilising AAOmega. Publications by AAO staff, utilising data not just from the AAT and UKST but also from international facilities such as the Gemini Observatory, have also maintained a healthy level.

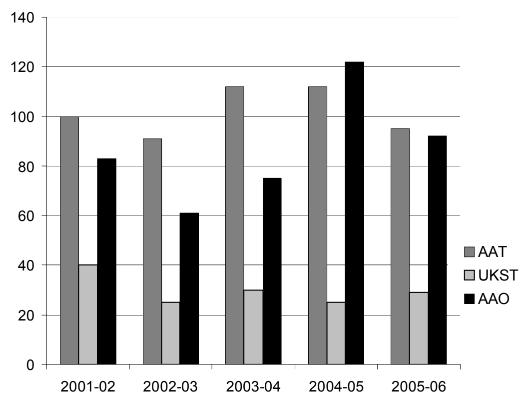


Figure 4.8 Total number of publications using AAT and UKST data, and AAO publications

The distribution of publications in refereed journals by location of the First Author is shown in Figures 4.9 and 4.10 for papers using AAT data and UKST data, respectively. The conclusion of the 6dF Galaxy Survey, and the First-Year Data Release from the RAVE survey, have contributed to a boost in UKST publications, particularly among Australian researchers.

Figure 4.9 Research papers published using AAT data by location of First Author

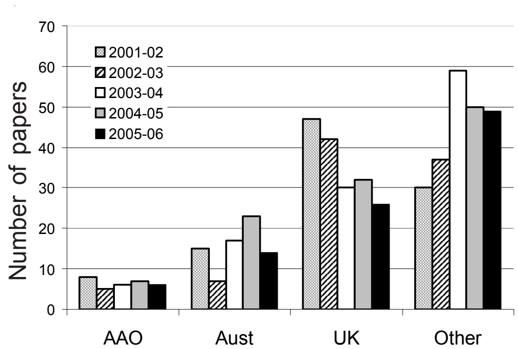


Figure 4.10 Research papers published using UK Schmidt data, by location of First Author.

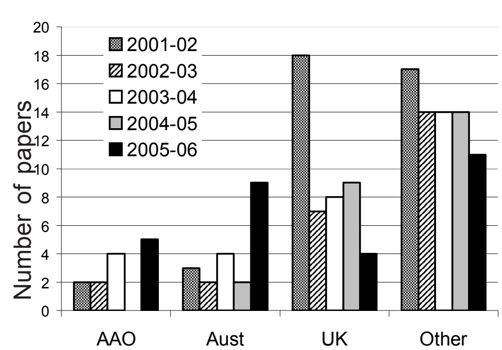


Figure 4.11 gives the number of AAO publications by AAO staff, students and visitors. This is sorted into papers making use of AAT data; UKST data; and papers involving data taken elsewhere (e.g. Gemini, ATNF, etc.), new theories or computational modelling, or new instrumentation technologies under development at the AAO. In all, some 168 unique refereed or conference papers were either published by AAO staff, or made use of AAT or UKST data, in addition to 4 articles in the popular press.

Figure 4.11 AAO publications by AAO staff, students and visitors

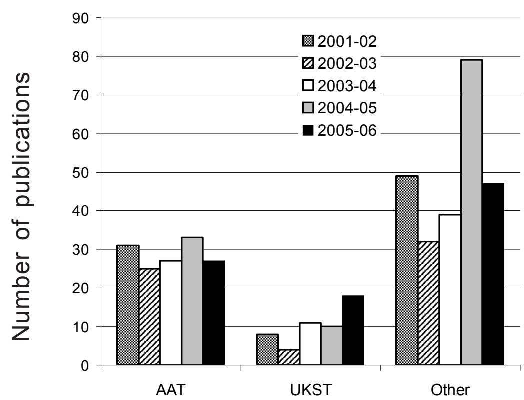


Figure 4.12 shows how well AAT observing programs are converted into scientific papers. To allow for the delay between observations and publications, the statistic given here is the number of publications in a given year divided by the number of scheduled proposals in the previous year. While down slightly on the record levels achieved in 2003–05 as noted earlier, this figure is still nearly double that achieved in 2000–01, an impressive gain in productivity and scientific impact.

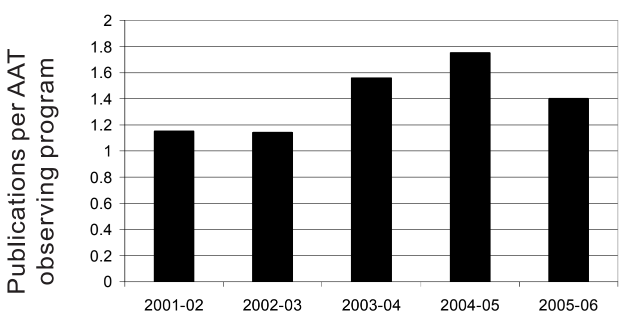


Figure 4.12 Publications per AAT observing program

Instrumentation

The AAO spends about 15 per cent of its budget each year on new instruments and associated software and detectors. Table 4.3 summarises the use made of instruments on the AAT over the last few years.

Table 4.3 Use of AAT instruments for the last three years (% nights allocated).*

Instrument	2003-04	2004-05	2005-06
2dF/AAOmega#	33.9	33.0	25.3
UCL coude échelle spectrographs (UCLES & UHRF)	23.9	31.3	45.7
Infrared imager/spectrograph (IRIS2)	24.5	26.3	21.5
WFI	2.8	2.5	1.6
TTF++	47.0	-	-
RGO++	43.0	-	-
SPIRAL integral field spectrograph++	0	-	0.9
Instruments supplied by users	5.9	6.9	5.0

*Years indicated are not financial years, but two AAO Semesters running from 1 February to 31 July (A) and 1 August to 31 January (B).

#2dF was unavailable in the last half of 2005 and was made available with AAOmega in the first half of 2006.

++TTF, RGO and SPIRAL were decommissioned in 2003–04. SPIRAL was recommissioned for use with the AAOmega Spectrograph in June 2006.

Usage of the 2dF multi-fibre spectrograph was down on previous years while the robotic fibre positioner was undergoing refurbishment in preparation for the arrival of the new AAOmega general-purpose optical spectrograph. The introduction of AAOmega has also enabled the fibre-fed integral field unit SPIRAL to be returned to service. Demand for the near-infrared imager and spectrograph IRIS2 remains strong, particularly for following up Galactic Plane sources discovered by the Spitzer infrared space telescope. Both of the high-resolution optical spectrographs UCLES and UHRF are also quite popular, with UCLES continuing the search for extrasolar planets; measuring the composition of stellar atmospheres; and 'listening' to the sound of stars ringing like a bell. A small fraction of the time is used by visiting instruments, notably the French-built Semel Polarimeter which can map 'starspots' and magnetic fields on nearby stars.

The science-grade infrared array detector in IRIS2 suffered a catastrophic failure during a warmup/cooldown process in May 2005. Although the AAO's backup detector kept the instrument in service despite this problem, the manufacturer agreed to supply a replacement at no cost, which was installed in IRIS2 in time for on-sky commissioning in May 2006. This new array performs as well as the previous science-grade array, with much better cosmetics and lower noise than the engineering-grade array used in the interim. An image of the Galactic star-forming region G15.03-0.68, taken with the new array, is shown at right.

The past year has also seen the successful commissioning of AAOmega, the AAT's new medium-resolution optical spectrograph for use with 2dF and SPIRAL. The transition of instrument control for UCLES and UHRF to more modern control computers has also proceeded steadily, as described in more detail in the following section.

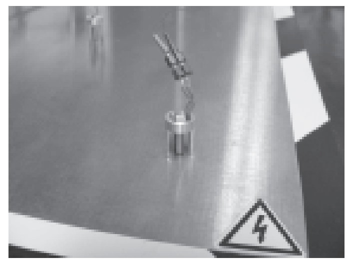
Image showing the stars, glowing gas, and dust in the Galactic star formation region known as G15.03-0.68, observed at a wavelength of 2.2 microns with IRIS2's new science-grade array. Image courtesy of Steven Longmore, UNSW.

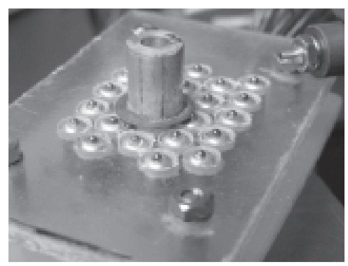
Instrument Science

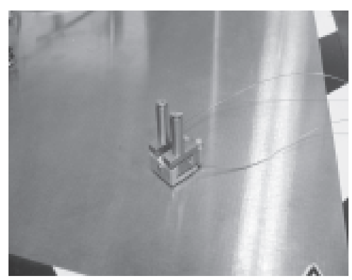
2005-06 has been a successful year for the Instrument Science group. The AAO was awarded a $1.6M research grant from PPARC to develop photonic OH suppression technology over the next three years. The group has developed several new concepts, including the AAOmicron IR wide-field spectrograph, Bragg gratings in few-mode fibres, an integrated photonic spectrograph, and super-starbugs for moving objects with a mass of order 1 kg. The group has also proposed the development of smart telescope structures in addition to smart focal planes as part of the push to develop an extremely large telescope (ELT).

In staff movements, Anthony Horton has joined the group from the Institute for Astronomy, Cambridge. He has expertise in optical design and systems software. Horton will play a key role in the Telescope Control System (TCS) project and will be active in new developments in astrophotonics. Peter Gillingham emerged from retirement to assist the group on key projects. PhD student Jackie Marcel completed her thesis on astrophotonics, and moves on to a research program at the University of Wisconsin, USA.

The Instrument Science group continues to be heavily involved in internal and external projects. The AAOmega project has been a spectacular success, in large part because of Will Saunders' technical oversight and unique abilities in commissioning instruments. Andrew McGrath has played a key role in both the FMOS and WFMOS projects, with FMOS now close to being shipped to the Subaru telescope. In collaboration with the University of Durham, Roger Haynes has now completed his two-year exploration of new photonic components, a project funded by an Innovative Technologies grant from PPARC. In collaboration with another staff member Simon Ellis, he championed the concept of the AAOmicron IR wide-field spectrograph, which builds on the existing AAOmega instrument. Horton and Saunders played a key role in the optical design of the Australian Patrol Telescope (APT) for the University of New South Wales.







Starbugs - microrobotic actuators - provide a precise, fast and flexible method of positioning multiple payloads in the focal plane of telescopes, to pick out small objects or regions of interest. Shown here are three prototype actuators developed at the AAO. Photos Jurek Brzeski

Work on the PPARC-funded 3-year research project has now started. This work has now ramped up with well defined milestones that need to be achieved ahead of a stage-gate review in early 2007. The project will fund Simon Ellis as the new instrument scientist who will develop the systems model for the OH suppression instrument concept. Anthony Horton and Roger Haynes are charged with designing the prototype OH suppression spectrograph that could ultimately be funded by either ESO or Gemini. Early successes include a high-throughput multi-mode fibre taper being developed with the University of Bath. Moreover, we have printed a Fibre Bragg Grating (FBG) into a few-mode fibre and demonstrated that the individual modes separate cleanly. Theoretical work has begun to define how the 75nm band gratings will be broadened by a factor of 4 to cover the full H and J bands.

AAO staff John Dawson, Vladimir Churilov and Greg Smith, assembling AAOmega. Photo David Smyth

Several of the group members made important representations at the SPIE meeting held in Orlando, Florida in May 2006. In a new development, Joss Bland-Hawthorn has described for the first time an integrated photonic spectrograph, a concept that caused a lot of excitement at the SPIE meeting. Horton presented new work on light coupling into few-mode fibres in anticipation of printing FBGs into these later in the year. Haynes presented results on new photonic components arising from the PPARC-funded astrophotonics work.

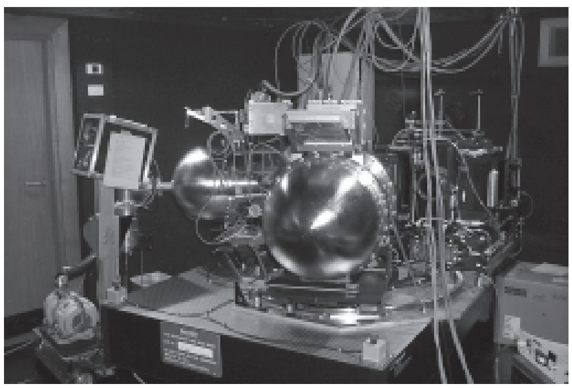
Earlier in the year, the AAO completed its Opticon FP6 commitment to developing a Starbug prototype, a quasi-autonomous robot that would form the basis of a "smart focal plane" positioning system. Ongoing work is currently unfunded, although the group has submitted a major proposal for PPARC funding. The group is currently engaged in defining the AAO's future role in a multinational submission by the European Community for future funding under Opticon FP7.

Finally, the Instrument Science group has been invited to join the CUDOS consortium based at the University of Sydney. A major submission has been made to the ARC in support of this. The AAO, under CUDOS, will investigate the potential of photonic gratings and mechanisms for use at mid-infrared wavelengths. The invitation by CUDOS is an endorsement by the photonics community of the AAO's leading role in developing the field of astrophotonics.

Current Instrumentation

AAOmega

The AAOmega project (http://www.aao.gov.au/AAO/2df/aaomega/aaomega_intro.html) is designed to replace the two 2dF top end mounted fibre-fed spectrographs with a new coude mounted dual beam spectrograph. Some upgrade work to the 2dF robotic fibre positioning system is also underway. The new spectrograph uses large format detectors, volume phase holographic gratings and will be able to carry out “red” and “blue” observation simultaneously, providing a facility that will enable much more detailed observation. The instrument was successfully commissioned on the AAT at the end of calendar year 2005.



Top: AAOmega installed in the Coude West room at the AAT. Left: Detail of the SPIRAL IFU. Photos Chris McCowage.

As well as the feeds from the 2dF field plates, AAOmega will also support integral field observations with a refurbished SPIRAL Integral Field Unit (IFU). The SPIRAL system will be available with any AAOmega grating configuration, and will give 50% higher spectral resolution because of its smaller fibres. Commissioning of the SPIRAL mode began in June 2006.

Telescope Control System (TCS)

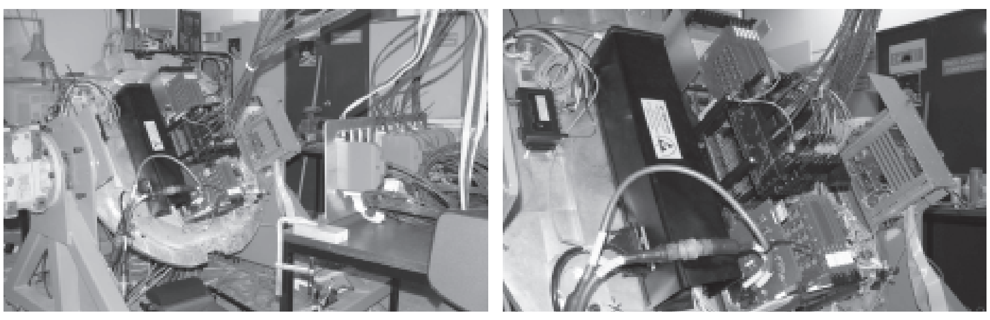
The telescope control system project is to implement a replacement of the original Interdata computer system. Although the current system is very reliable, the Interdata computer is obsolete and replacement parts are very difficult to find. The new system will implement a modern computer platform, but will retain the same functionality. Completion is expected to take place by mid-2007.

A related project is also underway to replace the old instrument control systems and will be finished in late 2006.

SuperAAPS

The SuperAAPS project is an upgrade to the UCLES system to automate its operations in support of the long-term Anglo-Australian Planet Search observing program. The primary objectives are to:

1. mount the iodine cell in the focal modifier wheel
2. mount a CCD camera behind the slit and feed it with a 1% pick-off mirror to serve as an exposure meter
3. provide improved imaging functionality for acquisition of bright UCLES targets without human intervention
4. integrate the above functionality with the new UCLES ICS system.



FMOS Echidna during 60 degree Zenith calibration tests. Photos Jurek Brzeski

FMOS Echidna

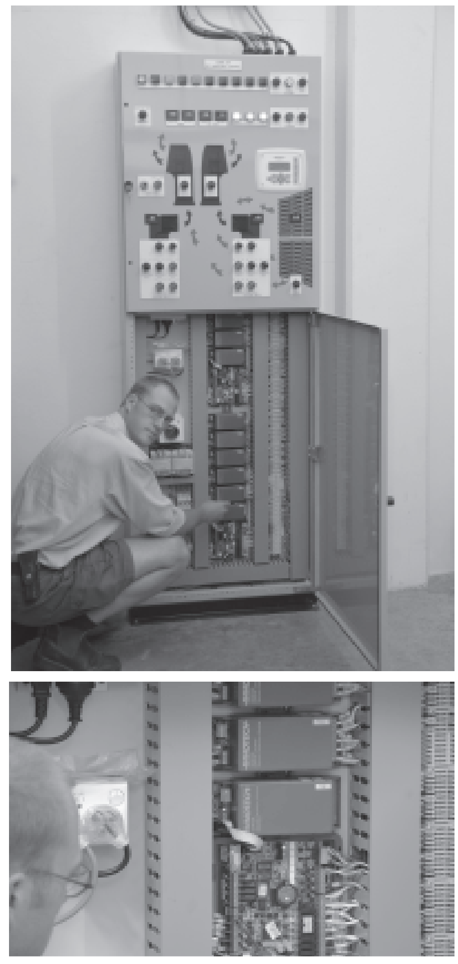
Echidna is a 400 optical fibre robotic positioning system for the Japanese Subaru telescope in Hawaii and is part of the FMOS system (http://www.naoj.org/staff/akiyama/FMOS/) that will provide a highly efficient near infrared spectroscopic facility. The principle of operation for Echidna is different from 2dF, 6dF and OzPoz in that all 400 fibres can be moved simultaneously to their required positions. The project is currently in the assembly and test stage. Delays have resulted due to late shipment of components from an overseas vendor. Delivery to Subaru should take place towards the end of 2006 with commissioning on the telescope by the middle of 2007.

Starbugs

The starbugs project is a technology study that has been funded as part of the Opticon program in Europe. Our effort is to look at the development of autonomous positioners that are able to configure themselves in the focal plane for multi-object spectroscopy with either fiber optics or relay optics. The study has recently completed the "Phase B" work package in which three prototype concepts were evaluated. Effort is now focused towards securing a PPARC grant and future FP7 funding for continued development.

WFMOS

The AAO led a collaboration of 7 institutions (including NOAO, Johns Hopkins University, University of Portsmouth, University of Oxford, University of Durham, and the Rutherford Appleton Laboratories) to develop a concept design for a very wide field (1.5 degree), highly multiplexed (4500 fibers) multi-object spectrograph for the Gemini observatory. The concept builds upon the Echidna technology. Due to funding shortfalls in the commissioning Gemini consortium, the study was halted in May 2006.



John Collins of the AAT's Electronics Section working on the air handling control system of the AAT Dome air conditioning. Photos Jonathan Pogson

APT CCD

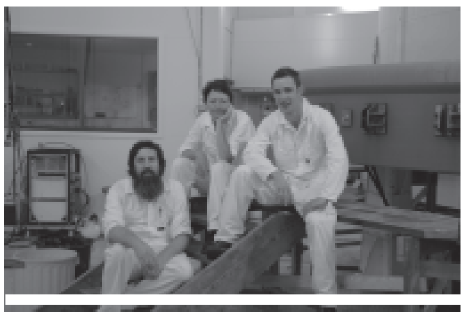
The AAO has designed and is building a CCD camera for the University of NSW for implementation on its Automated Patrol Telescope located at Siding Spring. Commissioning of the instrument will take place in late 2006.

SONG

The AAO has been developing the optical design for a high-resolution spectrograph to be used in the Stellar Oscillations Network Group (SONG), which is being developed in Denmark. Details of the SONG project can be found at http://astro.phys.au.dk/SONG/.

Resources

Human Resources



Top: John Danson (ADFA) and Kristin Fiegert viewed through a port in the lid of the AAT aluminising tank. Centre: Steve Lee, Head of Night Assistants, Kristin Fiegert , Optical Technician and ADFA Engineering Work Experience student John Danson, during the aluminising of the AAT primary mirror. Photos Jonathan Pogson. Below: Will Saunders and Greg Smith during the commissioning of AAOmega. Photo David Correll

The AAO strives to provide challenging work combined with good employment conditions and work-life balance. The AAO is an equal employment opportunity employer and has a strong commitment to occupational health and safety.

Staff numbers

The AAO employs research scientists, technical staff, software engineers, electronics engineers, optical and mechanical engineers, computing, administrative and library staff. Staff members are located at the Epping Laboratory and at the Siding Spring Observatory. Table 4.4 shows staff numbers by tenure.

Table 4.4 Staff Numbers by Tenure at 30 June 2006

Fixed Term Positions	**Number of Full Time**	**Number of Part-Time**	**TOTAL FTE#**
Director*	1	-	1.0
Instrument Scientist	1	-	1.0
Instrumentation	1	1	1.5
Research Astronomer	6	1	6.5
Operations	3	-	3.0
Corporate/Information Technology	1	1	1.8
Sub total	13	3	14.8
Indefinite Term Positions	**Number of Full Time**	**Number of Part-Time**	**TOTAL FTE#**
Executive Officer	1	-	1.0
Instrument Scientist	3	1	3.8
Instrumentation	18	1	18.8
Research Astronomer	1	-	1.0
Operations	13	3	14.5
Corporate/Information Technology	8	3	9.7
Sub total	44	8	48.8
Total Staff	**57**	**11**	**63.6**

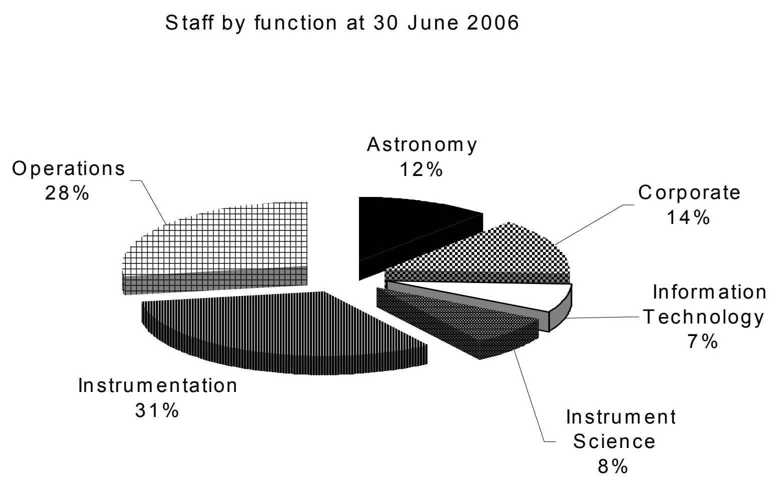
*direct Board appointment; # full time equivalent

Staff by function

The functional areas of the AAO are:

- Astronomy which includes staff astronomers, visiting astronomers, research fellows, and visiting students.
- Operations which is responsible for the running of the AAT and UKST at Siding Spring.
- Instrumentation which builds instruments for the AAO telescopes and external clients.
- Instrument Science which develops new technology.
- Corporate which includes accounting, library and other support services.
- Information technology which manages systems at both sites.

Figure 4.13 shows staff by function



Employment arrangements

The AAO's terms and conditions of employment are set via a certified agreement, the Anglo-Australian Telescope Board Enterprise Agreement 2005-2007, and the Anglo-Australian Telescope Board (Salaries and Conditions) Award 1999.

Equal Employment Opportunity (EEO)

The AAT Board is an equal employment opportunity employer and strongly supports workplace diversity. The chart overleaf shows the ratio of males to females at the AAO and reflects the difficulty of attracting and retaining females in science.

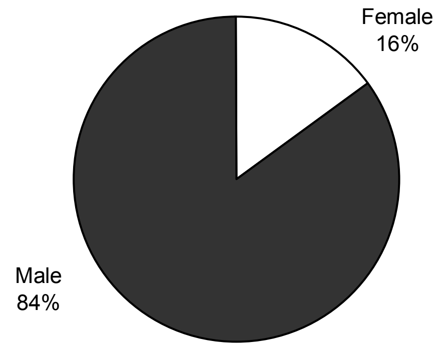


Figure 4.14 shows the relative numbers of male and female staff at the AAO

During the year the AAO also had 16 visiting students. Of this number 13% were female.

Occupational health and safety

The aim of the AAT Board's safety policy is to ensure that employees at every level and working visitors are provided with a safe and healthy working environment. The AAO has two Health and Safety committees – one at each site (Siding Spring and Epping) – which meet quarterly. They comprise staff and management representatives. The Executive Officer is a member of both committees. The names and contact details of committee members and the locations of first aid stations are posted on notice boards, as are emergency evacuation details.

The OH&S plan for the year continued to raise awareness throughout the organisation with the specific foci for the year on emergency and evacuation policy and procedures, safe handling of chemicals, and the use of laser equipment.

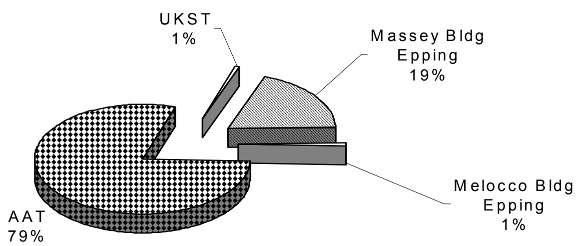
The AAT Board's Workers Compensation insurer is Comcare - an Australian Government statutory authority responsible for workplace safety, rehabilitation and compensation. The AAO has worked hard to maintain a safe working environment. There have been no notifications of dangerous occurrences for the last five years.

Table 4.5 OH&S Statistics

	2001-02	2002-03	2003-04	2004-05	2005-06
No of claims	1	5	2	2	3
Payments made	$75	$12,400	$2,735	$3,241	$15,121
Dangerous occurrences	0	0	0	0	0
Workers Compensation premiums	$16,926	$15,612	$32,500	$37,309	$35,120

In 2005, the AATB commissioned an external review of its OH&S infrastructure needs. The report identified various remedial works that need to be undertaken at both Epping and Siding Spring, with the bulk of the work to be undertaken at the AAT.

Figure 4.15 shows infrastructure upgrades by cost and location

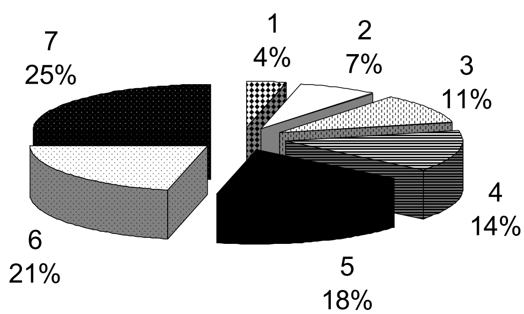


Following an approach by the AATB, the Australian and United Kingdom Governments provided $2.7 million to fund a remedial works program. This program has commenced and is expected to be completed over a 2-3 year timeframe. The AAO Safety Committees will be actively involved in the project.

The tasks identified for remedial work have been grouped into 7 sections reflecting the variety of works and the likely trades involved.

1. Asbestos identification and rectification
2. Buildings
3. Domes
4. Electrical
5. Fire
6. Heights & Handling
7. General

Figure 4.16 shows these task sections and the estimated costs



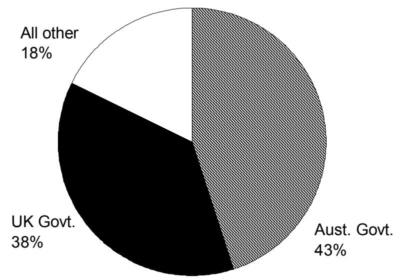
Financial Resources

The financial statements in Appendix A outline the AAO's financial position. The Australian National Audit Office (ANAO) has audited the financial statements of the AAT Board and has again provided a clear audit certificate. The auditor's report is also contained in Appendix A.

Funding sources for the AAO are:

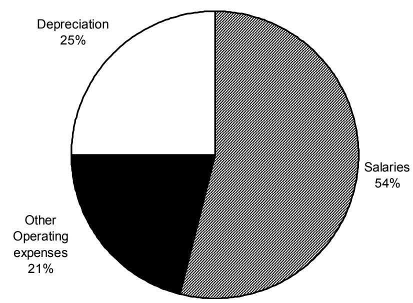
- Government grants provided by Australia and the United Kingdom.
- Contracts for the building of instruments for external clients.
- Other revenue which includes research grants, fellowships funded via the ARC and PPARC, and the RAVE international consortium for survey work on the UKST. This year PPARC has funded a major research project in the area of OH Suppression (see page 44).

Figure 4.17 Sources of funds for 2005-06



The AAT Board is funded mostly for recurrent expenditure and has to strike a balance between that expenditure, capital needs and telescope refurbishment. Funding from the Australian Government is made via the Department of Education, Science and Training (DEST Output 3.1). This funding is indexed whilst that of the UK is not.

Figure 4.18 Application of expenses for 2005-06



The results for 2005-06 show that the AAT Board has net assets of $46.8 million and both revenue and expenses increased by about 11% over the previous year. The AAT Board focus for the year has been both on its short-term budget position and identification of its longer-term needs, especially in the context of the UK's gradual withdrawal over the next few years.

The Australian astronomy community has included the AAO, as a priority, in its funding bid to the Australian Government's National Collaborative Research Infrastructure Strategy (NCRIS). This funding bid has arisen as the community seeks to fund its Decadal Plan 2006-2015. The Board is also attempting to increase its external revenue through its instrumentation program, both domestically and overseas. The Board expects to be able to fund an expenditure program of $11.2m for 2006/07.

Business Systems

Major instrumentation projects demand that the contractors have systems that are adequate to facilitate a high level of project performance, management and control. The AAO, as a contractor, has outgrown the capability of its business systems to meet such expectations for major projects. During the year, the AAO has sought new business software and investigated several packages. The preference was for:

- a fully integrated solution which will allow time recording, project management, project scheduling (i.e. integration with MS Project), project and general accounting, and general ledger functions.
- a smaller business-type solution with a low total cost of ownership.

The AAO has purchased MS Dynamics which includes time and expense management, billing, revenue recognition, cost allocations, contract management, employee and resource utilization, project profitability analysis and sophisticated reporting tools.

The implementation of this new software is one of the AAO's major tasks of 2006-07 and the aim is to have the new system running early in 2007. This implementation will more than satisfy the requirements of managing large projects.

Information Technology

The implementation of the IT Strategic plan is proceeding as planned. Funding of the plan's implementation is being drawn from the normal recurrent expenditure for Information Technology. Good progress has been made with the modernisation of the Observatory's computing infrastructure, and this program will be continuing over the next two years. Of significant note is the recent implementation of a high-speed Internet connection to Siding Spring. This new connection is performing well, and provides many opportunities for the future.

The focus of the IT team over the coming year will be the new project management and financial software, implementation of the new Telescope Control System for the AAT, continuation of the program to replace legacy systems and the upgrading of Network Infrastructure to ensure we can get the most from the new high-speed network link.

Environmental Performance

Dark-sky Protection

The Anglo-Australian Observatory continues to participate in activities designed to protect the dark sky of Siding Spring Observatory. The inter-organisational Working Group that develops and implements strategies to this end is now chaired by Mr Peter Starr (ANU Siding Spring Observatory Manager), with AAO representation coming from Dr Fred Watson (Astronomer-in-Charge) and Mr Paul Cass (UKST Observer). While the principal activity of the group centres around lighting control legislation, another important function is to educate and inform the public about good and bad lighting, and the impact of light pollution on optical astronomy.

The new Orana Regional Environmental Plan (REP), which addresses the issue of upward light spill over a large area of the state with a radius of 200 km centred on Siding Spring, is now in the final stages of ratification by the NSW Department of Planning. It will be placed on public display late in 2006 and is expected to be enacted early in 2007.

Ongoing challenges to the dark skies of Siding Spring remain the community of Coonabarabran (with growing ribbon development along the Timor Road leading to the observatory) and the cities of Dubbo and Sydney.

View of the UK Schmidt Telescope and across Warrumbungle National Park. Photo Jonathan Pogson

External Communications

The AAO is aware that good two-way communication is central to all its activities. While it must listen to its stakeholders, it must also communicate with the wider community. The stakeholders are the AAO staff, the astronomy community, responsible Ministers, funding agencies, the Board and its advisory committees and the time assignment committee. The community includes the general public, hence the broad term 'Public Relations.'

World Wide Web and digital images

The AAO's primary conduit for external communication, the website, has recently been upgraded and continues to attract a large audience. Most of the Internet visitors are attracted by the images pages, which now support a total of about 220 photographs.

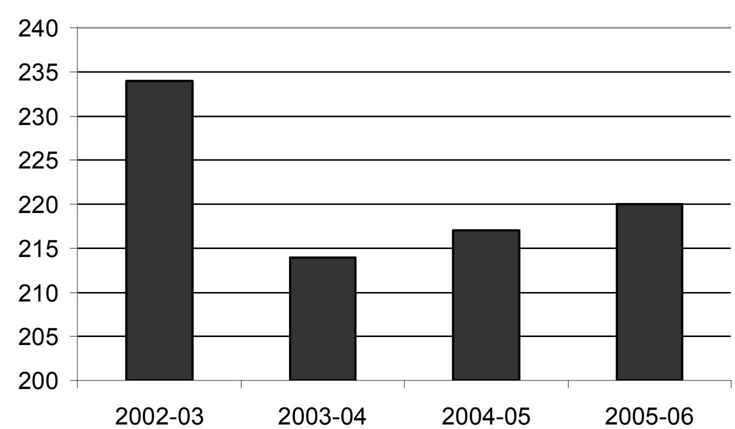
A newsletter is published twice a year on the web, and distributed as a hardcopy, to over 1,000 subscribers and institutions. It caters to a wide range of readers, including professional astronomers, instrument scientists, users of the observatory and local AAO staff.

The science web page has the aim of attracting students towards collaborative work at the AAO either through vacation positions or thesis study.

A wealth of more technical information is also available and is constantly being updated and developed.

Publicity and Outreach

Figure 4.19 Media Interviews



The AAO issued four media releases this year. AAO staff gave 220 media interviews (mainly radio) and wrote ten popular science articles; they gave 48 talks to audiences of lay-people and 79 talks to audiences of professional astronomers. The AAO organised the annual Bok lecture and a session of “Science in the Pub”—now becoming an annual tradition also—at Coonabarabran in October as part of the local “Festival of the Stars”, with the latter session attracting a standing-room-only crowd.

The panel for the 2005 session of “Science in the Pub” at the Coonabarabran Festival of the Stars. Left to right: Professor Fred Watson (AAO), Dr Maria Cunningham (UNSW), Ms Jen Lacey (ABC), and Associate Professor David McKinnon (Charles Sturt University). The topic was “Extraterrestrials: where are they?” Photo Helen Sim

In July 2005, “Discovery Communications” filmed a segment of its most ambitious project to date at the AAO’s telescopes on Siding Spring Mountain. Over the next five years this narrative will focus on the cultures, geography and natural phenomena of 30 of the worlds oldest and most diverse countries. The program for which Fred

Caption: AAT Astronomer-in-Charge, Fred Watson, being filmed for a Discovery Channel program, "Australia Revealed" in the AAT tea room. Photo Chris Thorburn, Beyond International Ltd.

Watson was filmed will go to air on Discovery Channel in most countries on October 22, 2006, and one week later on October 29 in Australia and New Zealand.

Professor Fred Watson was awarded the 2006 Australian Government Eureka Prize for Promoting Understanding of Science, and received the award in August in front of a crowd of more than 900 representatives of government, science, industry, academia and the media. The Eureka Prizes are a partnership between the Australian and NSW governments and more than 20 organizations, and the Eureka Prizes awards night is the largest single annual event in Australia for celebrating and rewarding outstanding science and science communication. The Eureka Prize for Promoting Understanding of Science is given for effort and initiatives in science outreach that go beyond the usual or expected scope and activities of an entrant's profession or occupation. Supporting statements for the award spoke of Fred's "passion and tireless enthusiasm" for his subject. One described his effect thus:

Listening to scientists talk can occasionally leave the lay-person feeling stupid and ill-informed; as if the subject at hand will always be beyond us. When Fred is talking, he seems to have the opposite effect: the mists clear and a whole world of knowledge suddenly seems accessible.

— Richard Glover, ABC

The Hon. Julie Bishop MP, Minister for Education, Science and Training. with Fred Watson, winner of the Eureka Prize for Promoting Understanding of Science Photo © Australian Museum