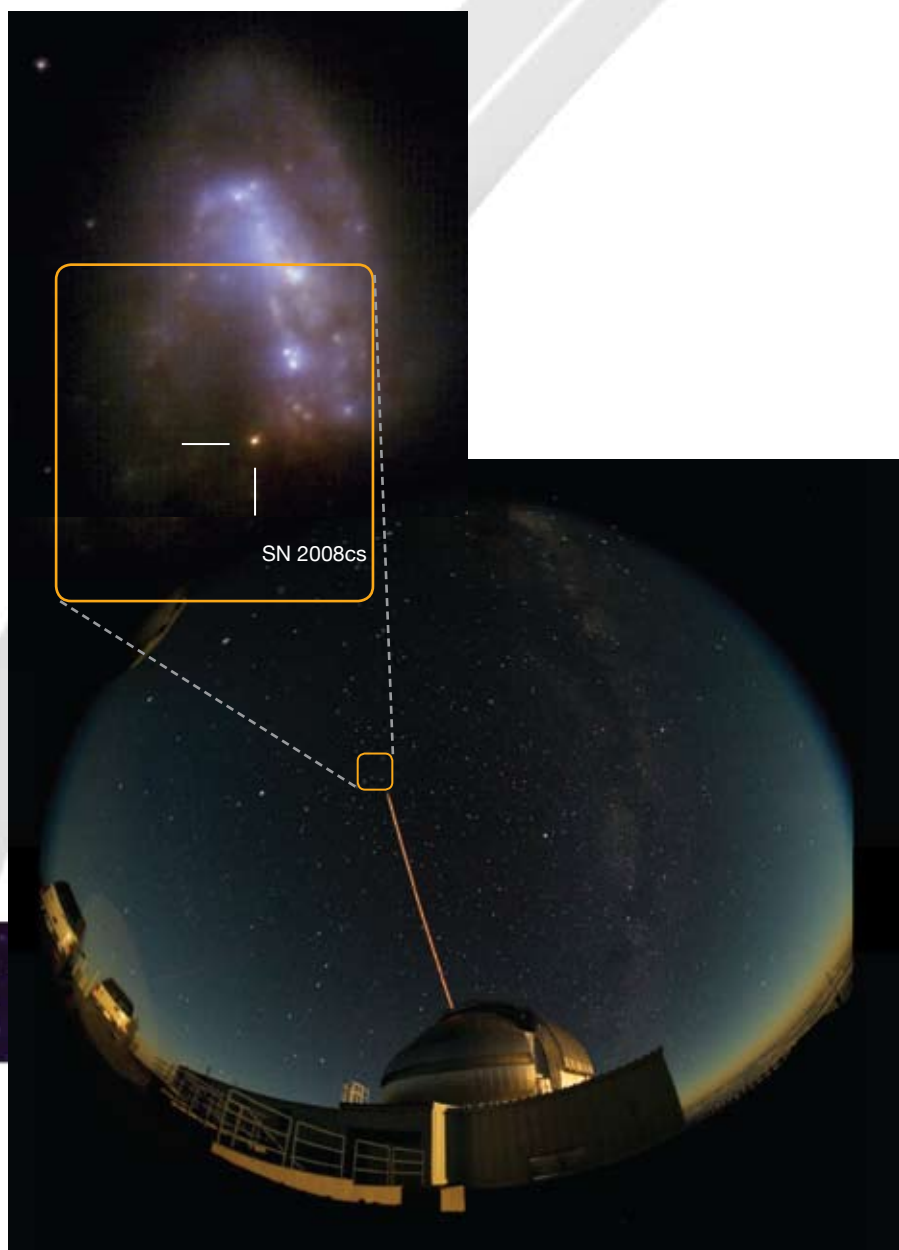




Astronomy  
Australia  
Ltd.



# 2008 / 09 Annual Report



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## Vision

*To provide an efficient structure to facilitate Australian investment in astronomical facilities and to be recognised by stakeholders of Australian astronomy as the organisation to co-ordinate matters of national astronomy infrastructure*

## Front cover image

Supernova SN 2008cs discovered with Gemini North's near-infrared adaptive optics system (Kankare et al 2008). It is the first supernova to be discovered with laser guide star adaptive optics. See page 20 for details. Image credit: Erkki Kankare (Tuorla Observatory) and Travis Rector (University of Alaska)  
Bottom: Gemini North with the Laser Guide Star System.

Image credit: Gemini Observatory/Association of Universities for Research in Astronomy.

Gemini North with the Laser Guide Star System.

Image credit: Gemini Observatory/Association of Universities for Research in Astronomy.



Artist's impression of ASKAP.  
Credit: Swinburne Astronomy Productions.





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# 09 A message from the Chairman

The third year of AAL's operation began with the drafting of the roadmap for astronomy at the instigation of the Department of Innovation, Industry, Science & Research (DIISR). This was written by a sub-committee of the AAL Board and chaired by Professor Brian Schmidt. Representing a current implementation plan for the NCA's "Decadal Plan for Australian Astronomy 2006-2015", this draft roadmap was widely commented upon by the astronomy community and the final version was submitted to DIISR on 17th October 2008. The primary aim of this roadmap was to set a context within which Government could understand the value and future role of the Anglo-Australian Observatory (AAO), including the Anglo-Australian Telescope. The outcome of this roadmap in conjunction with lengthy negotiations conducted by the AAO, was to assure the AAO's viability for the next 10 years. The AAO has become a statutory entity under the DIISR with new recurrent funding announced in the May 2009 Budget. This success, together with the upgrade of facilities at Siding Spring Observatory and the ongoing development of the HERMES instrument, both funded through AAL, will ensure the continued outstanding performance of the AAO until at least 2018.

These and other recommendations in the astronomy roadmap had been informed by the deliberations of the Astronomy NCRIS Strategic Options Committee (ANSOC) established by AAL, comprising three leading international astronomers and two independent AAL Board members (chaired by Professor Michael Barber). The ANSOC report recommended investment in additional 8m-class time on the Gemini and Magellan telescopes, and continued investment in the Giant Magellan Telescope (GMT) project due for completion in 2018.

Australia's leading role in Antarctic astronomy was highly valued by the AAL Board but unfortunately, it was not possible to continue the PILOT project into phase B. These recommendations were presented to the Annual General Meeting of AAL on 30th September 2008, and were accepted by the Members.

Accordingly AAL has funded a 5% share of the GMT Design Development Phase, while ANU has funded a matching 5% share. In February 2009, Professor Warrick Couch and I represented AAL at the formal launch of the GMT Founders' Agreement including a site inspection at Las Campanas Observatory in Chile. Subsequently ANU has devoted its EIF funding opportunity to a 10% share of the GMT Construction Phase, and AAL has negotiated that half of this investment will provide GMT access to the Australian community as a whole.

Having addressed current 4m telescope access and significantly progressed the future of 25m-class telescopes, the next pressing challenge for AAL on behalf of the community is to secure ongoing and increasing access to 8m-class telescopes by identifying sources of funding. This is being pursued with the ARC and DIISR, and through the EIF process.

One possible avenue to obtain increased 8m access is for Australia to join the European Southern Observatory (ESO). The NCA and AAL invited the Director-General of ESO, Professor Tim de Zeeuw to Australia in November 2008, to discuss the opportunity with the AAL Board and to address astronomer meetings in Sydney, Canberra and Melbourne. AAL has established an ESO working group chaired by Professor Jeremy Mould, to progress this opportunity. ESO membership would also bring access



to ALMA and the E-ELT in due course. The findings of a survey of the Australian astronomy community's attitude toward ESO, conducted jointly with the NCA, were presented during the ASA Annual Science Meeting in July 2009. This survey indicated strong support for joining ESO subject to its impact on other funding.

In the radio domain, AAL has continued to fund development of the digital system for the Australian SKA Pathfinder telescope project, which remains in good hands at the CSIRO.

AAL instigated a review of the Murchison Widefield Array (MWA) project chaired by Professor Lister Staveley-Smith. This excellent review dated 16th April 2009 was considered by AAL jointly with the US National Science Foundation (NSF), endorsing the review recommendations and reaching complete agreement on the way forward. AAL and NSF welcomed recent progress with MWA under Professor Steven Tingay, and AAL has underwritten the appointment of a permanent Project Manager, Mr Wayne Arcus.

We were delighted to welcome Dr Alex Zelinski and Professor Brian Boyle as guests to the Board meeting in May 2009, where it was agreed that CSIRO and AAL should work together to establish an advisory committee for radio astronomy. Other welcome guests at Board meetings over the past year have included Mr Brett Biddington and Professors John Storey, Matthew Colless and Harvey Butcher.

The Board held a strategic planning retreat on 6th February 2009, ably facilitated by Dr Michael Sargent. After developing a comprehensive SWOT analysis the Board considered ways to implement the roadmap and to strengthen Australian investment

in astronomy infrastructure. The global economic crisis and the fluctuation of the Australian dollar represented challenges to funding adequacy, which continue to be managed.

The Audit and Risk Management Committee (chaired by Dr Dave Warren) has continued to provide the necessary oversight of all AAL Board deliberations and processes.

The Nominations Committee chaired by Professor Elaine Sadler once again had a challenging task in vetting the many candidates standing for election to the vacant AAL Board positions at the last AGM (September 2008). The field of candidates was strong, we welcomed the new Board member, and we remain grateful to all who had offered their services.

A new part-time employee has been appointed during the year to support our Chief Operating Officer (COO), Mark McAuley. Libby Armstrong replaced Kate Farmer as AAL's office manager. We wish Kate well with her future endeavours. AAL's office is hosted by Swinburne University within its Centre for Astrophysics and Supercomputing. AAL Board meetings are usually held there also, and we remain extremely grateful to Swinburne and Professor Matthew Bailes for this accommodation.

I would like to express my appreciation to all members of the Board including the Company Secretary, and to the COO and staff for their contribution, dedication and support during the past year. I also acknowledge with thanks, the cooperation and support provided by the officers of the DIISR.



Dr Martin Cole

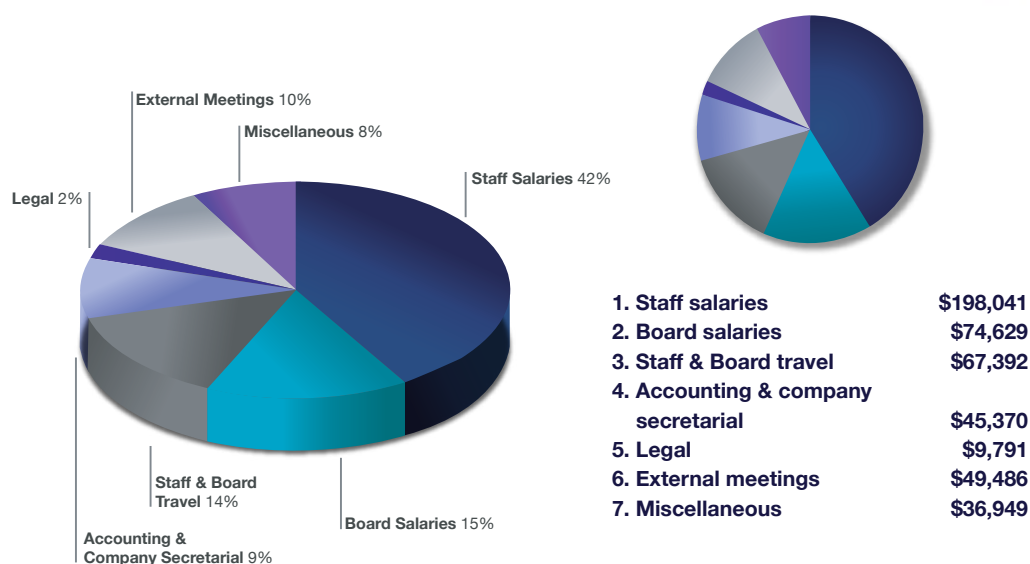


# 09 Financial summary

Note: All figures are GST exclusive

## AAL operating expenses

The Astronomy NCRIS funding agreement estimated cumulative expenses from the creation of AAL on 18th April 2007 until 30th June 2009 of **\$1,022,790**. Actual expenses during that period of **\$1,028,955** show that AAL has operated with less than a one percent deviation from its original budget. Actual expenses for 2008/09 were \$481,658.



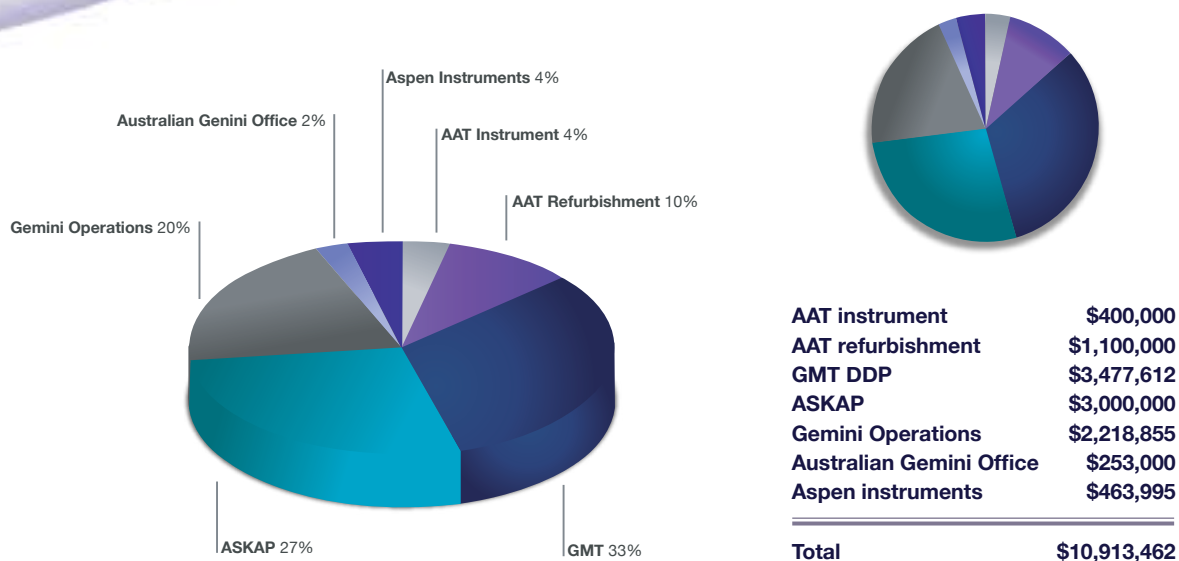
## Grants received during 2008/09

AAL received two major grants during 2008/09:

<b>Astronomy NCRIS (from DIISR):</b>	<b>\$10,795,000</b>
<b>AAL management fee taken from Astronomy NCRIS</b>	<b>(\$243,340)</b>
<b>Gemini LIEF (from ARC):</b>	<b>\$900,000</b>
<b>Total</b>	<b>\$11,451,660</b>



## NCRIS and LIEF grants paid to projects during 2008/09



## Grants re-allocated during 2008/09

\$511,972 from Aspen instruments and \$616,171 from Gemini operations were re-allocated to the Strategic Options fund. These re-allocations were possible due to the de-scope of the Aspen programme and favourable exchange rates associated with Gemini operations payments.

Following the ANSOC process, \$3,401,923 was allocated from the Strategic Options fund to the GMT DDP, and \$320,595 was allocated from the Strategic Options fund to Magellan.

Due to savings in Australian Gemini Office expenses, \$53,000 was re-allocated from that project to Magellan.



## Balance of grants held by AAL as of 30th June 2009

The NCRIS and LIEF grants are normally received by AAL around December or January each year. Therefore the balance of grants held by AAL on 30th June is used to fund projects for the subsequent six months until the yearly grant payments are received.

### NCRIS grant held by AAL as of 30th June 2009

<b>AAT instrument</b>	<b>\$2,250,000</b>
<b>AAT refurbishment</b>	<b>\$550,000</b>
<b>ASKAP</b>	<b>\$5,673,844</b>
<b>Gemini</b>	<b>\$1,128,394</b>
<b>Australian Gemini Office</b>	<b>\$156,000</b>
<b>Aspen</b>	<b>\$1,182,165</b>
<b>Magellan</b>	<b>\$373,595</b>
<hr/>	
<b>Total</b>	<b>\$11,313,998</b>

### LIEF grant held by AAL as of 30th June 2009

<b>Gemini:</b>	<b>\$3,700,000</b>
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## Reserves

AAL currently maintains two reserves:

**The Astronomy NCRIS reserve: \$114,843 (balance as of 30th June 2009)**

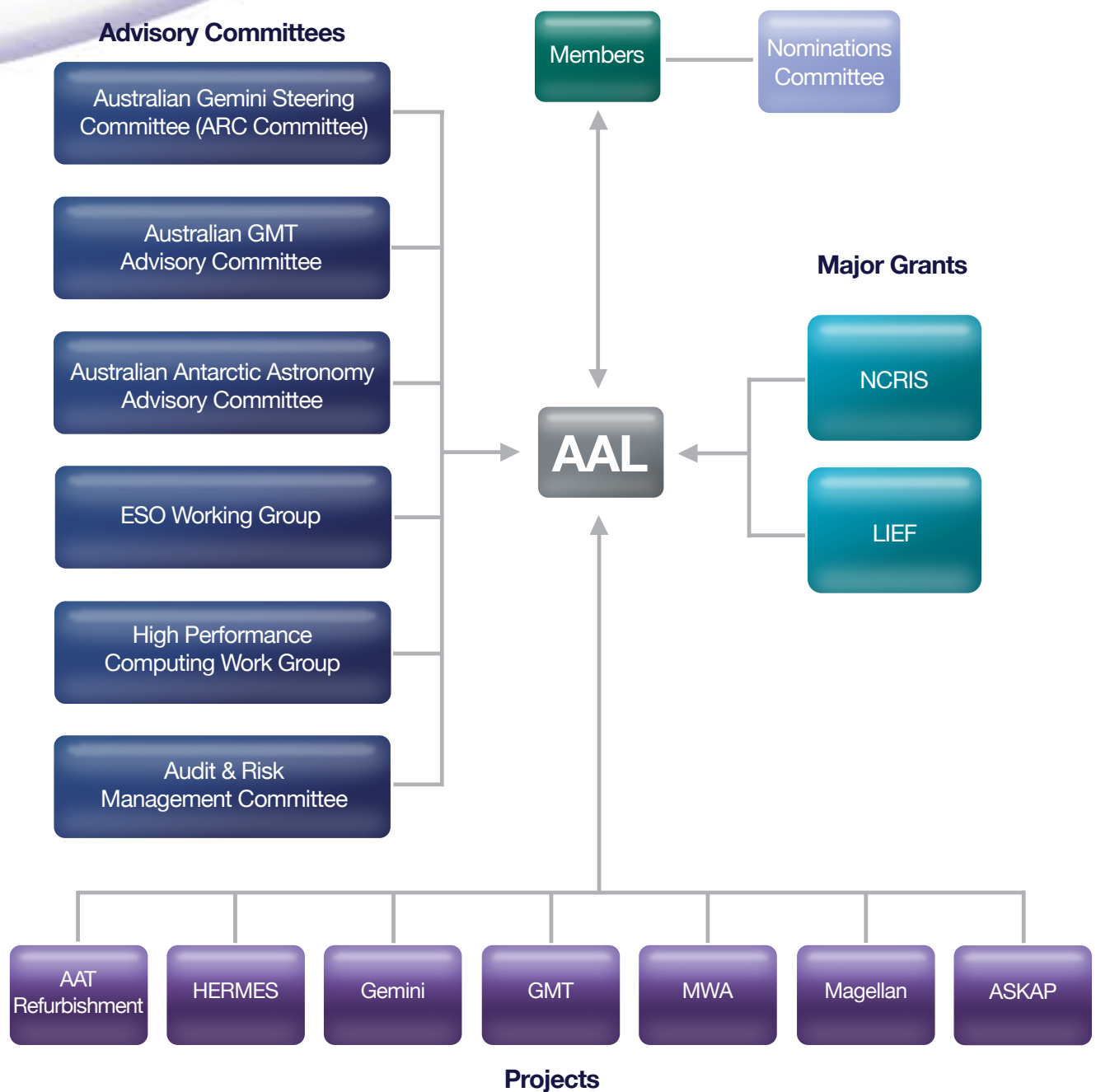
**The overseas optical reserve: \$3,756,388 (balance as of 30th June 2009)**

The Astronomy NCRIS reserve results from interest earned from the NCRIS grant and must be used for projects associated with the Astronomy NCRIS funding agreement. During 2008/09, \$1,500,000 from this reserve was used to support the operations of the Anglo-Australian Observatory, and \$60,000 was used to support the PILOT and GMT project offices until the completion of the strategic options process.

The overseas optical reserve is primarily used to cover shortfalls in payments to overseas optical telescope facilities. During 2008/09 \$469,597 from this reserve was used to purchase eight nights on the Magellan telescopes in 2009A. This payment bridged the gap between the end of MNRF-funded access to Magellan, which finished in 2008B, and the start of NCRIS-funded access to Magellan in 2009B. In addition, \$21,853 was used to pay for the Australian Gemini Undergraduate Summer Studentships program. AAL also draws down 1% of the balance of the reserve each year as a management fee (\$36,387 during 2008/09).



## Organisational chart as of 30th June 2009





# 09 Board of Directors

## Dr Martin Cole (Chair)

Appointed 18 April 2007  
till 2010 AGM

## Prof Elaine Sadler

Appointed 18 April 2007  
till 5th November 2009

## Prof Michael Barber

Appointed 5 July 2007  
till 5th November 2009

## Prof Brian Schmidt

Appointed 18 April 2007  
till 2011 AGM

## Prof Warrick Couch

Appointed 18 April 2007  
till 2010 AGM

## Prof Lister Staveley-Smith

Appointed 18 April 2007  
till 30 September 2008

## Prof Jeremy Mould

Appointed 30 September  
2008 till 2011 AGM

## Dr David Warren

Appointed 5 July 2007  
till 2010 AGM

## Meetings attendance

Director	Directors	Board	Operations	Project	Nominations	AGM
Cole	6/6	1/1	1/1	3/3	-	1/1
Barber	5/6	-	-	1/1	-	0/1
Couch	6/6	-	1/1	2/2	-	1/1
Mould	3/3	-	-	-	-	-
Sadler	6/6	-	-	1/1	1/1	1/1
Schmidt	6/6	-	-	-	-	0/1
Staveley-Smith	3/3	1/1	-	-	-	1/1
Warren	6/6	1/1	1/1	1/1	-	1/1

### Note:

The above table includes attendance by directors at committees which met during the 08/09 financial year but had disbanded by 30 June 2009: Roadmap (Chair: Prof Brian Schmidt), ANSOC (Chair: Prof Michael Barber), MWA (Chair: Prof Lister Staveley-Smith). Informal meetings which are not minuted and short teleconferences are not included in the above table.



## Committee membership as of 30 June 2009

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### Board Committees

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#### Audit and Risk Management Committee

**Chair**

Dr David Warren

**Members**

Prof Jeremy Mould

Dr Martin Cole

### Operations Committees

---

#### Executive Remuneration

**Chair**

Dr David Warren

**Members**

Dr Martin Cole

Prof Warrick Couch





# Project Committees

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## Australian Antarctic Astronomy Advisory Committee (AAAAC)

### Chair

**Mr Brett Biddington**, CISCO Systems Inc

### Members

**Prof Tim Bedding**, University of Sydney

**Prof Brian Boyle**, Director, Australia Telescope National Facility (ex-officio)

**Dr Martin Cole**, Astronomy Australia Limited

**Prof Iver Cairns**, University of Sydney

**Prof Matthew Colless**, Director, Anglo-Australian Observatory (ex-officio)

**Mr Roger Franzen**, Australian National University

**Mr Ben Galbraith**, Tasmanian Government Representative (ex-officio)

**Prof Karl Glazebrook**, Swinburne University of Technology

**Dr Charles Jenkins**, Australian National University

**Mr Michael Stoddart**, Australian Antarctic Division (ex-officio)

**Prof John Storey**, University of New South Wales (ex-officio, non-voting)

**Prof Mark Wardle**, Macquarie University





## Australian Giant Magellan Telescope Advisory Committee (AGMTAC)

### Chair

**Prof Karl Glazebrook**, Swinburne University of Technology

### Members

**Dr Michael Brown**, Monash University

**Prof Harvey Butcher**, Director, Research School of Astronomy and Astrophysics, Australian National University (ex-officio)

**Prof Matthew Colless**, Director, Anglo-Australian Observatory (ex-officio)

**Prof Warrick Couch**, Astronomy Australia Limited

**A/Prof Scott Croom**, University of Sydney

**Mr Greg Harper**

**Mr Jeff Ruckman**, SKM

**Prof Chris Tinney**, University of New South Wales

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## European Southern Observatory Working Group (ESOWG)

### Chair

**Prof Jeremy Mould**, Astronomy Australia Limited

### Members

**Prof Brian Boyle**, National Committee for Astronomy

**Prof Brian Schmidt**, Astronomy Australia Limited





## High Performance Computing Working Group (HPCWG)

### Chair

**Dr Darren Croton**, Swinburne University of Technology

### Members

**Prof Matthew Bailes**, Swinburne University of Technology

**Prof Lindsay Botten**, Australian National University

**Prof Geraint Lewis**, University of Sydney

**Dr Tara Murphy**, University of Sydney

**Prof Peter Quinn**, University of Western Australia

**Prof Brian Schmidt**, Astronomy Australia Limited

## Other Committees that AAL consults

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### Anglo-Australian Telescope Board (AATB)

#### Chair

**Prof Warrick Couch**, Swinburne University of Technology

#### Deputy Chair

**Prof Stephen Warren**, Imperial College London, UK

#### Members

**Dr Ian Chessell**, Chessell Research Pty Ltd

**Prof Sean Ryan**, University of Hertfordshire, UK

**Prof Bryan Gaensler**, University of Sydney

**Dr Colin Vincent**, Science and Technology Facilities Council, UK





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## Australian Gemini Steering Committee (AGSC)

### Chair and Australian Gemini Board Member

**Prof Warrick Couch**, Swinburne University of Technology

(From 1st July 2009: Prof Peter Quinn, University of Western Australia)

### Members

**Dr Stuart Ryder**, Anglo-Australian Observatory

**Prof Richard Coleman**, Australian Research Council

**Prof Gary Da Costa**, Australian National University

**Prof Matthew Colless**, Director, Anglo-Australian Observatory (ex-officio)

**Prof Karl Glazebrook**, Swinburne University of Technology

**Prof Michael Drinkwater**, University of Queensland

**Prof Peter Quinn**, University of Western Australia

**A/Prof Scott Croom**, University of Sydney



## 09 Members and their representatives

### Members and their representatives on 30th June 2009

Anglo-Australian Observatory

**Prof Matthew Colless**

Australian National University

**Prof Harvey Butcher**

Commonwealth Scientific and  
Industrial Research Organisation

**Prof Brian Boyle**

Curtin University of Technology

**Prof Steven Tingay**

James Cook University

**Dr Andrew Walsh**

Macquarie University

**Prof Mark Wardle**

Monash University

**Prof John Lattanzio**

Swinburne University of Technology

**Prof Matthew Bailes**

University of Melbourne

**Prof Rachel Webster**

University of New South Wales

**Prof John Storey**

University of Queensland

**Prof Halina Rubinsztein-Dunlop**

University of Sydney

**Prof Dick Hunstead**

University of Tasmania

**Prof John Dickey**

University of Western Australia

**Prof Peter Quinn**



Gemini North at night.

Image credit: Gemini Observatory/Association of Universities for Research in Astronomy.

# Project Reports





Inside the AAT dome.  
Image credit: Barnaby Norris.

## An upgrade for the Anglo-Australian Telescope

This NCRIS-funded project to upgrade the Anglo-Australian Telescope (AAT) infrastructure is progressing well, with the telescope receiving a substantial amount of attention over the year.

The first of the five racks for a new telescope interlock control system has been manufactured and is scheduled to be installed and commissioned. The 2dF focal plane imaging camera was installed and is operating successfully.

The project to replace the telescope drive systems is also well advanced, with a prototype right ascension drive system tested on the telescope and showing that the system will point and track the telescope as specified. The installation and commissioning of the right ascension drive is expected to be completed in November 2009, with work to start on the declination drives shortly thereafter.

The new telescope focus drive system was designed and developed utilising similar technology to the telescope drive systems. The focus motors have been operating successfully since they were commissioned.



The incremental and absolute encoders for the telescope declination, hour angle, dome and windscreen have been replaced. The final step will be the installation of the focus and tube extension linear absolute encoders, and work is well underway towards completing the mechanical engineering and electronic interfacing for these remaining encoders.

The project to replace the ageing air conditioning refrigeration plant with a more reliable and efficient system has been completed, with initial signs showing a significant reduction in consumed electrical power. Due to the design of the installation, further efficiencies have been achieved, with some of the waste heat normally dissipated via cooling towers being diverted to assist in heating the mechanical workshop.

The cooling towers selected for the project have a very economic footprint and use a fraction of the water of a conventional tower, with much of this water being provided by a rain water collection system.

A mechanical engineer has joined the project on a part-time basis to assist with the development of a braking system for the AAT dome maintenance platform. Initial tests on the prototype are positive, but further design work is still required. The braking system being designed for the maintenance platform is also proposed to be used on the AAT dome main shutter.

The high voltage switchgear and generator, which are owned and operated by the ANU, are now scheduled to be replaced in 2009/10 due to OH&S issues. This being a shared facility, the AAO will be expected to pay some of the cost; this was not part of the original project budget. The project manager is continuously reviewing and prioritising the work within the refurbishment project in order to ensure that there are sufficient funds available to address the high-priority tasks.



Left: 350kW centrifugal chillers. Right: Hybrid cooling towers. Image credit: Doug Gray.



# HERMES

The AAO has finalised a basic optical configuration for HERMES that will meet the project requirements. The optical design for the baseline three-channel spectrograph was developed, along with an upgrade path to an additional fourth channel that could be implemented if additional funding is identified. The wavelength coverage for both the three- and four-channel implementations was finalised, and a report identifying the wavelength regions of interest for the Galactic Archaeology science case was completed. The 3-channel baseline design achieves most of the Galactic Archaeology objectives, but leaves out a critical element (oxygen) that would significantly enhance the science outcomes. The on-axis and off-axis collimator and slit designs were progressed to the point where the impact of each on the complexity and performance of the instrument could be evaluated, with the off-axis design being preferred. Various detector and controller options were identified and studied to identify cost and performance issues.

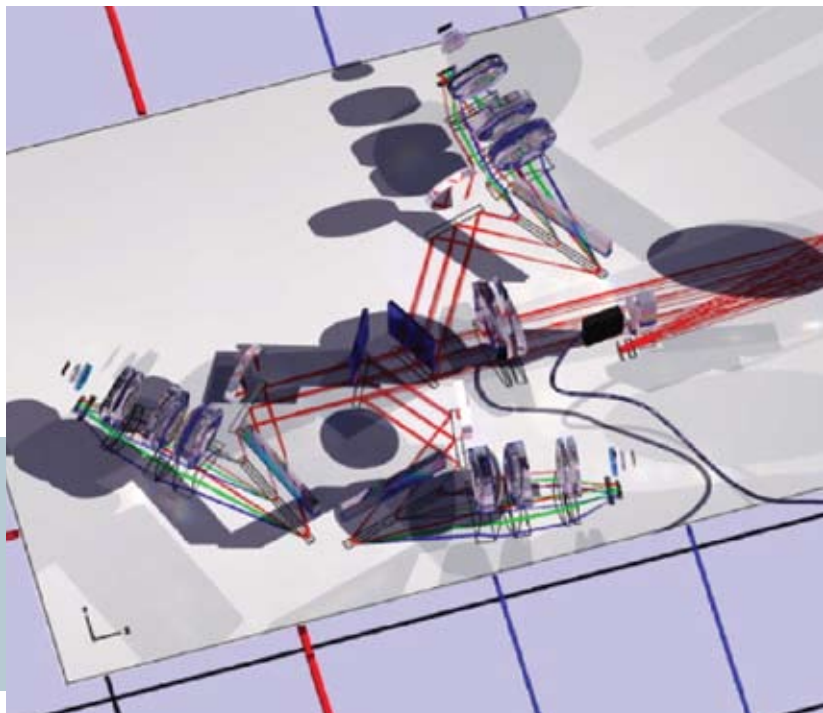
Over 20 people attended the HERMES Configuration Design Review on 18 June 2009. A report was then produced by the external reviewers about the questions raised in the HERMES Configuration Design Review. The successful outcome of the review enables the project to move to the next phase, which includes the development of the performance specification and the

detailed design for the sub-systems.

Other activities that resulted from the review meeting are the testing of the commercial off-the-shelf fibre connectors and exploration of implementing dual-fibre cables within the 2dF positioner as an alternative. These tests were commenced in June 2009. An initial vibration measurement for the Coude floor of the AAT has also been completed. The HERMES Architecture Team was formed to fast-track the preliminary designs for the instrument.

A new project manager (Anthony Heng) was engaged in June 2009 to manage the HERMES project. Due to the re-design to make HERMES a stand-alone spectrograph instead of an upgrade to AAOmega (which has resulted in both improved performance and reduced cost), the project schedule has been re-evaluated with the delivery of HERMES delayed by one year. HERMES is now planned to be commissioned in 2012.

Top view of HERMES baseline design (3 channels) with the light path for each channel in blue, green or red. Image credit: Anglo-Australian Observatory.







Progress on the fibre connector prototyping effort. Fibre connector test bench (above left)  
Dionne Haynes polishing the fibre tube as part of the fibre connector test (above right)  
Image credit: Anthony Heng.

## Scientific drivers

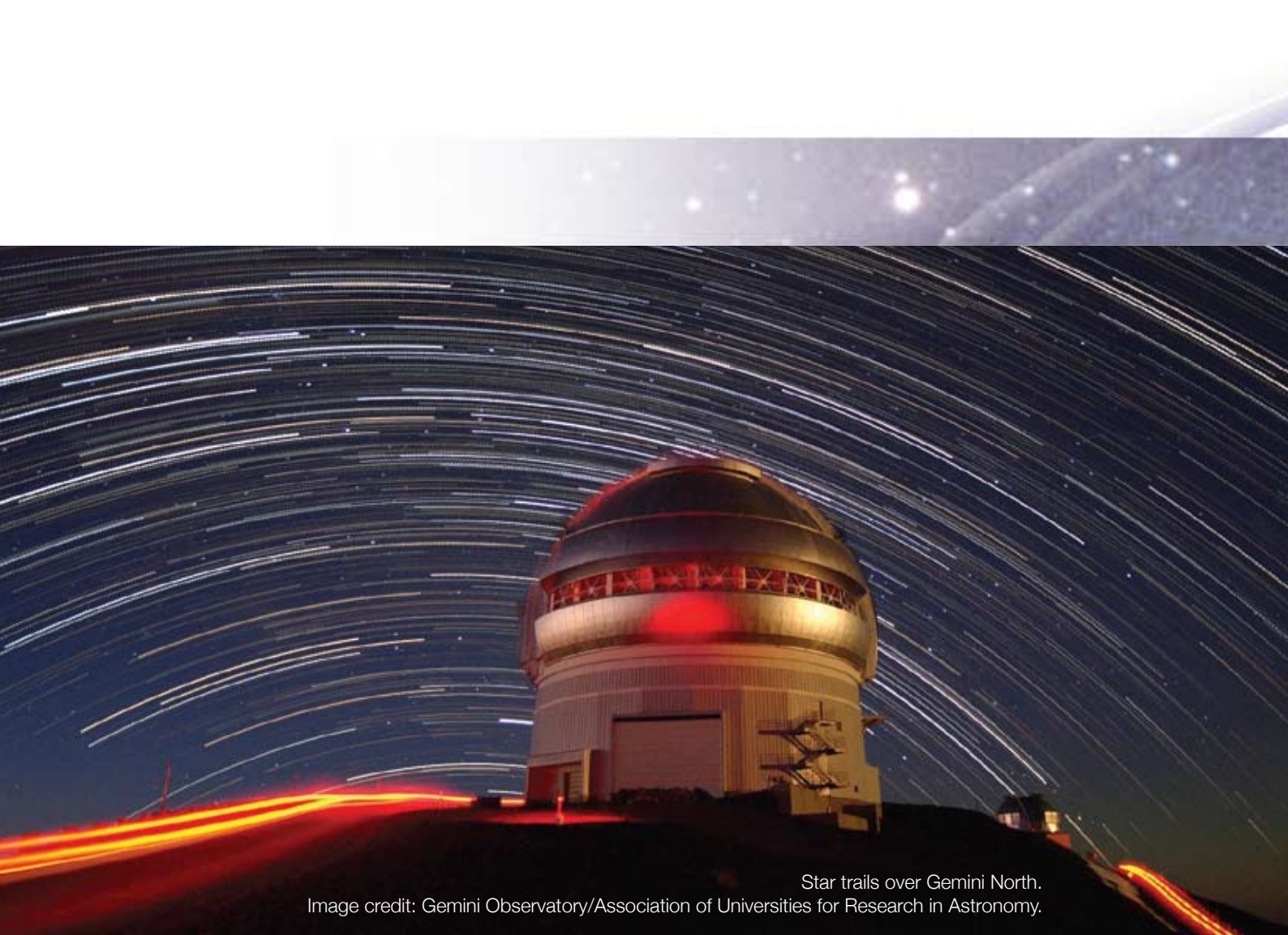
Several presentations on the capabilities of HERMES and the science it enables were given at scientific meetings and conferences in Australia and overseas this year. These have generated considerable interest in the program, and it is clear that HERMES has strong support in the both the Australian and international scientific community. Feedback has indicated that the proposed addition of a fourth camera, with additional funding, will greatly enhance the Galactic Archaeology survey.

## Technical challenges

To successfully deliver HERMES, there are two major technical challenges facing the project. They are: (1) minimise downtime interruption during commissioning by appropriate design of the HERMES interface to AAOmega and the 2dF system; and (2) enable an effective switching of the fibre feed between AAOmega and HERMES. These challenges require thorough testing of connector and dual-fibre probe implementations before commissioning the instrument.

Besides these major challenges, several minor challenges face HERMES. These challenges arise because HERMES has a number of novel design aspects (e.g. size and performance of the dichroic beamsplitters and utilization of VPH grating technology at such high dispersion). These subsystem components need to be carefully designed, sourced, tested and integrated. The precision of the equipment and material used in this project will be dictated in the preliminary and detailed designs. Challenging components include the collimator (mirror, correcting lenses and coating), detector system (cryostat and focus mechanism), beamsplitters (substrates and coatings), Volume Phase Holographic (VPH) gratings, detector controller, slit mechanism (fibre slitlets, fibre relay optics, geometry, slit mask, field lens and coating), camera shutters, and spectrograph table.





Star trails over Gemini North.  
Image credit: Gemini Observatory/Association of Universities for Research in Astronomy.

## Gemini and Magellan

Australia has a 6.19% share of time on the twin 8.1 metre telescopes on Mauna Kea in Hawaii and Cerro Pachon in Chile operated by the Gemini Observatory, an international partnership which also includes the USA, UK, Canada, Argentina, Brazil, and Chile. Australian membership of the Gemini Observatory is funded jointly by the Australian Research Council and by NCRIS funds administered by AAL. AAL has continued an agreement with the Carnegie Institution for Science to purchase 15 nights per year on the twin 6.5 m Magellan telescopes at the Las Campanas Observatory in Chile that provide complementary instrumentation to that offered by Gemini.

The Australian Gemini Office (AusGO) operated by the AAO under contract to AAL coordinates Australia's usage of Gemini and Magellan time by issuing calls for proposals; acting as first point of contact

for prospective Australian applicants; technically assessing proposals on behalf of the Australian Time Assignment Committee; assisting successful Australian Principal Investigators with preparing their programs; providing guidance in how to reduce and analyse new and archival data; and helping to promote Australian science from Gemini and Magellan to the media and general public. AusGO comprises five astronomers: the Australian Gemini Scientist Dr Stuart Ryder, and Deputy Gemini Scientist Dr Simon O'Toole, both based at the AAO; Deputy Gemini Scientist Dr Christopher Onken based at RSAA; and 2 Magellan Fellows (Dr David Floyd and Dr Ricardo Covarrubias) based in Chile, who after two years each conducting research with and providing operational support to the Magellan telescopes, will spend a third year of research at an Australian institution of their choice.



AusGO coordinates the Australian Gemini Undergraduate Summer Studentship (AGUSS) program sponsored by AAL. Under this scheme, up to 3 Australian undergraduate students spend 10 weeks working at the Gemini South headquarters in La Serena, Chile, on a research project supervised by Gemini staff. As its contribution to the International Year of Astronomy, AusGO is running a contest for Australian high school students to win one hour of time on the Gemini South telescope to observe an object suggested by them on scientific and aesthetic grounds.

## Instrumentation

Australia plays a key role in providing state-of-the-art instrumentation for the Gemini telescopes. While the Gemini South Adaptive Optics Imager (GSAOI) awaits delivery of the 50 W laser system needed to drive the rest of the multi-conjugate adaptive optics system on Gemini South, the Near-infrared Integral Field Spectrograph (NIFS) instrument is routinely used with the current adaptive optics system on Gemini North to dissect

the cores of active galactic nuclei and jets emanating from newborn stars. Both GSAOI and NIFS were designed and built by RSAA at ANU.

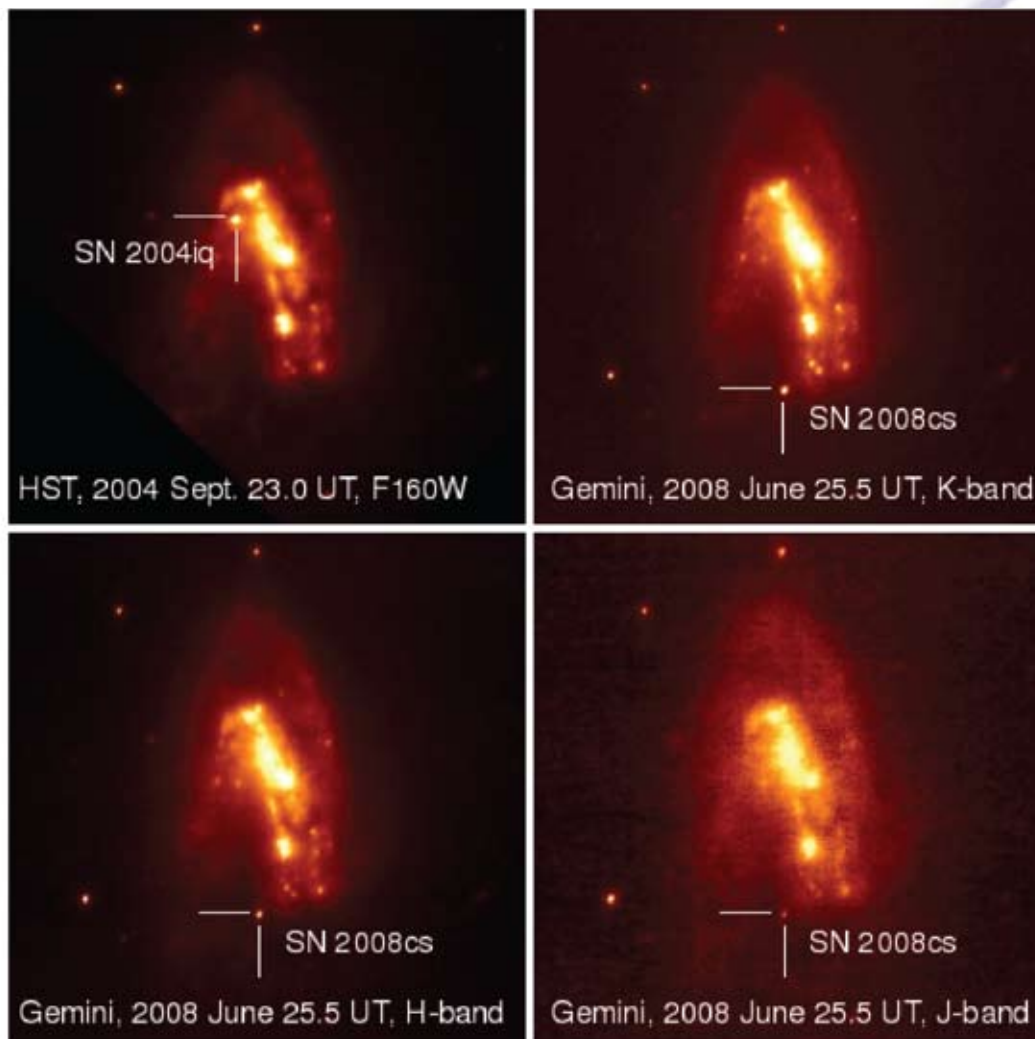
The AAO completed one of two competing design studies for the Wide-Field Multi-Object Spectrograph (WF MOS), a major element of the Aspen instrumentation program for Gemini. Despite strong scientific interest among both the Gemini and Japanese user communities for mounting WF MOS on the Subaru telescope, the Gemini Board was forced to cancel the WF MOS program at its May 2009 meeting due to funding limitations. The sole remaining Aspen instrument, the Gemini Planet Imager is due to be commissioned in 2011.

The AAO, in partnership with several Australian universities, has submitted a LIEF proposal to construct an OH-suppressing J band fibre-feed for the IRIS2 spectrograph on the AAT. If successful, phase 2 of this program would deliver a J+H band OH-suppressing fibre-feed for the refurbished GNIRS spectrograph on Gemini North.



Dr Stuart Ryder (far left) and Dr Chris Onken (far right) from AusGO join AGUSS students David Palamara (left centre) and Sophie Underwood (right centre) in the Gemini South control room for a live video link-up with the official Australian launch of the International Year of Astronomy at Questacon, 28 Jan 2009. Image credit: Stuart Ryder.





Images of the LIRG IRAS 17138-1017 obtained from the Hubble Space Telescope (top left) in 2004, and with Gemini's laser guide star AO system in 2008. The previously unreported SN 2004iq and newly-discovered SN 2008cs are marked. Image credit: Erkki Kankare (Tuorla Observatory).

## Gemini Science Highlight

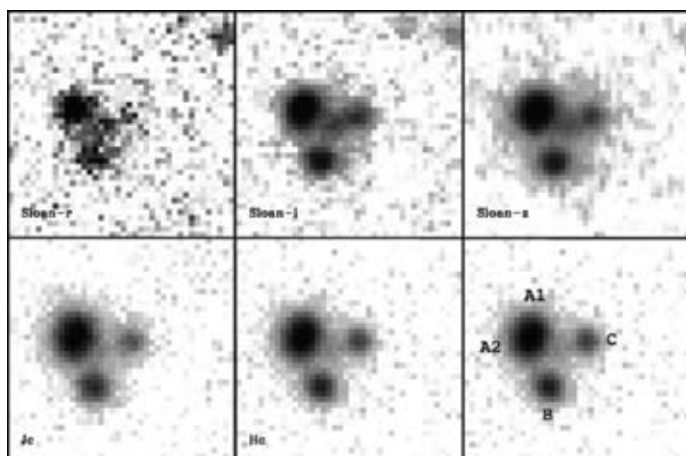
If the rates of star birth within the class of Luminous Infrared Galaxies (LIRGs) implied by their brightness at infrared wavelengths are to be believed, then the most massive of these new stars should end their lives as core-collapse supernovae at the rate of 1 or 2 a year. However, barely a handful of the ~4500 supernovae known have been found in LIRGs due to their high dust content, and clumpy nature. Spotting a new point source like a supernova inside a LIRG is therefore hopeless at optical wavelengths, but is ideally suited to near-infrared adaptive optics (AO) techniques. The Gemini North telescope uses a laser to create an artificial optical star in the upper atmosphere, which enables images at infrared wavelengths to be corrected for the distortions introduced by the atmosphere and deliver images as sharp as (but deeper than) those obtained from the Hubble Space Telescope (HST).



A collaboration led by Stuart Ryder (AusGO) and Seppo Mattila (University of Turku, Finland) has been using near-IR AO systems on Gemini and the VLT to hunt for these “missing” supernovae. They had their first success in mid-2008, when PhD student Erkki Kankare compared Gemini imaging of IRAS 17138-1017 with an HST image from 2004, and found not just one new supernova (SN 2008cs), but also one “historical” supernova (SN 2004iq) that had gone unnoticed at the time (Kankare et al. 2008, ApJL, 689, L97). By measuring the changing colours of SN 2008cs as it faded, they showed that it suffers the most obscuration by dust of any supernova known, with fewer than one in a million optical photons able to escape the dust unhindered. It is little wonder therefore that such heavily-obscured objects have gone unnoticed previously. This first-ever discovery of a supernova using laser guide star AO was featured in the Sydney Morning Herald on 5 Jan 2009, as well as the May/June 2009 issue of Australian Sky & Telescope.

## Magellan Science Highlight

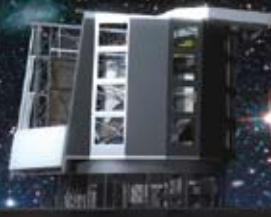
The phenomenon of gravitational microlensing, in which the gravity of a foreground galaxy acts to focus and magnify light from an even more distant galaxy behind it producing one or more images depending on the alignment, enables astronomers to study the lensed galaxy at a level of detail not normally possible. Observations of gravitational microlensing in multiply-imaged quasars currently provide the only direct probe of the accretion disk of hot gas being drawn into the super-massive black hole at scales of less than 1 microarcsecond. Previous analyses used microlensing variability over several years of the lensed images. A team from the University of Melbourne, involving Magellan Fellow David Floyd, has demonstrated a technique for constraining the size of the quasar’s accretion disc simply by imaging the lensed quasar in several colours within one night (Bate et al. 2008, MNRAS, 391, 1955). They obtained images of the lensed quasar MG 0414+0534 in five wavelength bands using the IMACS optical and PANIC infrared cameras on the Magellan 6.5 m Baade telescope. These data, in combination with four existing images from the Hubble Space Telescope, were used to model the size and radial temperature profile of the accretion disc in the quasar MG 0414+0534, finding it to be consistent with a standard Shakura–Sunyaev turbulent thin-disc model.



Magellan IMACS and PANIC imaging of the multiply-lensed quasar MG 0414+0534, taken on 3 Nov 2007. The change in flux ratios of each component (labeled A1, A2, B, and C in the lower-right image) with wavelength is primarily due to microlensing, and can be used to constrain the nature of the quasar’s accretion disc. Image credit: David Floyd (Magellan Fellow).



# Giant Magellan Telescope



Artist's impression of GMT.

Image credit: Giant Magellan Telescope – Carnegie Observatories.

The Giant Magellan Telescope (GMT) Project is an international effort to design and construct one of the next generation of extremely large optical/infrared telescopes, that will provide unrivalled views of the Universe in terms of depth and clarity. The revolutionary GMT, with its enormous 25-m aperture, will be up to 100 times more sensitive than current ground-based telescopes, and will produce images 10 times sharper than those from the Hubble Space Telescope. It will be sited at Las Campanas Observatory on the edge of the Atacama Desert in Chile, a site with some of the best seeing conditions in the world.

Along with the ANU, AAL is a founding participant in the GMT project, with the goal that the ANU/AAL investments will jointly realise total Australian engagement at the 10% level. Current investment is in the three year Design Development Phase (DDP) of the project, with AAL committed to a ~5% share. Its participation in the first year was funded according to the original NCRIS investment plan. Its participation in the second and third years is being funded through the use of its “strategic options” funding, following the outcomes of the ANSOC process that took place in September 2008.

During 2008/09, the GMT Founders Agreement was signed by all currently participating parties to formalise the legal structure managing the GMT project, and create the GMT Corporation. As prescribed by the Agreement, AAL and ANU are each entitled to one member on the GMT Board of Directors. AAL appointed Professor Matthew Colless (AAO Director) as its GMT Board member. Since the Agreement was signed, the University of Chicago signalled its intention to join the project and was granted observer status at Board meetings. The South Korean government announced its full participation in the project at the 10% level, and reserved the necessary funds in its forward-look national budget for its share of the DDP and construction phases.

## GMT Instrument Workshop

A GMT Instrument Workshop was organised and hosted by the Anglo-Australian Observatory in November 2008. Community input on the current and new instrument concepts for GMT was received, and consideration given to the science objectives, requirements and priorities within the Australian community. Currently two Australian instruments, GMTIFS and MANIFEST, are under consideration to proceed to the concept design study stage.

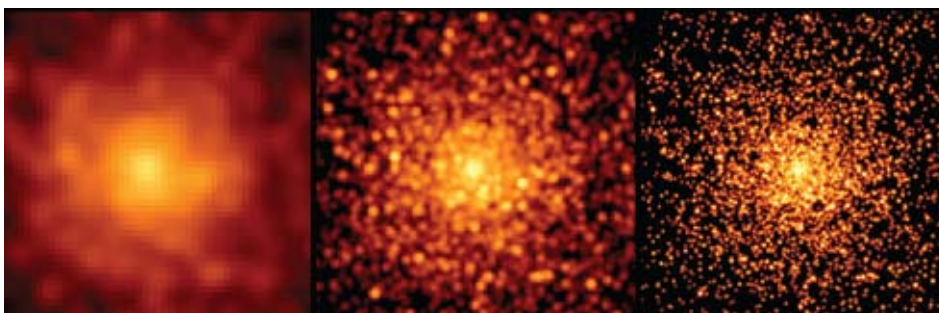


GMTIFS is an ANU-led design for a single-object, AO-corrected, integral-field spectrograph and imager, operating in the near infrared. It will be used with the GMT Laser Tomography Adaptive Optics System to provide full sky AO-corrected coverage. GMTIFS will be optimised for the study of the first galaxies as they formed in the early Universe, and to study the giant black holes at the centre of galaxies. This instrument builds on the strong heritage ANU has established in building the NIFS instrument for the Gemini 8m telescopes.

MANIFEST is a new AAO-led concept for a multi-instrument fibre system which could be used to multiplex a range of other GMT instruments. It is designed to take hundreds or thousands of spectra over the full GMT 20' diameter field of view. By feeding the light to individual instruments, MANIFEST will allow a diverse range of studies, from near-field cosmology to the dynamics of distant galaxy clusters and mapping out the structure of the Universe. MANIFEST will provide optimized packing of spectra on each instrument's detector, and through the choice of appropriate fibres, will optimise transmission at optical and infrared wavelengths. OH sky-lines will be suppressed using advanced Bragg grating technologies pioneered at the AAO.

## Technical challenge

In order to realise its giant-sized 25-m aperture, GMT will combine the light collected by seven individual 8.2-m mirrors, which are arranged in a petal-like configuration. This involves having one central mirror, which is surrounded by the remaining six that are “off-axis” and asymmetric, but which collectively form a perfectly shaped giant parabolic collecting surface. One of the greatest technical challenges and risks to the project is ensuring the six off-axis mirrors are correctly shaped, where the level of accuracy needs to be extremely high (~20 nm) if the telescope is to deliver the exquisite resolution it is capable of. To mitigate this risk, the first step in the GMT mirror production has been to manufacture one of the off-axis mirrors, making sure these stringent requirements in terms of shape and optical quality can be achieved, before the project proceeds any further. A key part of this process has been to construct a new testing tower, together with the highly sophisticated laser-based optical testing equipment that is needed to accurately verify mirror performance. The first mirror is expected to be completed in 2010, with production of the second mirror to start shortly thereafter.



Simulated H-band images of a globular cluster at the distance of Centaurus A (3.8 Mpc). The left, middle and right images correspond to the Hubble Space Telescope, an 8-m telescope with AO, and GMT with AO respectively. GMT's vision will be 10 times sharper than the Hubble. Image credit: Pat McCarthy



# Australian SKA Pathfinder

The Australian SKA Pathfinder (ASKAP) has enjoyed significant development over the past year across all domains. For example, the digital system, which is funded by AAL, now has a full system design and the hardware for the entire first prototype is in-house and under test. These developments feed into Australia's position in the overall SKA process, and the team is working closely with the international SKA Project Development Office (SPDO) and the Preparatory Study for the SKA ("prepSKA") teams to develop the best site and technology for the SKA. The first phase of ASKAP, called the Boolardy Engineering Test Array (BETA), comprises the first 6 production antennas with prototype electronics and will be under test in mid-2010. The full ASKAP system is expected to be operational in early 2013.

The antenna contract for ASKAP's innovative three axes design has been let with the 54th Research Institute of the China Electronics Technology Corporation (CETC54) and the first antenna is scheduled for delivery to site in December 2009.

In order to facilitate cable routing and packaging, a full-scale wooden mock-up of the antenna based on the design drawings has been fabricated at the Sydney CSIRO Radiophysics Laboratory. The entire functioning electronics test setup will be installed within this mock-up to make sure it all integrates together.

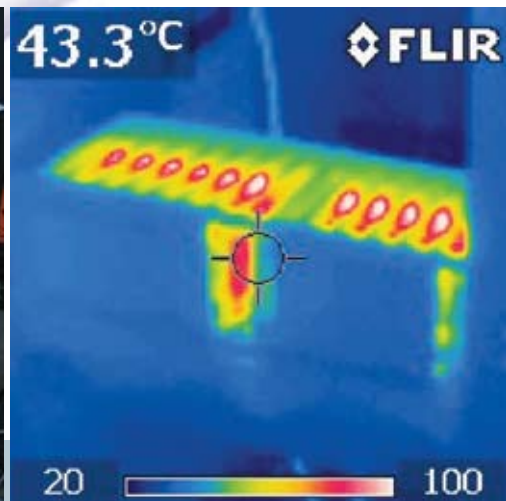
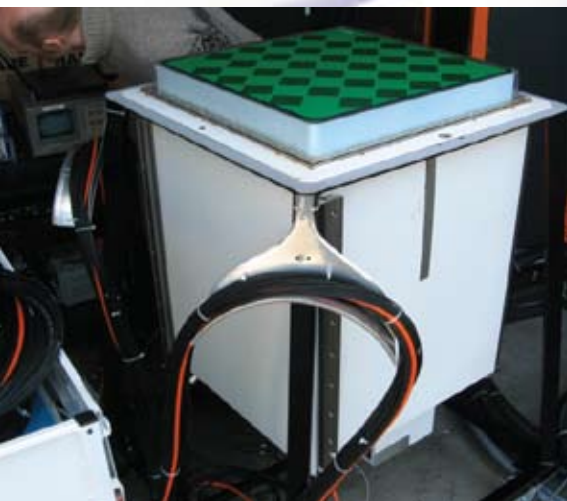
CSIRO has purchased the 345,957 hectare Boolardy Pastoral Station and will excise about 120 km<sup>2</sup> of area to establish the Murchison Radio-astronomy Observatory (MRO). CSIRO, the Commonwealth and State Government of Western Australia

have concluded an Indigenous Land Use Agreement (ILUA) with the Wajarri Yamatji people of WA's Mid-west, which is now being registered with the National Native Title Tribunal. The Commonwealth Department of Environment, Health, Water and the Arts has evaluated ASKAP's environmental impact and declared it as "not a controlled action if undertaken in a particular manner."

As mentioned, the ASKAP digital system has completed its design and all of the hardware for its first prototype is complete. This hardware is being assembled into the complete system and is under test. The team is testing novel cooling schemes to yield an efficient and "green" system. The digital Critical Design Review (CDR) is scheduled for October 2009. The full BETA digital system is expected to be installed on-site in mid-2010.







Left: An updated version of the phased array feed is under test in preparation for installation at the 12-m Parkes Testbed Facility. The production version is under design in conjunction with the remaining electromagnetic modelling. Middle: Thermal image of digitizer rack to understand and optimize thermal performance. Right: Digitiser rack under test. Image credit: CSIRO.

## Scientific drivers

In order to maximize ASKAP's survey effectiveness, the team has been working with the international community and soliciting explicit proposals for transformational scientific surveys. The selected international Science Survey Teams will be intimately involved with scoping ASKAP and defining and developing the algorithms for processing. It is vital to involve the groups early, since most of the data from ASKAP cannot be kept due to sheer volume, so the science must be embedded deep within the system.

The first round consisted of short Expressions of Interest from international teams, which were then evaluated and a subset were invited to submit a full proposal. Seventeen full proposals were received, involving 693 scientists from around the world, and, if fully implemented, would require 12 years of observing time. Following a review by an international committee, the results will be communicated by October 2009.

The fully-designed antenna on a rendered site similar to the Boolardy site for ASKAP. Image credit: Swinburne Astronomy Productions.





# Murchison Widefield Array

The Murchison Wide-field Array (MWA) is a large-N interferometric radio telescope operating at low frequencies (80 – 300 MHz) and is currently under construction at the Murchison Radioastronomy Observatory (MRO). Since the MWA is designed to allow a number of science investigations to be conducted at the low end of the radio-frequency spectrum, a pristine radio frequency environment is required – hence the choice of the MRO is based on the very low levels of radio frequency interference detected at that site.

The primary science goals of the MWA are aimed at investigations of the Epoch of Re-ionisation (EoR), Solar, Heliospheric and Ionospheric phenomena, transient radio sources, and Galactic and Extragalactic phenomena.

The MWA project is supported by a large number of partner institutions in Australia, India and the United States. Funding stems from both partner institutions and allocations from national funding agencies. Funding is being sought from AAL to extend the 32 tile-based (a tile is a four by four regular grid of dual polarisation dipole elements) demonstration system (i.e., the 32-T System) to the intended final 512-tile configuration.

A regular monthly site visitation program was established and conducted over the period August 2008 through March 2009. This program permitted a build-up of critical on-site infrastructure and a staged platform for the 32-T demonstration system deployment. Site visits are now scheduled on a per case basis in support of finalising the 32-T system demonstration and to support conduct of the test and evaluation program and beyond.

Highlights resulting from the site visitation program include: the installation of new laboratory work-space and air conditioning; upgrade of the diesel generator capacity; antennas refit; deployment of beamformers; laying of data and power cables; and the integration of four receivers. Additionally, a number of interim prototype subsystems

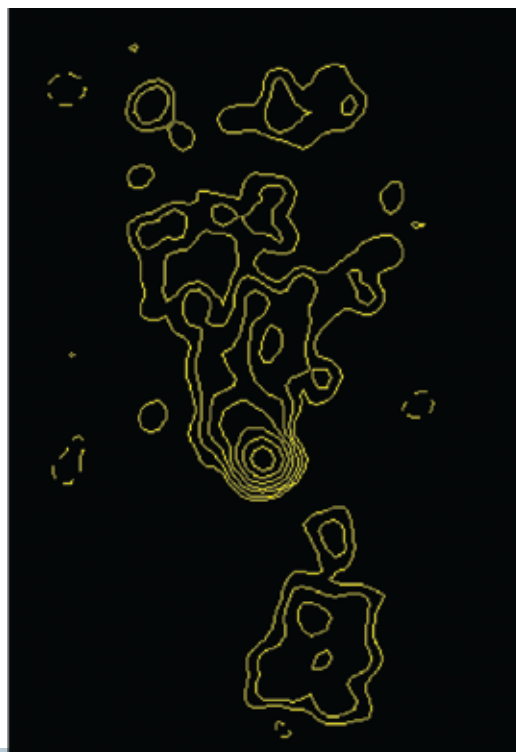


Figure 1: The entire Centaurus A radio source, as imaged with the MWA 32-T system at an angular resolution of 20 arcmin. Image credit: MWA consortium.



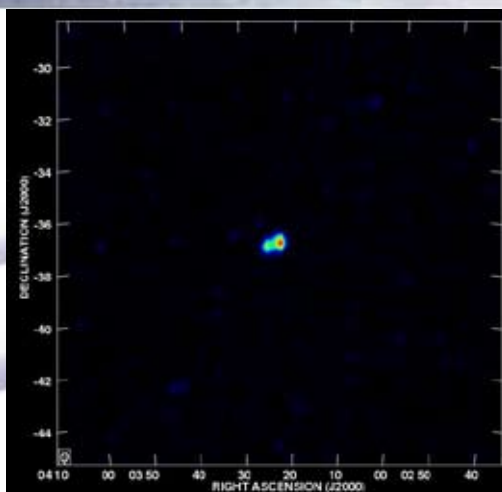


Figure 2: The double-lobed radio galaxy Fornax A imaged at 159 MHz. Image credit: MWA consortium.

were deployed such as a clock distribution system, Graphic Processing Unit based software correlator (albeit with a limited 1.28MHz bandwidth) and the preliminary data acquisition cluster.

Antennas, beamformers, receivers are operational and the interim software correlator was successfully trialled along with rudimentary remote monitoring and control capability. This allowed ongoing development and verification of front-end subsystems as well as the development of the suite of operational software to be undertaken. Furthermore, initial testing and science observations have been undertaken ahead of the 32-T demonstration including the capture of imagery.

Principal activities remaining towards preparation for the 32-T demonstration, a significant project milestone, include integration and deployment of the hardware-based Polyphase Filter Bank and Correlator subsystems with the receiver and Real-Time Computer/Software (RTS/RTC) subsystems. This work is currently being undertaken.

## Scientific Highlight

In mid-November 2008 the first significant data was collected from the system, though only 26 tiles were available for actual data collection at that time via the aforementioned interim on-site software correlator.

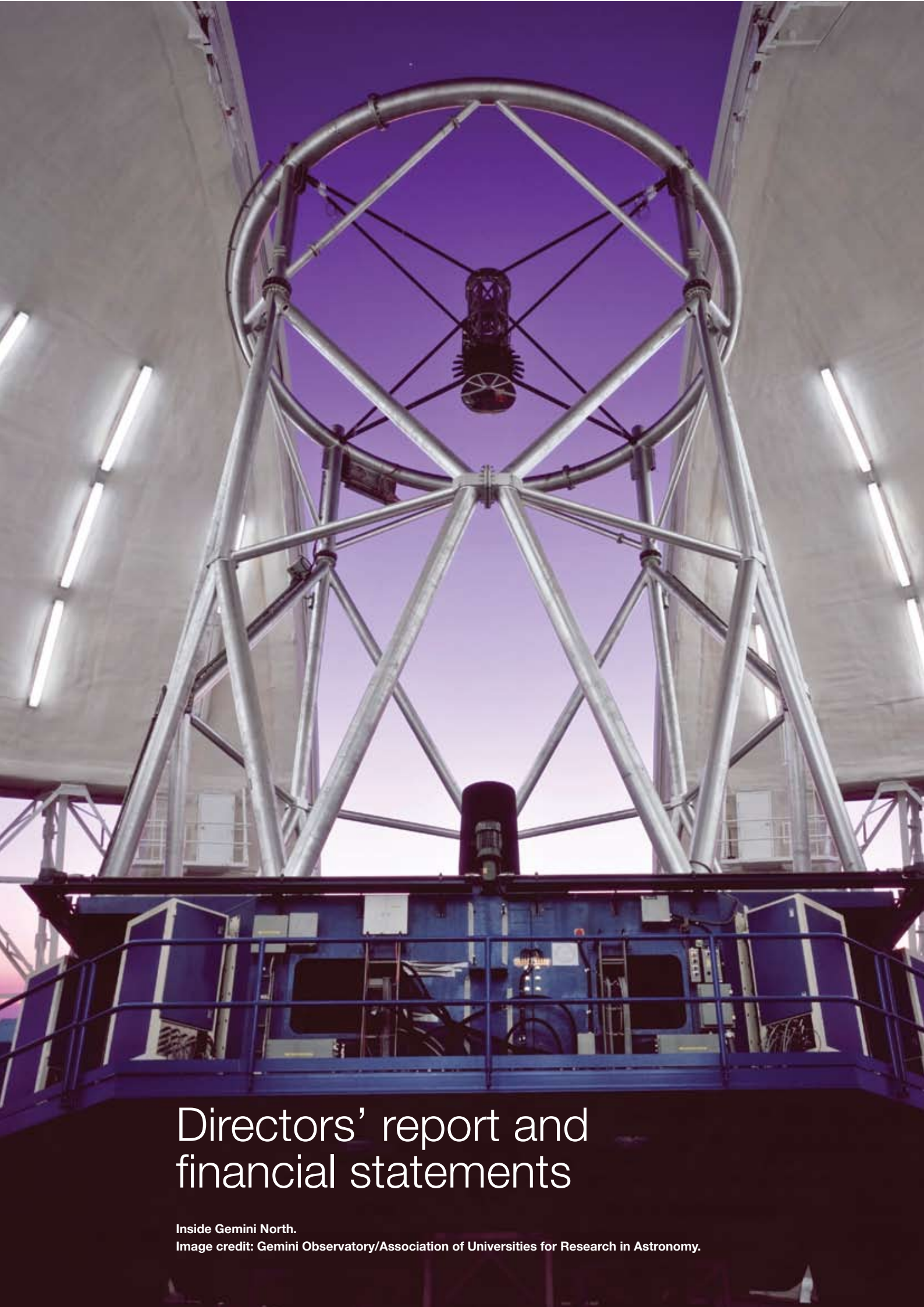
A variety of sources were observed, including the sun, the South Pole region, and the candidate EoR region. Roughly 6TB of data were collected, which were subsequently copied and distributed to several institutions for analysis. The data has been utilised to study the performance of the 32-T array including data quality determination.

Several sky images from that data set have been created, a sample of which are shown in figures 1 and 2. Figure 2 depicts an image of the double-lobed radio galaxy Fornax A at 159 MHz obtained with the 26-tile system, along with two other sources (lower left of the image). The total bandwidth was 1.28MHz, divided into 128 channels with dual linear polarizations. These data comprise a five-minute observation correlated with 1-second records and were subsequently processed using AIPS package. To produce this image, data were self-calibrated in both phase and amplitude, averaged over the inner 0.96 MHz of the band and imaged using a multi-faceted, wide-field CLEAN deconvolution process. The synthesized beam is 21'x14' and the dynamic range is approximately 100-to-1; consistent with expected array performance parameters.









# Directors' report and financial statements

Inside Gemini North.

Image credit: Gemini Observatory/Association of Universities for Research in Astronomy.







## Directors' Report

### Astronomy Australia Limited

A.B.N 19 124 973 584

Your directors present their report on the company for the financial year ended 30 June 2009. Astronomy Australia is a company limited by guarantee.

The names of the directors in office at any time during, or since the end of, the year are:

Dr. Martin T. Cole  
Prof. Warrick J. Couch  
Prof. Elaine M. Sadler  
Prof. Brian P. Schmidt  
Prof. Lister Staveley-Smith (retired 30th September 2008)  
Prof. Michael N. Barber (appointed 5th July 2007)  
Dr. David M. Warren (appointed 5th July 2007)  
Prof. Jeremy R. Mould (appointed 30th September 2008)

Directors have been in office since the date of incorporation, being 18th April 2007, to the date of this report unless otherwise stated.

The surplus of the company for the financial year after providing for income tax of \$Nil, amounted to (\$592,596) (2008 - \$4,495,764).

### Review of Operations

During the year the company consolidated its operations to facilitate the extensive work requirements of the Chief Operating Officer and the Directors.

No significant change in the nature of these activities occurred during the year.

The principal activities of the company during the financial year were liaison with the Australian astronomical community and ensuring investment in Australian astronomy infrastructure results in valuable national scientific infrastructure for the benefit of the entire Australian astronomical community.

To these ends the company has entered into an agreement with the Commonwealth of Australia, Department of Innovation, Industry, Science and Research (DIISR), for the receipt of funds over five years to enable the implementation of an investment plan for the National Collaborative Research Infrastructure Strategy Capability, known as Radio and Optical Astronomy.



## Directors' Report

Other likely developments in the operations of the entity and the expected results of those operations in future financial years have not been included in this report as the inclusion of such information is likely to result in unreasonable prejudice to the entity.

No matters or circumstances have arisen since the end of the financial year which significantly affected or may significantly affect the operations of the company, the result of those operations, or the state of affairs of the company in future financial years.

The company's operations are not regulated by any significant environmental regulation under a law of the Commonwealth or of a State or Territory.

No dividends were paid during the year and no recommendation is made as to the dividends as the constitution of the company does not permit the payment of dividends.

No options over issued shares or interests in the company were granted during or since the end of the financial year and there were no options outstanding at the date of this report.

The company has paid directors' and officers' liability insurance with a policy under which all directors and officers of Astronomy Australia Ltd. are both indemnified and insured.

## Company Secretary

The following person held the position of company secretary at the end of the financial year:

Mr. Robert W. Osborne, Chartered Accountant

Mr. Osborne is the principal of the firm R.W. Osborne & Associates and has held a Certificate of Public Practice since 1980. He is a Fellow of the Institute of Chartered Accountants in Australia and a Fellow of CPA Australia. Mr. Osborne is contracted to Astronomy Australia Ltd. and was appointed company secretary on 18th April, 2007.



## Directors' Report

# Information on Directors

Dr. Martin T. Cole  
(Non Executive Chairman)

### **Qualifications:**

Diploma of Electronics Engineering,  
Master of Engineering,  
Doctor of Philosophy (Fluid Dynamics)

### **Experience:**

As a member of the Prime Minister's Science, Engineering & Innovation Council (1999-2007), he chaired the PMSEIC Work Group on Astronomy. Currently he is Managing Director of Cole Innovation & Design Pty. Ltd. and its subsidiary imRAC Pty. Ltd. In 1970 he founded IEI Pty. Ltd., an electronics research and manufacturing company which grew from a zero base to generate over \$200M total sales and over 2000 person-years of direct employment. He has invented and patented many electronic security devices and systems for crime prevention. He also pioneered the development and worldwide adoption of a revolutionary fire detection system, covered by several additional patents. This system protects over 50,000 zones including the NASA Space Shuttle launch pads. Recently he launched the next generation fire-prevention technology known as Monitair™ which won an EA National Engineering Excellence Award in 2005 and has been adopted worldwide by Siemens. National President of Engineers Australia (80,000 members) 2000 and 2001. On becoming an EA Fellow in 1982, he served the EA National Council for 21 years.

He designed the new corporate image for EA and held six successive portfolios as a National Vice (or Deputy) President. He initiated higher professional standards of membership, raised members' professional standing in the community, and introduced the "Council and Congress" model of governance and representation. He was also Chairman Victoria Division 1990, and was founding National President of the Society of Fire Safety 1994-99.

### **Interests:**

Research (fluid dynamics, optical physics, electronics), cosmology (gravity & dark energy), graphic design, technical journalism, motor racing.

### **Family:**

Christine with five children.

### **Special Responsibilities:**

**Chair** – AAL Board of Directors

**Member** – Executive Remuneration

**Member** – Audit & Risk Management Committee

**Member** – Astronomy Roadmap Committee

**Member** – Australian Antarctic Astronomy Advisory Committee



## Directors' Report

# Information on Directors

Prof. Warrick J. Couch  
(Non Executive Director)

### Qualifications:

Bachelor of Science with Honours,  
Master of Science,  
Doctor of Philosophy (Astronomy)

### Experience:

*Optical Astronomy* – Prof. Couch has a research career spanning 30 years in this area, with an extensive and distinguished track record in terms of:

- (i) Use of university, national and international telescope facilities (including the AAT, Gemini, VLT, HST),
- (ii) Research publications (career total of 160 refereed journal papers) and citation impact (Australian citation laureate and “Highly Cited” researcher), and
- (iii) Securing external research grant funding (career total of more than A\$3M).

*Research collaboration at the national and international level* – His research has involved numerous and often high profile national and international collaborations, the most notable examples being: the Berkeley-AAO Distant Supernovae Search, the MORPHS HST Distant Cluster Imaging Program (Aus, UK, US), the 2dF Galaxy Redshift Survey (Aus-UK), and the “WiggleZ” Dark Energy Survey (Aus, Us, Canada).

### *National research policy and priorities* –

He is or has been an active member of key national astronomy committees and bodies that are responsible for dealing with research policy and priorities, including the Australian Academy of Science’s National Committee for Astronomy (at the time when it had oversight of the last decadal planning process), the Anglo-Australian Telescope Board, the Australian Gemini Steering Committee, and the executive group responsible for writing the Australian “Radio and Optical Astronomy” NCRIS Investment Plan.

### *Strategy formulation and implementation*

– He has gained considerable experience in this area through his involvement in the aforementioned national astronomy committees, particularly in developing short and long term strategies and priorities for our national astronomy infrastructure, and implementing related funding programs (e.g. MNRF and NCRIS).

### Special Responsibilities:

**Member** – Executive Remuneration

**Member** – Australian Giant Magellan Telescope Advisory Committee

**Member** – Gemini Finance Committee



## Directors' Report

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# Information on Directors

Prof. Elaine M. Sadler  
(Non Executive Director)

**Qualifications:**

Bachelor of Science with Honours,  
Doctor of Philosophy (Astronomy)

**Experience:**

*Radio Astronomy* – Prof. Sadler has carried out many large research programs in radio astronomy, including the recently completed Sydney University Molonglo Sky Survey (SUMSS). Since 2001 she has been increasingly involved with science planning and technology development for the SKA and its pathfinder telescopes. Much of her current research uses the Australia Telescope facilities.

*Optical Astronomy* – She has spent six years as a staff astronomer and instrument scientist at the Anglo-Australian Observatory, and has also worked at major European (ESO) and US (Kitt Peak) observatories. Her current research programs use the AAT, Gemini and Magellan telescopes, and she is a member of the international Science Advisory Group for the AAO's 6dF Galaxy Survey.

*Research collaboration at the national and international level* – She served as President of Commission 28 (Galaxies) of the International Astronomical Union (IAU) from 2003-06 and is now President of IAU Division VIII. The IAU is the world

coordinating body for astronomy, and Commission Presidents are responsible for overseeing activities in their research area at an international level. She currently has active research collaborations with colleagues in Europe, India and the USA, and with researchers from several groups around Australia.

*National research policy and priorities* – She was involved in the Australian Astronomy decadal plan (2006-15), both at the Working Group stage and as a member of the Editorial Board which put together the final published document. She is currently a member of the National Committee for Astronomy. She has also been involved in discussion of national research issues as a member of AABoM, and as President of the Astronomical Society of Australia.

**Special Responsibilities:**

**Chair** – Nominations Committee

**Member** – Astronomy Roadmap Committee



## Directors' Report

# Information on Directors

Prof. Brian P. Schmidt  
(Non Executive Director)

### **Qualifications:**

Bachelor of Science, Physics and  
Astronomy, A.M. in Astronomy,  
Doctor of Philosophy (Astronomy)

### **Experience:**

*Optical astronomy* – Prof. Schmidt is one of Australia's most active optical astronomers. His work has focused on the physics of supernovae and gamma ray bursts, and using these objects for cosmological studies. He is the instrument scientist for the new SkyMapper telescope which will undertake a comprehensive optical survey of the southern skies. Schmidt has received a variety of awards over his career, including the 2007 Gruber Prize for Cosmology, the 2006 Shaw Prize for Astronomy, and the inaugural Ministers Malcolm McIntosh award for Achievement in the Physical Sciences in 2000.

*Radio Astronomy* – Prof. Schmidt has undertaken research using radio facilities to understand supernovae and Gamma Ray Bursts, and involved in the development of radio transient astronomy with the Murchison Widefield Array, and the Australian SKA Pathfinder (ASKAP). Prof. Schmidt is actively involved in the development Murchison Wide Field array, has served as the Chair of the ATNF Time assignment committee, and as a member of the ASKAP Survey Science Proposal Committee.

*Research collaboration at the national and international level* – Schmidt was leader of the High-Z team, a group of 20 astronomers on 6 continents whose 1998 discovery of an accelerating Universe was named Science Magazines Breakthrough of the Year. He has participated in several large international groups that have studied supernovae and gamma ray bursts, and is a member of the Australian and US National Academies of Science.

*National research policy and priorities* – Schmidt has been an active member of several national astronomy and science bodies that are responsible for prioritizing and allocated resources for research. These include having served on the Major National Research Facilities selection panel in 2000, served as a member of the Australian Square Kilometre Array Steering Committee, and chairing the Australian Decadal Working group on International Facilities.

*Strategy formulation and implementation* – Professor Schmidt has taken a leading role in formulating strategy and implementation in Australian Astronomy. He is currently a member of the Murchison Widefield Array Board. He chaired the Australian National Academies LOFAR options working group.

### **Special Responsibilities:**

**Chair** – Astronomy Roadmap Committee

**Member** – High Performance Computing Workshop Group

**Member** – European Southern Observatory Working Group



## Directors' Report

# Information on Directors

Prof. Lister Staveley-Smith  
(Non Executive Director) – Retired 30th September 2008

### **Qualifications:**

Bachelor of Arts with Honours,  
Doctor of Philosophy (Radio Astronomy)

### **Experience:**

*Astronomy Research* – Prof. Staveley-Smith is an active researcher, with 330 publications, 110 of which have been in the last 5 years. He is a member of the Editorial Advisory Committee for PASA.

*Radio Astronomy* – With a PhD in radio astronomy, he has worked for 16 years at ATNF, prior to becoming a Premier's Fellow in Radio Astronomy at UWA.

*Research Collaboration* – many of the projects that he has been involved in are collaborative in nature with national and international participation. A current example is his recent work on Gas Evolution which involves researchers from Australia, Germany, USA, Netherlands, and the UK.

*National Research Policies* – He is currently a member of the NCA and the Advisory Panel for the Australia-India Strategic Research Collaboration Fund. He was the

immediate past Director of the Gemini and SKA MNRF and was a member of the Australian Astronomy Board of Management.

*Business Administration and Finance* – He was Head of Astrophysics at ATNF for 6 years and Assistant Director Astrophysics for two years, responsible for annual theme funding of \$4M. He has participated in several project management, business management and leadership courses including that of the Australian Institute of Company Directors (AICD) in February 2005.

*Strategy Foundation* – He has been a member of various NCRIS and Decadal Plan working groups and is also past chair of the MWA Science Council.

### **Special Responsibilities:**

**Member** – Audit & Risk  
Management Committee



## Directors' Report

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# Information on Directors

Prof. Michael N. Barber  
(Non Executive Director)

**Qualifications:**

Bachelor of Science with Honours,  
Doctor of Philosophy (Theoretical Physics)

**Experience:**

Prof. Michael Barber brings to the Board  
extensive experience:

*National research policy and priorities* – He  
has served as Secretary, Science Policy of  
the Australian Academy of Science, been a  
member on the Australian Research Council  
and has lead CSIRO's engagement with the  
National Research Priorities.

*Research collaboration at the national and  
international level* – In addition to his ARC  
and CSIRO experience, he has worked  
closely with a number of overseas agencies  
including FRST in NZ and the Industry  
Canada in the development of policies and  
programs to enhance collaborative research.  
He also has strong personal networks that

include senior people in agencies such as  
the NSF, the National Research Council and  
the Carnegie Institution in the US and the  
European Union.

*Strategy formulation and implementation*  
– He has been a senior executive in two  
universities – UWA and ANU – and CSIRO  
in a number of roles that have all involved  
the development and implementation of  
strategy. He is currently Vice Chancellor and  
President of Flinders University.

**Special Responsibilities:**

**Chair** – Astronomy NCRIS Strategic  
Options Committee



## Directors' Report

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# Information on Directors

Dr. David M. Warren  
(Non Executive Director)

**Qualifications:**

HonsDSc,  
Bachelor of Science with Honours

**Experience:**

Dr. Warren brings a combination of international business experience and knowledge of practical astronomy. He has been involved in corporate governance to public company standards and has considerable experience with corporate legal matters. He is well acquainted with matters of Business Administration and Finance. Of particular relevance is his membership of the Audit and Remuneration committees of Altium Ltd. Altium Ltd. is a Sydney based company which makes CAD software for electronic design.

Physics and astronomy led him into the world of electronics and software where technologies employed at the cutting edge of science were rolled out into the commercial world. This involvement with electronics and software spans a period from before the microprocessor until the present age of ubiquitous computing and global connectivity.

He has established a DSP group at the University of Tasmania and is involved in optical astronomy micro-lensing studies for the purpose of discovering new planets. He has acted as an observer for the PLANET consortium of which his local UTAS micro-lensing group is a member.

**Special Responsibilities:**

**Chair** – Audit & Risk Management Committee

**Chair** – Executive Remuneration

**Member** – Astronomy NCRIS Strategic Options Committee



## Directors' Report

# Information on Directors

Prof. Jeremy R. Mould (Non Executive Director)  
Appointed 30th September 2008

### **Qualifications:**

The University of Melbourne 1968-1972,  
Bachelor of Science with Honours  
The Australian National University,  
1972-1975 Ph.D.

### **Experience:**

Demonstrator, School of Physics,  
The University of Melbourne, 1971  
Junior Research Fellow,  
Royal Greenwich Observatory, 1976  
Postdoctoral Research Associated,  
Kitt Peak National Observatory, 1977-78  
Carnegie Fellow, Hale Observatories,  
1978-79  
Assistant Astronomer,  
Kitt Peak National Observatory, 1979-82  
Associate Professor, California Institute  
of Technology, 1988-94  
Professor, California Institute of Technology,  
1988-94  
Professor, The Australian National University,  
1993-2001  
Visiting Associate, California Institute  
of Technology, 1995-2001  
Director, National Optical Astronomy  
Observatory, 2001-07  
Professorial Fellow, The University  
of Melbourne, 2003-

### **Professional Societies and Awards:**

American Astronomical Society (AAS)  
International Astronomical Union  
Astronomical Society of Australia  
Van Biesbroeck Award  
(jointly with M. Aaronson), 1981  
Newton Lacy Pierce Prize, AAS  
(jointly with M. Aaronson), 1984  
Oort Professorship, Leiden University 1998  
Fellow of the Australian Academy  
of Science, 1998  
Fellow of the Royal Astronomical  
Society, 2000  
Gruber Cosmology Prize, 2009

### **Research Publications:**

Author of over 400 scientific publications,  
Thomson ISI Australian Citation  
Laureate, 2001

### **Management Experience:**

Executive Officer for Astronomy,  
California Institute of Technology, 1987-90  
Director, Mount Stromlo & Siding  
Spring Observatories, 1993-98  
Director, Research School of Astronomy  
& Astrophysics, ANU, 1998-2001  
Director, National Optical Astronomy  
Observatory, 2001-2007

### **Special Responsibilities:**

**Chair** – European Southern Observatory  
Working Group

**Member** – Audit & Risk Management  
Committee



Directors' Report

## Register of Directors interests

### **Dr. Martin T. Cole**

1. Fellow – Australian Academy of Technological Sciences & Engineering
2. Honorary Fellow and Past President – Engineers Australia
3. Fellow – Australian Institute of Management
4. Associate – Astronomical Society of Australia

### **Prof. Brian P. Schmidt**

1. Employed by the Australian National University, RSAA
2. Board Member - MWA
3. Member – AURA-Gemini oversight committee
4. Member – Australian Academy of Sciences
5. ARC Grant holder
6. Member – International Astronomy Union
7. Fellow – Astronomical Society of Australia

### **Prof. Lister Staveley-Smith (retired 30th September 2008)**

1. Employed by University of Western Australia
2. Member – MWA Science Council
3. Member – MWA monitor and control team at UWA
4. Member – ASKAP science working group
5. Member – ASKAP user policy group
6. Member – National Committee for Astronomy
7. Member – Australia-India Strategic Research Fund panel
8. Member – Astronomical Society of Australia council
9. Member – Australian Institute of Physics
10. Member – International Astronomy Union
11. Member – Publications of the Astronomical Society of Australia editorial committee.
12. ARC Grant holder



Directors' Report

## Register of Directors interests

### **Prof. Michael N. Barber**

1. Vice Chancellor and President of Flinders University
2. Director – AARNet Pty Ltd
3. Member – Universities Australia
4. Fellow – Australian Academy of Science

### **Dr. David M. Warren**

1. Non Executive Director, Altium Ltd ([www.altium.com.au](http://www.altium.com.au))  
Remuneration committee member, Altium Ltd
2. Non Executive Director, Houstons Farm Pty Ltd  
Remuneration committee member, Houstons Farm Pty Ltd
3. Honorary Research Associate, School of Mathematics and Physics, UTAS
4. Considerable financial support for astronomy at UTAS and indirectly of PLANET.
5. Member of the Australian Institute of Physics
6. Member of the Australian Institute of Company Directors

### **Prof. Elaine M. Sadler**

1. Employed by the University of Sydney
2. President – IAU Division VIII (Galaxies and the Universe)
3. Member – National Committee for Astronomy
4. Member – ASKAP User Policy Taskforce
5. ARC Grant holder
6. Member at Large – ESO Scientific and Technical Committee (STC)
7. Member – ALMA European Science Advisory Committee (ESAC)
8. Member – ICRAR Science and Technology Advisory Committee (STAC)



Directors' Report

## Register of Directors interests

### **Prof. Warrick J. Couch**

1. Employed by Swinburne University of Technology
2. President – Astronomical Society of Australia
3. Chair – Anglo-Australian Telescope Board
4. Chair – Australian Gemini Steering Committee
5. Member – International Gemini Board
6. Member – National Committee for Astronomy
7. Fellow – Astronomical Society of Australia
8. ARC Grant holder
9. Fellow of the Australian Academy of Science
10. Fellow and Immediate Past President of the ASA

### **Prof. Jeremy R. Mould**

1. Honorary Professorial Fellow – University of Melbourne
2. Fellow – Australian Academy of Science



## Directors' report

# Meetings of Directors

	Directors Meetings		Board Committee Meetings	
	No. Eligible to Attend	No. Attended	No. Eligible to Attend	No. Attended
<b>Name:</b>				
Dr. Martin T. Cole	6	6	1	1
Prof. Warrick J. Couch	6	6	-	-
Prof. Elaine M. Sadler	6	6	-	-
Prof. Brian P. Schmidt	6	6	-	-
Prof. Lister Staveley-Smith	3	3	1	1
Prof. Michael N. Barber	6	5	-	-
Dr. David M. Warren	6	6	1	1
Prof. Jeremy R. Mould	3	3	-	-

## Auditor's Independence Declaration

A copy of the auditor's independence declaration as required under section 307C of the Corporations Act 2001 is set out on page 47.

Signed in accordance with a resolution of the Board of Directors:

Director:   
Dr. Martin T. Cole

Director:   
Prof. Warrick J. Couch

Dated this 4th day of September 2009



**Astronomy Australia Limited A.B.N 19 124 973 584**

Auditor's Independence Declaration under section  
307C of the Corporation Act 2001 to the directors of  
Astronomy Australia Limited

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## Auditor's Independence Declaration

I hereby declare, that to the best of my knowledge and belief, during the financial year ended 30 June 2009 there have been no:

- (i) contraventions of the auditor independence requirements as set out in the Corporations Act 2001 in relation to the audit; and
- (ii) contraventions of any applicable code of professional conduct in relation to the audit.

**Name of Firm:** E. Townsend & Co.  
Chartered Accountants

**Name of Partner:**   
Eric Townsend

**Address:** 35 Mereweather Avenue, Frankston. Vic. 3199.

Dated this 4th day of September 2009



## Income statement for the year ended 30 June 2009

	<b>Note</b>	<b>2009 \$</b>	<b>2008 \$</b>
Revenues from ordinary activities	<b>2</b>	12,853,973	11,934,639
Grants paid		(12,964,911)	(7,089,023)
Auditor's remuneration	<b>3</b>	(4,800)	(2,100)
Bad and doubtful debt expenses		-	(5,000)
Depreciation and amortisation expenses		(3,834)	(1,139)
Employee benefits expenses		(243,543)	(175,904)
Other expenses		(229,481)	(165,709)
<b>Surplus before income tax</b>	<b>4</b>	<b>(592,596)</b>	<b>4,495,764</b>

The accompanying notes form part of these financial statements



Balance sheet as at 30 June 2009

	Note	2009 \$	2008 \$
<b>CURRENT ASSETS</b>			
Cash and cash equivalents	5	18,192,029	19,206,789
Trade and other receivables	6	772,820	-
<b>TOTAL CURRENT ASSETS</b>		18,964,849	19,206,789
<b>NON-CURRENT ASSETS</b>			
Property, plant and equipment	7	5,968	8,097
<b>TOTAL NON-CURRENT ASSETS</b>		5,968	8,097
<b>TOTAL ASSETS</b>		18,970,817	19,214,886
<b>CURRENT LIABILITIES</b>			
Trade and other payables	8	15,038,424	14,686,718
Provisions	9	4,096	7,275
<b>TOTAL CURRENT LIABILITIES</b>		15,042,520	14,693,993
<b>TOTAL LIABILITIES</b>		15,042,520	14,693,993
<b>NET ASSETS</b>		3,928,297	4,520,893
<b>EQUITY</b>			
Reserves		3,871,231	4,448,374
Retained earnings	10	57,066	72,519
<b>TOTAL EQUITY</b>		3,928,297	4,520,893

The accompanying notes form part of these financial statements



Statement of changes in equity for the year ended 30 June 2009

	Note	Retained Earnings \$	NCRIS Reserve Account \$	Overseas Optical Reserve Account \$	Total \$
<b>Balance at 30 June 2007</b>		18,474	6,655	-	25,129
Surplus attributable to equity shareholders		4,495,764	-	-	4,495,764
Receipts Allocated to Reserves		(3,512,032)	-	3,512,032	-
Interest Received Less Bank Fees Allocated to Reserves		(987,187)	822,980	164,207	-
Payments allocated from Reserves		57,500	(20,000)	(37,500)	-
<b>Balance at 30 June 2008</b>		<b>72,519</b>	<b>809,635</b>	<b>3,638,739</b>	<b>4,520,893</b>
Surplus attributable to equity shareholders		(592,596)	-	-	(592,596)
Interest Received Allocated to Reserves		(1,510,844)	865,358	645,486	-
Payments allocated from Reserves		2,087,987	(1,560,150)	(527,837)	-
<b>Balance at 30 June 2009</b>		<b>57,066</b>	<b>114,843</b>	<b>3,756,388</b>	<b>3,928,297</b>

The accompanying notes form part of these financial statements



Cash flow statement for the year ended 30 June 2009

	<b>2009</b> <b>\$</b>	<b>2008</b> <b>\$</b>
<b>Cash Flows from Operating Activities:</b>		
Receipts from Grants/Members	12,640,988	17,998,239
Interest Received	780,374	997,038
Payments to Suppliers, Employees & Taxes	(816,021)	(1,980,390)
Payments of Grants	(13,618,396)	(7,797,925)
Net Cash Provided by (Used in) Operating Activities	(1,013,055)	9,216,962
<b>Cash Flows from Investing Activities:</b>		
Proceeds from Sale of Property, Plant & Equipment	-	-
Payment for Property, Plant & Equipment	(1,705)	(7,177)
Net Cash Provided (Used in) Investing Activities	(1,705)	(7,177)
<b>Cash Flows from Financing Activities:</b>		
Proceeds from Borrowings	-	-
Repayment of Borrowings	-	-
Distributions/Dividend by Chief Entities	-	-
Net Cash Provided (Used in) Financing Activities	-	-
Net Increase (Decrease) in Cash Held	(1,014,760)	9,209,785
Cash at Beginning of the financial year	19,206,789	9,997,004
Cash at 30th June 2009	18,192,029	19,206,789

The accompanying notes form part of these financial statements



## Notes to the financial statements for the year ended 30 June 2009

### 1 Statement of Significant Accounting Policies

The financial report is a general purpose financial report that has been prepared in accordance with Accounting Standards, including Australian Accounting Interpretations, other authoritative pronouncements of the Australian Accounting Standards Board and the Corporations Act 2001.

The financial report covers Astronomy Australia Limited as an individual entity. Astronomy Australia Limited is a company limited by shares, incorporated and domiciled in Australia.

The financial report of Astronomy Australia Limited as an individual entity complies with all International Financial Reporting Standards (IFRS) in their entirety.

The following is a summary of the material accounting policies adopted by the company in the preparation of the financial report. The accounting policies have been consistently applied, unless otherwise stated.

#### Basis of Preparation

The accounting policies set out below have been consistently applied to all years presented.

#### Reporting basis and conventions

The financial report has been prepared on an accruals basis and is based on historical costs modified by the revaluation of selected non-current assets, financial assets and financial liabilities for which the fair value basis of accounting has been applied.

#### Income Tax

The Company is an income tax exempt charitable institution.



## Notes to the financial statements for the year ended 30 June 2009

### Accounting Policies

#### Property, Plant and Equipment

Each class of property, plant and equipment is carried at cost or fair value less, where applicable, any accumulated depreciation and impairment losses.

#### Plant and equipment

Plant and equipment are measured on the cost basis less depreciation and impairment losses.

The carrying amount of plant and equipment is reviewed annually by directors to ensure it is not in excess of the recoverable amount from these assets. The recoverable amount is assessed on the basis of the expected net cash flows that will be received from the assets' employment and subsequent disposal. The expected net cash flows have been discounted to their present values in determining recoverable amounts.

#### Depreciation

The depreciable amount of all fixed assets including building and capitalised lease assets, but excluding freehold land, is depreciated on a diminishing basis over their useful lives to the company commencing from the time the asset is held ready for use. Leasehold improvements are depreciated over the shorter of either the unexpired period of the lease or the estimated useful lives of the improvements.

#### Employee Benefits

Provision is made for the company's liability for employee benefits arising from services rendered by employees to balance date. Employee benefits that are expected to be settled within one year have been measured at the amounts expected to be paid when the liability is settled, plus related on-costs. Employee benefits payable later than one year have been measured at the present value of the estimated future cash outflows to be made for those benefits.



## Notes to the financial statements for the year ended 30 June 2009

The amount recognised in the balance sheet represents the present value of the defined benefit obligations adjusted for any unrecognised actuarial gains and losses and unrecognised past service costs less the fair value of the plan's assets. Any asset recognised is limited to unrecognised actuarial losses, plus the present value of available refunds and reductions in future contributions to the plan.

Actuarial gains and losses are amortised over the expected average remaining working lives of the participating employees in the scheme. Gains or losses on the curtailment or settlement of a defined benefit plan are recognised in the income statement when the company is demonstrably committed to the curtailment or settlement.

Past services costs are recognised when incurred to the extent that benefits are vested, and are otherwise amortised on a straight-line basis over the vesting period.

### Provisions

Provisions are recognised when the company has a legal or constructive obligation, as a result of past events, for which it is probable that an outflow of economic benefits will result and that outflow can be reliably measured.

### Cash and Cash Equivalents

Cash and cash equivalents include cash on hand, deposits held at call with banks, other short-term highly liquid investments with original maturities of three months or less, and bank overdrafts. Bank overdrafts are shown within short-term borrowings in current liabilities on the balance sheet.

### Revenue

Revenue from rendering a service is recognised upon the delivery of the service to customers.

Interest revenue is recognised on a proportional basis taking into account the interest rates applicable to the financial assets.



## Notes to the financial statements for the year ended 30 June 2009

### Goods and Services Tax (GST)

Revenues, expenses and assets are recognised net of the amount of GST, except where the amount of GST incurred is not recoverable from the Australian Tax Office. In these circumstances, the GST is recognised as part of the cost of acquisition of the asset or as part of an item of the expense. Receivables and payables in the balance sheet are shown inclusive of GST.

Cash flows are presented in the cash flow statement on a gross basis, except for the GST component of investing and financing activities, which are disclosed as operating cash flows.

### Comparative Figures

When required by Accounting Standards, comparative figures have been adjusted to conform to changes in presentation for the current financial year.

### Critical Accounting Estimates and Judgments

The directors evaluate estimates and judgments incorporated into the financial report based on historical knowledge and best available current information. Estimates assume a reasonable expectation of future events and are based on current trends and economic data, obtained both externally and within the company.

#### Key Estimates – Impairment

The company assesses impairment at each reporting date by evaluating conditions specific to the company that may lead to impairment of assets. Where an impairment trigger exists, the recoverable amount of the asset is determined. Value-in-use calculations performed in assessing recoverable amounts incorporate a number of key estimates.

No impairment has been recognised in respect of the year ended 30th June 2009.

The financial report was authorised for issue by the board of directors on 4th September 2009.

### Overseas Optical Reserve

As part of the Australian Research Council's financial arrangements with Sydney University for paying for the Australian share of Gemini, a substantial reserve was established. When the ARC LIEF grant for Gemini was transferred from Sydney University to AAL, this "Gemini Reserve" was also transferred to AAL. AAL and the ARC have agreed that the primary use of this reserve would be to cover shortfalls in payments to overseas optical telescope facilities due to currency fluctuations. AAL therefore renamed this reserve the "Overseas Optical Reserve".

A 1% administration fee totaling \$36,387 (2008 - \$Nil) has been transferred from the Reserve.



Notes to the financial statements for the year ended 30 June 2009

	2009 \$	2008 \$
<b>2 Revenue</b>		
<b>Operating activities</b>		
Operating Grants/Membership Subscriptions	11,492,907	10,940,695
Interest received – General Account	7,577	6,456
Interest received – Grants Account	865,358	823,281
Interest received – Overseas Optical Reserve Account	488,131	164,207
Total revenue	12,853,973	11,934,639
<b>Movement in Grants Allocation for the Year</b>		
<b>NCRIS Grants to be Allocated</b>		
Opening Balance	10,772,469	9,052,500
Grants Paid	(10,010,131)	(6,320,325)
Grants Received	10,551,660	8,040,294
Closing Balance (Note 8)	11,313,998	10,772,469
<b>LIEF Grants to be Allocated</b>		
Opening Balance	3,703,331	-
Grants Paid	(903,331)	(948,337)
Grants Received	900,000	4,651,668
Closing Balance (Note 8)	3,700,000	3,703,331
<b>3 Auditor's Remuneration</b>		
Audit Services	4,800	2,100
<b>4 Surplus</b>		
<b>Expenses</b>		
Depreciation of property, plant and equipment	3,834	1,139
Bad Debts Written Off	-	5,000
Total bad and doubtful debts	-	5,000



Notes to the financial statements for the year ended 30 June 2009

	<b>2009</b> <b>\$</b>	<b>2008</b> <b>\$</b>
<b>5 Cash and Cash Equivalents - Current</b>		
Cash on Hand	55	-
Term Deposit - Grant Account	12,500,000	3,700,000
Term Deposit - Overseas Optical Reserve Account	-	2,638,739
Term Deposit - Overseas Optical Reserve Account (Secured)	1,000,000	1,000,000
Term Deposit - Grant Account USD	1,903,448	-
Cash at Bank - General Account	6	19,599
Cash at Bank - General Maximiser Account	62,653	62,465
Cash at Bank - Grant Account	99	596
Cash at Bank - Grant Maximiser Account	2,725,768	11,785,390
	18,192,029	19,206,789
<b>6 Trade and Other Receivables</b>		
Current		
Trade Debtors	1,100	-
Other Debtors	580,692	-
GST Payable	191,028	-
	772,820	-
<b>7 Property, Plant and Equipment</b>		
Plant and Equipment		
At cost	11,031	9,326
Accumulated depreciation	(5,063)	(1,229)
Total Plant and Equipment	5,968	8,097
<b>Office Furniture and Equipment</b>		
Opening Balance	8,097	2,059
Purchases	1,705	7,177
Depreciation Expense	(3,834)	(1,139)
Closing Balance at 30th June 2009	5,968	8,097



Notes to the financial statements for the year ended 30 June 2009

	2009 \$	2008 \$
<b>8 Trade and Other Payables</b>		
<b>Current</b>		
NCRIS Grants to be allocated	11,313,998	10,772,469
LIEF Grants to be allocated	3,700,000	3,703,331
Other Creditors	24,426	13,746
GST Payable	-	197,172
	15,038,424	14,686,718
<b>9 Provisions</b>		
Provision for Recreational Leave	4,096	7,275
<b>Total provisions</b>	4,096	7,275
<b>Analysis of Total Provisions</b>		
Current	4,096	7,275
	4,096	7,275



Notes to the financial statements for the year ended 30 June 2009

	<b>2009</b> <b>\$</b>	<b>2008</b> <b>\$</b>
<b>10 Retained Earnings</b>		
Retained earnings at the beginning of the financial year	72,519	18,474
Net surplus attributable to members of the company	(592,596)	4,495,764
Transfer To Reserves	(1,510,844)	(4,499,219)
Transfer from Reserves	2,087,987	57,500
Retained earnings at the end of the financial year	57,066	72,519
<b>11 Cash Flow Information</b>		
<b>Reconciliation of Cash</b>		
Cash at the end of the financial year as shown in the Statement of Cash Flows is reconciled to the related items in the statement of Financial Position as follows:-		
Cash on hand	55	-
Cash at Bank – General Account	6	19,599
Cash at Bank – General Maximiser Account	62,653	62,465
Cash at Bank – Grant Account	99	596
Cash at Bank – Grant Maximiser Account	2,725,768	11,785,390
Term Deposit – Grant Account	12,500,000	3,700,000
Term Deposit – Overseas Optical Reserve Account	-	2,638,739
Term Deposit – Overseas Optical Reserve Account (Secured)	1,000,000	1,000,000
Term Deposit – Grant Account USD	1,903,448	-
	18,192,029	19,206,789
<b>Reconciliation of Cash flow from Operations with Surplus after Income Tax</b>		
Surplus from ordinary activities after tax	(592,596)	4,495,764
<b>Non-cash flows in surplus (deficit)</b>		
Depreciation	3,834	1,139
<b>Changes in assets and liabilities, net of the effects of purchase and disposal of subsidiaries</b>		
(Increase)/decrease in trade and other receivables	(772,820)	6,134
Increase/(decrease) in trade and other payables	351,706	4,706,650
Increase/(decrease) in current provisions	(3,179)	7,275
	(1,013,055)	9,216,962



## Notes to the financial statements for the year ended 30 June 2009

### 12 Financial Instruments

#### **Financial Risk Management**

The company's financial instruments consists primarily of deposits with banks, accounts receivable and payable.

The company does not have any derivative instruments at 30 June 2009.

### 13 Capital & Leasing Commitments

There are no Capital or Lease Commitments

### 14 Segment Reporting

The company operates predominantly in one business and geographical segment being liaison with the astronomy community and managing capital grant funds to astronomy projects throughout Australia.

### 15 Economic Dependency Contingent Assets & Contingent Liabilities

The company receives the majority of its grant funds from the Department of Innovation, Industry, Science & Research (DIISR). This funding source establishes certain procedures for grant expenditure and acquittal. If grants are not expended and acquitted in accordance with grantor's procedures, the Grantor can refuse to make further grants and request repayments of grants made.

The company has entered into a long funding agreement with the Department of Innovation, Industry, Science & Research (DIISR) for the receipt of A\$45,000,000 over 5 years of which a portion is for the company's operating costs and the majority is for projects to be undertaken by third parties.



Notes to the financial statements for the year ended 30 June 2009

**16 Financial Instruments**

**(a) Financial Risk Management**

The company's financial instruments consist mainly of deposits with the National Australia Bank Ltd.

**(b) Interest Rate Risk**

The company's exposure to interest rate risk, which is the risk that a financial instrument's value will fluctuate as a result of changes in market interest rates and the effective weighted average interest rates on classes of financial assets and financial liabilities, is as follows:

**Cash & Cash Equivalent**

	<b>2009 \$</b>	<b>2008 \$</b>
Cash on hand	-	-
Cash at Bank – General Account	-	-
Cash at Bank – General Maximiser Account	3.00%	7.10%
Cash at Bank – Grant Account	-	-
Cash at Bank – Grant Maximiser Account	3.50%	7.10%
Term Deposit – Grant Account	3.80%	7.83%
Term Deposit – Overseas Optical Reserve Account	-	8.06%
Term Deposit – Overseas Optical Reserve Account (Secured)	4.33%	8.11%
Term Deposit – Grant Account USD	0.58%	-
<b>Cash &amp; Cash Equivalent</b>		
Cash in hand	55	-
Cash at Bank – General Account	6	19,599
Cash at Bank – General Maximiser Account	62,653	62,465
Cash at Bank – Grant Account	99	596
Cash at Bank – Grant Maximiser Account	2,725,768	11,785,390
Term Deposit – Grant Account	12,500,000	3,700,000
Term Deposit – Overseas Optical Reserve Account	-	2,638,739
Term Deposit – Overseas Optical Reserve Account (Secured)	1,000,000	1,000,000
Term Deposit – Grant Account USD	1,903,448	-
	<b>18,192,029</b>	<b>19,206,789</b>



Notes to the financial statements for the year ended 30 June 2009

**17 Forward US Dollar Contracts**

The company has purchased forward dollar contracts with maturity dates between 1st July 2009 and 1st July 2010 totalling US\$2,926,981 (AUD\$3,425,373.00) for forward overseas commitments of present and future NCRIS Grants (2008 - US\$4,822,907 (AUD\$5,644,128)) secured with a Term Deposit of \$1,000,000.

**18 Contingent Liability**

During 2007/08 AAL made a commitment to purchase eight nights on the Magellan telescope. All liabilities are now included in grant contracts and the liability of AAL is \$Nil at 30 June 2009.

**19 Company Details**

Astronomy Australia Limited  
C/- Swinburne University  
John Street  
Hawthorn. Vic. 3122.



## Directors' Declaration

The directors of the company declare that:

1. The financial statements and notes, as set out on pages 33 to 62, are in accordance with the Corporations Act 2001:
  - (a) comply with Australian Accounting Standards and the Corporations Regulations 2001; and
  - (b) give a true and fair view of the financial position as at 30 June 2009 and of the performance for the year ended on that date of the company; and
2. In the directors' opinion there are reasonable grounds to believe that the company will be able to pay its debts as and when they become due and payable.

This declaration is made in accordance with a resolution of the Board of Directors.

**Director:**



Dr. Martin T. Cole

**Director:**



Prof. Warrick J. Couch

Dated this 4th day of September 2009



**Astronomy Australia Limited A.B.N 19 124 973 584**

## Independant Auditor's Report to the members of Astronomy Australia Limited

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### Report on the Financial Report

I have audited the accompanying financial report of Astronomy Australia Limited which comprises the balance sheet as at 30 June 2009, and the income statement, statement of changes in equity and cash flow statement for the year ended on that date, a summary of significant accounting policies and other explanatory notes and the directors' declaration.

### Directors' Responsibility for the Financial Report

The directors of the company are responsible for the preparation and fair presentation of the financial report in accordance with Australian Accounting Standards (including the Australian Accounting Interpretations) and the Corporations Act 2001. This responsibility includes establishing and maintaining internal control relevant to the preparation and fair presentation of the financial report that is free from material misstatement, whether due to fraud or error; selecting and applying appropriate accounting policies; and making accounting estimates that are reasonable in the circumstances. In Note 1, the directors also state, in accordance with Accounting Standard AASB 101: "Presentation of Financial Statements", that compliance with the Australian equivalents to International Financial Reporting Standards (IFRS) ensures that the financial report, comprising the financial statements and notes, complies with IFRS.

### Auditor's Responsibility

My responsibility is to express an opinion on the financial report based on my audit. I conducted my audit in accordance with Australian Auditing Standards. These Auditing Standards require that I comply with relevant ethical requirements relating to audit engagements and plan and perform the audit to obtain reasonable assurance whether the financial report is free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial report. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial report, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial report in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by the directors, as well as evaluating the overall presentation of the financial report.

I believe that the audit evidence I have obtained is sufficient and appropriate to provide a basis for my audit opinion.

### Independence

In conducting my audit, I have complied with the independence requirements of the Corporations Act 2001. I confirm that the independence declaration required by the Corporations Act 2001, provided to the directors of Astronomy Australia Limited on 4th September 2009, would be in the same terms if provided to the directors as at the date of this auditor's report.



**Astronomy Australia Limited A.B.N 19 124 973 584**

**Independant Auditor's Report to the members of  
Astronomy Australia Limited**

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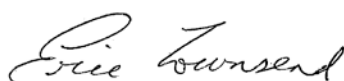
**Auditor's Opinion**

In my opinion:

- (a) The financial report of Astronomy Australia Limited is in accordance with the Corporations Act 2001, including:
  - (i) giving a true and fair view of the company's financial position as at 30 June 2009 and of its performance for the year ended on that date; and
  - (ii) complying with Australian Accounting Standards (including the Australian Accounting Interpretations) and the Corporations Regulations 2001.
- (b) The financial report also complies with International Financial Reporting Standards as disclosed in Note 1.

**Name of Firm:** E. Townsend & Co.  
Chartered Accountants

**Name of Principal:**



Eric Townsend

**Address:** 35 Mereweather Avenue, Frankston. Vic. 3199.

Dated this 4th day of September 2009



Profit and Loss Statement for the year ended 30 June 2009

	<b>2009 \$</b>	<b>2008 \$</b>
<b>REVENUE</b>		
Administration Grant - NCRIS	243,340	237,140
Membership Subscriptions - Level 1	156,750	135,000
Membership Subscriptions - Level 2	20,900	25,000
Administrative Services	1,100	-
Gemini Reserve Received	157,356	3,512,032
Grants Allocated	10,913,461	7,031,523
	11,492,907	10,940,695
<b>LESS: GRANTS PAID</b>		
Grants Paid	10,913,461	7,031,523
Grants Paid from Reserves	2,051,450	57,500
	12,964,911	7,089,023
<b>GROSS SURPLUS FROM TRADING</b>	(1,472,004)	3,851,172
<b>OTHER INCOME</b>		
Interest Received - General Account	7,577	6,456
Interest Received - Grants Account	865,358	823,281
Interest Received - Overseas Optical Reserve Account	488,131	164,207
	1,361,066	993,944
	(110,938)	4,845,616

The accompanying notes form part of these financial statements



Profit and Loss statement for the year ended 30 June 2009

	<b>2009 \$</b>	<b>2008 \$</b>
<b>Expenses</b>		
Accountancy & Company Secretary Fees	45,370	41,085
Auditor's Remuneration	4,800	2,100
Bad Debts Written Off	-	5,000
Bank Charges	1,087	716
Contract Staff	14,882	6,691
Depreciation	3,834	1,139
Filing Fees	40	375
Insurance	6,229	6,094
Legal Costs	9,791	29,230
Meeting Expenses	49,486	21,355
Printing & Stationery	13,263	3,137
Office Expenses	2,686	-
Salaries	166,689	119,944
Salaries - Board	55,126	33,312
Software	500	675
Subscriptions	727	714
Superannuation - Board	5,258	11,262
Superannuation Contributions	16,470	11,386
Telephone	1,991	584
Training / Conference	818	-
Travel - Staff	18,692	19,778
Travel - Board	48,700	21,503
Travel - Board - Salary	14,245	12,785
Workcare	974	657
Website Expenses	-	330
	<b>481,658</b>	<b>349,852</b>
<b>Surplus before income tax</b>	<b>(592,596)</b>	<b>4,495,764</b>

The accompanying notes form part of these financial statements









# Appendix Astronomy NCRIS Progress Report

Artist's impression of GMT.  
Credit: Giant Magellan Telescope - Carnegie Observatories.







## Astronomy NCRIS Progress Report

### Access and Pricing

The access and pricing arrangements described in section 3, “Access and Charging Arrangements” of the Project Plan remain unchanged and are unlikely to change in the future. The arrangements for existing infrastructure have been operating successfully for many years and have been leveraged in devising the arrangements outlined for future infrastructure.

### Deviations from the Project Plan

- **Gemini** - The Aspen Gemini instrument program has again been descoped with the Wide Field Multi-Object Spectrograph (WFMOS) project cancelled, and only the project to build the Gemini Planet Imager (GPI) instrument remaining.
- **MWA** - The size of the MWA array will be significantly smaller than the 1024 tiles envisaged in the Astronomy NCRIS Funding Agreement. Curtin University of Technology is now the leading MWA organisation and is expected to sign the MWA contract by December 2009.
- **HERMES** - is now envisaged to be a standalone system (independent of the existing AAOmega spectrograph) based on Volume-Phase Holographic (VPH) gratings. This configuration provides better performance and requires less telescope down-time to install and commission. Completion of HERMES commissioning and start of science observations is now scheduled for mid-2012. The latter is 12 months later than envisaged in the Astronomy NCRIS Funding Agreement. The revised plan will also require an additional \$1,300,000 which the AAO will contribute from its own funds.
- **Magellan** - DIISR agreed that AAL could use strategic options funding to extend Australian access to the Magellan telescopes until the end of 2011. Unfortunately the sharp decline in the Australian dollar relative to the US dollar has significantly increased the cost of strategic options fund commitments. Therefore AAL has scaled back its commitment to Magellan access until the middle of 2011.



# Progress against Milestones

A. Governance				
Milestone	Due	Completed	Comments	
2008/09 Annual Business Plan Approved	Apr 2008	Jul 2008		
Establish a single advisory committee to cover all optical/IR astronomy infrastructure (AAT + 8m class telescopes)	Jun 2008	Ongoing	AAL is awaiting DIISR's decision on the future advisory committee structure for the AAO following the cessation of the AATB in June 2010	
Sixth board meeting held	Sep 2008	Jul 2008		
Quarterly newsletter published (Q1)	Sep 2008	Aug 2008		
2007/08 Astronomy NCRIS progress report submitted to DIISR and made available from the AAL website	Sep 2008	Sep 2008		
Nominations Committee to nominate new AAL board directors	Sep 2008	Sep 2008		
Hold 2008 AAL Annual General Meeting	Sep 2008	Sep 2008		
Australian Gemini membership paid for second half of 2008	Sep 2008	Jul 2008		
AAL receives recommendation from ANSOC on the use the Strategic Options funding	Sep 2008	Sep 2008		
AAL Board's recommendations and ANSOC report to be simultaneously submitted to the NCRIS Secretariat and made public	Sep 2008	Sep 2008		
MWA contract with the University of Melbourne signed	Dec 2008	Superseded	Curtin University of Technology is now expected to be the MWA lead organisation. AAL expects to sign the MWA contract with Curtin by Dec 2009	



## Progress against Milestones cont.

<b>A. Governance</b>			
<b>Milestone</b>	<b>Due</b>	<b>Completed</b>	<b>Comments</b>
Seventh board meeting held	Dec 2008	Sep 2008	
Quarterly newsletter published (Q2)	Dec 2008	Nov 2008	
Submit Astronomy Roadmap to DIISR	Dec 2008	Oct 2008	
Eighth board meeting held	Mar 2009	Feb 2009	
Quarterly newsletter published (Q3)	Mar 2009	Mar 2009	
Ninth board meeting held	Jun 2009	May 2009	
Quarterly newsletter published (Q4)	Jun 2009	Jun 2009	
2009/10 Astronomy NCRIS business plan submitted to DIISR	Apr 2009	Jun 2009	



## Progress against Milestones cont.

<b>B. Research Infrastructure</b> <b>AAO – Refurbishment of facilities</b> <b>Milestone</b>			
	<b>Due</b>	<b>Completed</b>	<b>Comments</b>
Tender for purchases of replacement of capital equipment	Sep 2007	Completed	
Commission inspection and report phase activities on AAT dome subsystems	Sep 2007	Ongoing	<ul style="list-style-type: none"> <li>• Structure and fabric - completed</li> <li>• Drive and control systems - completed</li> <li>• Crane, bogies and rail - completed</li> <li>• Shutter and windscreen - ongoing</li> <li>• Maintenance platform - ongoing</li> <li>• Tube access platform – ongoing</li> </ul>
Commission inspection and report phase activities on infrastructure subsystems	Sep 2007	Completed	
Commission inspection and report phase activities on AAT telescope subsystems	Dec 2007	Ongoing	<ul style="list-style-type: none"> <li>• Telescope mount - completed</li> <li>• Main drive and control – 90% complete.</li> <li>• Hydrostatic support system - awaiting consultant's report</li> <li>• Telescope optics – ongoing part of maintenance works</li> <li>• Mirror support systems (ongoing) and encoders (95% complete)</li> </ul>
Commission inspection and report phase activities on architectural and building subsystems	Dec 2007	Ongoing	<ul style="list-style-type: none"> <li>• Fabric – 30% complete</li> <li>• HVAC - completed</li> <li>• Electrical – 40% complete</li> <li>• Hydraulic lifts - completed</li> </ul>



## Progress against Milestones cont.

<b>B. Research Infrastructure</b> <b>AAO – Refurbishment of facilities</b> <b>Milestone</b>					<b>Due</b>	<b>Completed</b>	<b>Comments</b>
Scope and design HVAC work packages					Dec 2007	Completed	
Consultants and specialists undertake inspections and deliver reports on telescope subsystems					Dec 2007	Completed	
Tender for air conditioning chiller replacement					Mar 2008	Sep 2008	
Consultants and specialists undertake inspections and report on dome subsystems					Mar 2008	Ongoing	60% complete
Review reports and prepare tenders for dome subsystems refurbishment					Mar 2008	Ongoing	
Sign contract for air conditioning chiller replacement					Mar 2008	Jan 2009	
Review reports and prepare tenders for telescope subsystems refurbishment					Mar 2008	Completed	
Sign contracts for telescope subsystems refurbishment					Mar 2008	Completed	
Commission inspection and report phase activities on infrastructure subsystems					Jun 2008	Apr 2009	
Identify instrumentation refurbishment work packages for internal and external resources, tendering as required					Jun 2008	Ongoing	
Sign contracts for dome subsystems refurbishment					Jun 2008	Ongoing	30% complete
Sign contracts for instrumentation refurbishment					Jun 2008	Cancelled	Work will be carried out in-house



## Progress against Milestones cont.

<b>B. Research Infrastructure</b> <b>AAO – Refurbishment of facilities</b>				
<b>Milestone</b>	<b>Due</b>	<b>Completed</b>	<b>Comments</b>	
Install and commission air conditioning chiller replacement	Jun 2008	Jul 2009		
Commence architectural and building refurbishment works	Jun 2008	Complete		
Ongoing miscellaneous works	Ongoing	Ongoing		
Inspect and overhaul the primary mirror elevator	Sep 2008	Jan 2009		
Upgrade the dome shutter and brake control system	Sep 2008	Ongoing	Delayed due to the delay in the upgrade of the maintenance platform although progress has been made on the latter	
Upgrade the main air-conditioning and ventilation system	Sep 2008	Ongoing	To be completed by November 2009	
Upgrade the telescope ancillary system	Sep 2008	Ongoing	Work commenced	
Upgrade specified HVAC plant	Dec 2008	Ongoing	To be completed by the end of July 2009	
Upgrade telescope hydraulic system	Dec 2008	Ongoing	Waiting on a quote	
Carry out major maintenance of aluminising plant and cryogenic systems	Dec 2008	Ongoing	To be carried out in Sep 2009	



## Progress against Milestones cont.

<b>B. Research Infrastructure</b> <b>AAO – Refurbishment of facilities</b> <b>Milestone</b>				<b>Due</b>	<b>Completed</b>	<b>Comments</b>
Carry out major maintenance on specified instruments and optics				Dec 2008	Ongoing	Bring carried out as ongoing operational and maintenance work
Replace standby generator and upgrade the main electrical switch gear.				Mar 2009	Ongoing	Waiting on the ANU to agree to proceed
Purchase various items of testing and inspection equipment				Mar 2009	Sep 2008	
Purchase various mechanical machine tools and equipment				Jun 2009	Sep 2008	
Upgrade various optical equipment				Jun 2009	Ongoing	Being carried out as ongoing operational and maintenance work
Upgrade the control system for the dome windscreen and cranes				Jun 2009	Ongoing	<ul style="list-style-type: none"> <li>Both floor hatch cranes completed</li> <li>Quote to replace the dome crane controls received.</li> <li>Dome windscreen on schedule for late 2009</li> </ul>
Commence dome refurbishment works				Jun 2009	Completed	



## Progress against Milestones cont.

<b>AAT – New Instrument HERMES</b>			
<b>Milestone</b>	<b>Due</b>	<b>Completed</b>	<b>Comments</b>
Release System Requirements document.	Sep 2008	Jan 2009	
Release draft Optical Component Specification document	Sep 2008	Ongoing	Collimator (Jul 2009), slit specification, grating and beamsplitter (Aug 2009), and camera (Sep 2009)
Place orders for critical long lead-time optical elements	Sep 2008	Ongoing	Ordered CCD detector (Aug 2009) and cryostat (Jul 2009); other sub-component of HERMES in progress
Complete preliminary design work	Dec 2008	Ongoing	To be completed Sep 2009
Release preliminary design report	Dec 2008	Ongoing	To be released Oct 2009
Release System Specification document	Dec 2008	Cancelled	Cancelled following revised milestones*
Release revised Optical Component Specification document	Dec 2008	Cancelled	Cancelled following revised milestones*
Hold Preliminary Design review	Mar 2009	Ongoing	Completed configuration design review Jun 2009; preliminary design review Sep 2009
Complete preliminary design phase	Mar 2009	Ongoing	Scheduled for Sep 2009
Start final design phase	Mar 2009	Ongoing	Scheduled for Oct 2009
Release component requirements document	Mar 2009	Cancelled	Cancelled following revised milestones*
Define construction work packages	Mar 2009	Cancelled	Cancelled following revised milestones*
All long-lead time components ordered	Jun 2009	Ongoing	Delayed following revised milestones*; some already ordered, expect completion by Jun 2010
Release draft component specification documents	Jun 2009	Cancelled	Cancelled following revised milestones*
Release construction phase plan	Jun 2009	Cancelled	Revised plan will follow from final design review

\* HERMES is now envisaged to be a standalone system (independent of the existing AAOmega spectrograph) based on Volume-Phase Holographic (VPH) gratings. The milestones from the AAL 2007/08 Business Plan have been revised. Completion of commissioning and start of science observations is now scheduled for mid-2012.



## Progress against Milestones cont.

<b>Australian Membership of the Gemini International Partnership</b>			
<b>Milestone</b>	<b>Due</b>	<b>Completed</b>	<b>Comments</b>
Continue current level of support for RSAA-based AusGO	Sep 2007	Ongoing	
Support Australian involvement in 8m-class telescopes by: <ul style="list-style-type: none"> <li>• Managing the Australian time allocation process for 8m telescopes</li> <li>• The AGS and both DGS's performing specified Gemini support duties</li> <li>• Supporting Gemini instruments as required</li> <li>• Maintaining an up-to-date AusGO web site</li> <li>• Managing the two Magellan support astronomers</li> </ul>	Ongoing	Ongoing	
AusGO promotes new Gemini capabilities to community at July 2008 Astronomical Society of Australia Annual Scientific Meeting in Perth, and by visits to Gemini user institutions	Sep 2008	Completed	
Recruit 3 Australian Gemini Undergraduate Summer Students (AGUSS) to spend Dec 2008 - Feb 2009 at Gemini South	Sep 2008	Completed	Only two students recruited due to Gemini constraints: Sophie Underwood (Adelaide) & David Palamara (Monash)
Second Deputy Gemini Scientist (based at ANU) to begin contract	Sep 2008	Completed	Dr Christopher Onken in post from 1 Sep 2008
AGSC (advisory committee) reports to AAL on increased access to 8m telescopes	Sep 2008	Completed	AGSC submitted proposal for increased access to ANSOC



## Progress against Milestones cont.

<b>Australian Membership of the Gemini International Partnership</b>			
<b>Milestone</b>	<b>Due</b>	<b>Completed</b>	<b>Comments</b>
Coordinate AGUSS travel and projects with Gemini South	Dec 2008	Completed	
Implement on-line database of all Australian 8m telescope proposals, to streamline reporting requirements	Dec 2008	Ongoing	Lack of software effort availability has delayed implementation until Q2 of FY2009-10
Host National Gemini Office staff and Operations Working Group meetings at AAO (Jan 2009)	Mar 2009	Cancelled	Gemini Observatory budget constraints forced relocation of OpsWG meeting to Chile, and cancellation of NGO staff meeting
Organise AGUSS final seminars via videoconference from Chile	Mar 2009	Completed	Seminars on 21 Feb 2009 video-linked to AAO, RSAA, Swinburne
Promote awareness of WFMOS to Gemini and Japanese user communities at the 3rd Gemini Science Meeting, proposed for Japan in April 2009	Jun 2009	Completed	Six Australian astronomers received AusGO travel support to attend meeting
Conduct Australian 8m telescope user survey	Jun 2009	Cancelled	Results of Gemini's own user survey posted on-line
AGSC reports to AAL on the Aspen program (this is dependent on the WFMOS (major Aspen instrument) concept design studies being complete and reports to the Gemini Board)	Jun 2009	Cancelled	WFMOS terminated by Gemini Board; Aspen ends with GPI only



## Progress against Milestones cont.

GMT Design Development Phase			
Milestone	Due	Completed	Comments
Initial design study contracts for GMT DDP let	Mar 2008	Completed	Some studies have been let including the Australian Jenkins et. al. site turbulence study
Preliminary instrument study reports for GMT DDP due	Jun 2008	Completed	Initial Instrument Concept selected from Letter of Intent. Concept Studies proposals due Oct 2009, with Concept Studies to start late 2009
AAL to provide advice to the NCRIS Committee on the possible expenditure of the strategic options component of the NCRIS funds on the second and/or third year of the DDP	Jun 2008	Sep 2008	
Final AAL DDP funding justification submitted	Sep 2008	Jul 2008	
AGMTAC reports to AAL on year one of GMT DDP	Sep 2008	Aug 2008	
ANSOC Review Discussions	Sep 2008	Sep 2008	
Final status report submitted to AAL Board	Sep 2008	Sep 2008	
Assist AAL with National Optical Facilities Roadmap draft	Sep 2008	Oct 2008	
Competitive Technology Assessment	Sep 2008	Completed	Survey of Australian industry capabilities carried out
Identification of candidate Pasadena Project Office secondees	Sep 2008	Ongoing	Under review



## Progress against Milestones cont.

<b>GMT Design Development Phase</b>			
<b>Milestone</b>	<b>Due</b>	<b>Completed</b>	<b>Comments</b>
Continuation of promotional activities such as maintaining the website and industry cluster database and disseminating information about the GMT at appropriate venues in both academic and industry circles (Q1 08/09)	Sep 2008	Completed	
Review DDP Funding Justification Document once work packages are released	Dec 2008	Cancelled	Overtaken by HEEF/EIF process
Assist AAL with National Optical Facilities Roadmap	Dec 2008	Oct 2008	
Selection of Project Office secondees	Dec 2008	Ongoing	Under review
Continuation of promotional activities such as maintaining the website and industry cluster database and disseminating information about the GMT at appropriate venues in both academic and industry circles (Q2 08/09)	Dec 2008	Cancelled	Funding was not available to continue the AGMTPO
Reach an agreement with AAL, ANU, DIISR, GMTO on a path for the future	Dec 2008	Superseded	Superseded by subsequent HEEF and EIF bids

<b>Australian GMT Project Office</b>			
<b>Milestone</b>	<b>Due</b>	<b>Completed</b>	<b>Comments</b>
Revised AAL DDP funding justification circulated	Jun 2008	Jul 2008	
Fourth AGMTAC meeting completed	Jun 2008	Jul 2008	
Final AAL DDP funding justification submitted	Jun 2008	Jul 2008	



## Progress against Milestones cont.

<b>PILOT Design Study</b>			
<b>Milestone</b>	<b>Due</b>	<b>Completed</b>	<b>Comments</b>
<p>Design Review of PILOT project convened, Outcomes will be:</p> <ul style="list-style-type: none"> <li>A final report that includes a detailed costing for the construction and whole-of-life operation for the 2.4 metre PILOT telescope. These costings will be justified with supporting documentation from potential vendors, and are expected to be accurate to within 10%</li> <li>Identification of any remaining risks; and an approved risk mitigation strategy</li> <li>Identification of potential construction contractors and a spend profile for the Construction Phase</li> </ul>	Jun 2008	Jul 2008	Final report submitted. However the Design Concept Study was accurate to within 35%
Quarterly report to AAL. Report will include identification of international partners, their degree of commitment, and readiness to enter into formal agreements for the Construction Phase	Jun 2008	Completed	Completed as part of milestones above
Detailed report on the site characteristics at Dome C, with particular attention to atmospheric seeing and turbulence, together with a detailed science case for PILOT	Jun 2008	Completed	Completed as part of milestones above
Final PILOT funding justification submitted to AAL	Sep 2008	Completed	Completed as part of milestones above
AAAAC (advisory committee) reports to AAL on PILOT design study	Sep 2008	Aug 2008	
ANSOC Review Discussions	Sep 2008	Sep 2008	



## Progress against Milestones cont.

<b>PILOT Design Study Milestone</b>				
	<b>Due</b>	<b>Completed</b>	<b>Comments</b>	
Final status report submitted to AAL Board	Sep 2008	Cancelled	Not required following ANSOC decision	
Assist AAL with the National Optical Facilities Roadmap draft	Sep 2008	Oct 2008		
Continuation of promotional activities such as maintaining the website and disseminating information about PILOT at appropriate venues <ul style="list-style-type: none"> <li>Public Presentation for "Festival of the Stars", Sydney Observatory</li> <li>Scientific presentation at SCAR meeting, St Petersburg, Russia</li> <li>Scientific presentation at FOROT meeting, Sardinia, Italy</li> </ul>	Sep 2008	Cancelled	PILOT was not funded post ANSOC review	
Assist AAL with the National Optical Facilities Roadmap	Dec 2008	Cancelled	As above	
Continuation of promotional activities such as maintaining the website and disseminating information about PILOT at appropriate venues (Q2 2008)	Dec 2008	Cancelled	As above	
Continuation of promotional activities such as maintaining the website and disseminating information about PILOT at appropriate venues (Q3 2008)	Mar 2009	Cancelled	As above	
Continuation of promotional activities such as maintaining the website and disseminating information about PILOT at appropriate venues (Q4 2008) Scientific presentation at ARENA meeting, Frascati, Italy	Jun 2009	Cancelled	As above	



## Progress against Milestones cont.

<b>ASKAP Digital System Milestone</b>			
<b>Milestone</b>	<b>Due</b>	<b>Completed</b>	<b>Comments</b>
Parkes Testbed Facility (PTF) uses recent ATNF digital developments (SKAMP and CABB processor systems) to validate algorithms	Mar 2008	Completed	
Digital Integrated Product Team is set up	Mar 2008	Completed	
First draft of Project Book chapter and WBS	Mar 2008	Completed	
Parkes testbed system operational	Jun 2008	Completed	
BETA Digital System Preliminary Design Review	Jun 2008	Completed*	
Revised digital project plan submitted to AAL	Jun 2008	Completed*	
BETA digital design complete	Sep 2008	Completed	
Full ASKAP Digital System conceptual design	Sep 2008	Completed	
BETA Digital System Critical Design Review	Sep 2008	Ongoing*	BETA/ASKAP systems have merged. Single CDR in Oct 2009
ASKAP Digital System Preliminary Design Review	Jun 2009	Completed*	
ASKAP Digital Systems Critical Design Review	Jun 2009	Ongoing*	BETA/ASKAP systems have merged. Single CDR in Oct 2009
BETA Digital System manufacture commence	Jun 2009	Ongoing	Delayed until Q2/Q3 2009/10 to match PAF deployment at best cost/performance (new generation of FPGAs)

\* The approach to the BETA/ASKAP Digital PDR and CDR has changed. The BETA PDR became the ASKAP PDR. Both BETA and ASKAP will have single CDR in October 2009.



## Progress against Milestones cont.

<b>ASKAP Overall Milestone</b>			
	<b>Due</b>	<b>Completed</b>	<b>Comments</b>
PTF operational	Mar 2008	Completed	
Antenna design tender	Mar 2008	Completed	
Antenna Preliminary Design Review	Mar 2008	Completed	
Site fibre link design	Mar 2008	Completed	
Testing of prototype phased-array feed on PTF	Jun 2008	Completed	
Antenna build tender	Sep 2008	Completed	
Site fibre link tender	Sep 2008	Ongoing	Delayed due to delayed land acquisition, Completion is expected by end of 2009
Design site infrastructure/buildings	Sep 2008	Ongoing	As above
First site infrastructure	Jun 2009	Ongoing	As above

<b>C. Promotion Milestone</b>			
	<b>Due</b>	<b>Completed</b>	<b>Comments</b>
Quarterly newsletters published	Ongoing	Ongoing	All quarterly newsletters published on the AAL website within several weeks of the Board meeting
Presentations where appropriate at committee/staff meetings	Ongoing	Ongoing	Presentations made at several advisory committee meetings throughout the year.



## List of Astronomy NCRIS cash receipts and payments - grant allocations (GST exclusive)

Facility	Item	Transaction Type	From / To	Budget Receipts	Budget Payments	Actual Receipts	Actual Payments
AAO	AAT instrument	Payment - Capital	AATB		\$425,000		\$0
AAO	AAT instrument	Payment - Capital	AATB		\$425,000		\$200,000
AAO	AAT instrument	Receipts	NCRIS	\$1,800,000		\$1,800,000	\$0
AAO	AAT instrument	Payment - Capital	AATB		\$425,000		\$0
AAO	AAT instrument	Payment - Capital	AATB		\$425,000		\$200,000
AAO	AAT refurbishment	Payments - Operating	AATB		\$275,000		\$275,000
AAO	AAT refurbishment	Payments - Operating	AATB		\$275,000		\$275,000
AAO	AAT refurbishment	Receipts	NCRIS	\$1,100,000		\$1,100,000	\$0
AAO	AAT refurbishment	Payments - Operating	AATB		\$275,000		\$275,000
AAO	AAT refurbishment	Payments - Operating	AATB		\$275,000		\$275,000
MIRA	ASKAP	Payment - Capital	CSIRO		\$1,000,000		\$1,000,000
MIRA	ASKAP	Payment - Capital	CSIRO		\$1,000,000		\$1,000,000
MIRA	ASKAP	Receipts	NCRIS	\$4,442,551		\$4,442,551	\$0
MIRA	ASKAP	Payment - Capital	CSIRO		\$1,000,000		\$1,000,000



## List of Astronomy NCRIS cash receipts and payments - grant allocations (GST exclusive)

Facility	Item	Transaction Type	From / To	Budget Receipts	Budget Payments	Actual Receipts	Actual Payments
Gemini	Aspen	Payments - International Access	NSF (USA)		\$499,018		\$463,964
Gemini	AusGO	Payments - Operating	AATB		\$75,000		\$75,000
Gemini	AusGO	Payments - Operating	AATB		\$75,000		\$75,000
Gemini	AusGO	Receipts	NCRIS	\$312,000		\$312,000	\$0
Gemini	AusGO	Payments - Operating	AATB		\$78,000		\$78,000
Gemini	AusGO	Payments - Operating	AATB		\$78,000		\$25,000
Gemini	Gemini operations	Payments - International Access	NSF (USA)		\$1,095,717		\$1,095,717
Gemini	Gemini operations	Receipts	NCRIS	\$1,042,938		\$1,042,938	\$0
Gemini	Gemini operations	Receipts	ARC	\$900,000		\$900,000	\$0
Gemini	Gemini operations	Payments - International Access	NSF (USA)		\$900,000		\$903,331
Gemini	Gemini operations	Payments - International Access	NSF (USA)		\$223,108		\$219,807



## List of Astronomy NCRIS cash receipts and payments - grant allocations (GST exclusive)

Facility	Item	Transaction Type	From / To	Budget Receipts	Budget Payments	Actual Receipts	Actual Payments
GMT	GMT DDP	Payments - International Access	GMT PO (USA)		\$75,689		\$75,689
MIRA	MWA	Payment - Capital	Melb Uni		\$400,000		\$0
MIRA	MWA	Receipts	NCRIS	\$400,000		\$0	
Strategic Options	GMT/PILOT/8m	Receipts	NCRIS	\$616,171		\$616,171	\$0
Strategic Options	GMT/PILOT/8m	Receipts	NCRIS	\$1,238,000		\$1,238,000	\$0
Strategic Options	GMT/PILOT/8m	Payments - International Access	GMT PO (USA)		\$4,344,347 <sup>†</sup>		\$3,401,923
				<b>\$11,851,660</b>	<b>\$13,643,879</b>	<b>\$11,451,660</b>	<b>\$10,913,431</b>

The actual receipts are approximately 97% relative to the budget; the \$400,000 difference is due to the with-holding of the first scheduled MWA receipt from AAL as the MWA contract is yet to be signed. The actual payments are 80% relative to the budget. The significant reduced payments throughout the year compared to budget are: \$1,300,000 for the AAT instrument due to project delays; \$942,424 for strategic options (the most aggressive payment schedule was assumed in the budget prior to the decision on the use of the strategic options fund); and \$400,000 for the MWA due to project delays. These changes have resulted in an update of the Astronomy NCRIS summarised in the 2009/10 Astronomy NCRIS business plan.

The above payments of \$10,913,431 are confirmed in the financial statements. (See Note 2 to Financial Statements: sum of NCRIS Grants Paid plus LIEF Grants Paid. Note \$30 discrepancy.)

The above receipts of \$11,451,660 are confirmed in the financial statements. (See Note 2 to Financial Statements: sum of NCRIS Grants Received plus LIEF Grants Received.)

<sup>†</sup> The payment of \$4,344,347 was listed as two separate payments of \$2,987,972 and \$1,356,375 in the budget section of the 2008/09 annual business plan.



## List of Astronomy NCRIS cash receipts and payments – AAL operations (GST exclusive)

Facility	Item	Transaction Type	From / To	Budget Receipts	Budget Payments	Actual Receipts	Actual Payments
AAL	AAL Operations	Receipts	AAL members	\$170,000		\$177,650	
AAL	AAL Operations	Payments - Operating	AAL		\$170,000		\$177,650
AAL	AAL Operations	Receipts	NCRIS	\$243,340		\$243,340	
AAL	AAL Operations	Payments - Operating	AAL		\$243,340		\$243,340
				<b>\$413,340</b>	<b>\$413,340</b>	<b>\$420,990</b>	<b>\$420,990</b>

The above receipts of \$243,340 for the administration fee taken from the Astronomy NCRIS grant is confirmed in the financial statements. (See Profit and Loss Statement – Revenue.)  
The above receipts of \$177,650 from Members are confirmed in the financial statements. (See Profit and Loss Statement – Revenue: Membership Subscriptions Level 1 \$156,750 + Level 2 \$20,900 = \$177,650.)

## List of Astronomy NCRIS in-kind contributions (GST exclusive)

Facility	Item	Transaction Type	From / To	Budget Receipts	Budget Payments	Actual Receipts	Actual Payments
PILOT	Science Centre	Receipts	UNSW	\$176,355		\$137,513	
PILOT	Science Centre	Payments - Operating	UNSW		\$176,355		\$137,513
MIRA	MRO	Receipts	WA Govt	\$4,080,000		\$4,200,000	
MIRA	MRO	Payments - Capital	WA Govt		\$4,080,000 <sup>‡</sup>		\$4,200,000
				<b>\$4,256,355</b>	<b>\$4,256,355</b>	<b>\$4,337,513</b>	<b>\$4,337,513</b>

The in-kind receipts and payments are confirmed in the letters from the participating organisations (see letters below).

<sup>‡</sup> The contribution of \$4,080,000 by the Government of Western Australia to the Murchison Radio-astronomy Observatory was scheduled for 2008/09 in the Astronomy NCRIS funding agreement but was incorrectly omitted from the budget table of the 2008/09 annual business plan.



## List of Astronomy NCRIS Reserve receipts and payments (GST exclusive)

Facility	Item	Transaction Type	From / To	Budget Receipts	Budget Payments	Actual Receipts	Actual Payments
NCRIS reserve	NCRIS reserve	Receipts	Interest	\$670,000		\$865,208	
Roadmap	AGMTPO	Payments - Operating	ANU		\$30,000		\$30,000
Roadmap	PILOT Office	Payments - Operating	AAO		\$30,000		\$30,000
AAO	AAO Operations	Payments - Operating	AATB		\$375,000		\$375,000
AAO	AAO Operations	Payments - Operating	AATB		\$375,000		\$375,000
AAO	AAO Operations	Payments - Operating	AATB		\$375,000		\$375,000
AAO	AAO Operations	Payments - Operating	AATB		\$375,000		\$375,000
				<b>\$670,000</b>	<b>\$1,560,000</b>	<b>\$865,208</b>	<b>\$1,560,000</b>

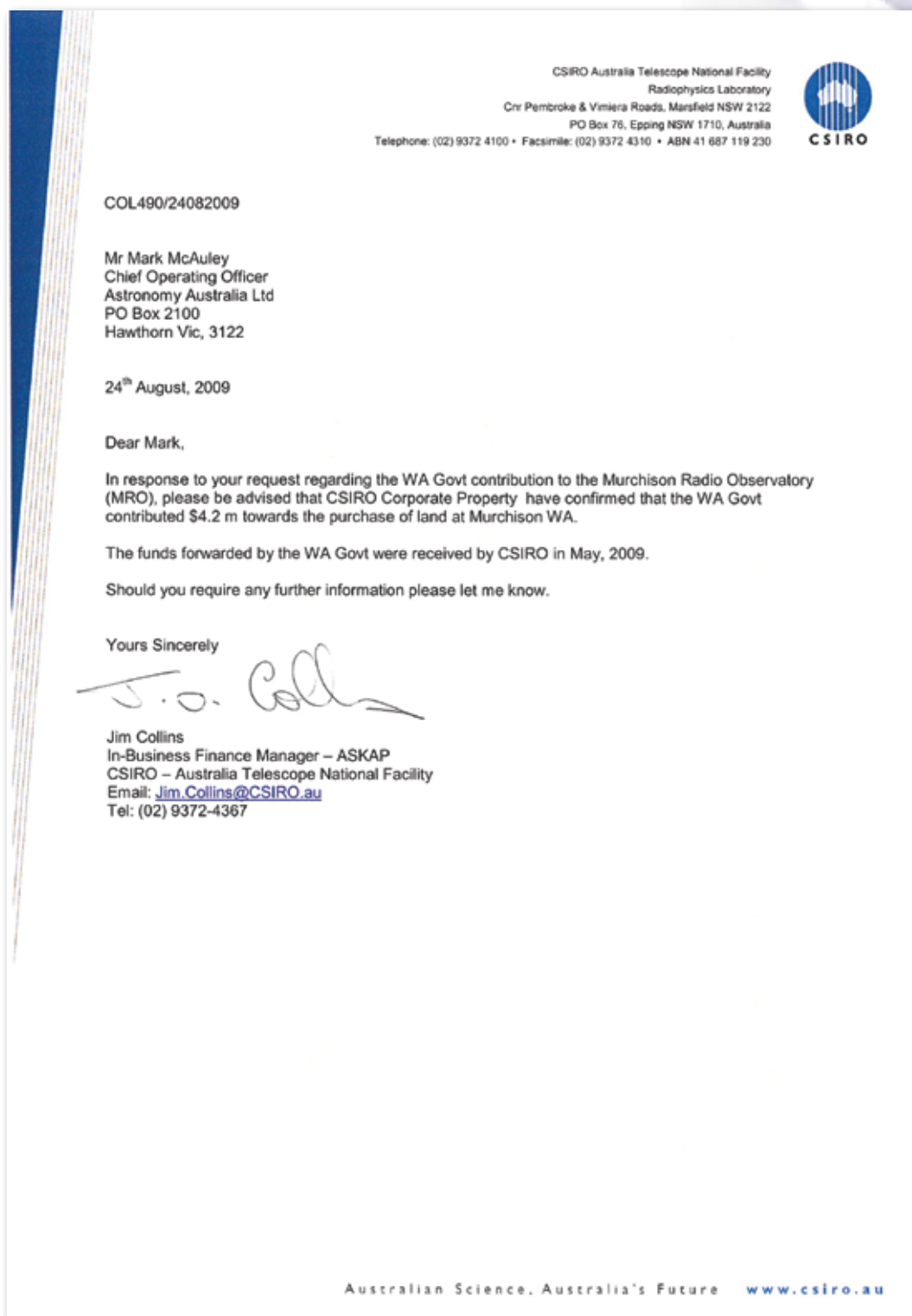
The amount of interest earned was 129% relative to budget. This was due to the decreased payments regarding the AAT Instrument and Strategic Options (noted above) and the timing of receipts and payments. The decrease in interest rates available in Australia did not have a major impact as a significant cash balance had been invested in term deposits prior to the sudden change in interest rates.

The interest earned by the NCRIS grant is allocated to the Astronomy NCRIS Reserve, and payments are drawn from that reserve to pay for activities related to the Astronomy NCRIS. The above receipts and payments are confirmed in the financial statements (see Statement of Changes in Equity).

**Note:** The \$865,208 allocated to the Astronomy NCRIS Reserve is the interest earned by the Astronomy NCRIS minus bank fees associated with the Astronomy NCRIS bank accounts.



## CSIRO Statement confirming In-kind Contribution





## UNSW Statement confirming In-kind Contribution

THE UNIVERSITY OF  
NEW SOUTH WALES



SCHOOL OF PHYSICS

4<sup>th</sup> September 2009

Mr. Mark McAuley  
Chief Operating Officer  
Astronomy Australia Limited  
c/o Swinburne University of Technology (H39 CASC)  
1 Alfred Street Hawthorn  
VIC3122

Dear Mark

### UNSW Contribution Towards the PILOT Science Office

As mentioned to you in my letter of 11th July 2008, there is a mismatch between UNSW's and AAL's financial years. The financial year for UNSW is from 1 January to 31st December but for AAL, it is from 1st July to 30th June. The funds will be spent in accordance with the UNSW financial year.

I am pleased confirm that we have spent a total of \$137,513.30 during the AAL financial year 08/09. The remaining budget of \$38,841.21 will be spent by the end of 2009, ie by end of UNSW 09 financial year.

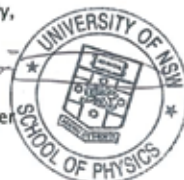
In summary, the total funds of \$250,000 contributed by UNSW towards the PILOT Science Office will be spent as outlined below:

AAL Financial Year	Amount Spent (\$)
07/08 (1.7.07 - 30.6.08)	73,645.49
08/09 (1.7.08 - 30.6.09)	137,513.30
09/10 (1.7.09 - 31.12.09)	38,841.21
<b>Total Amount Spent</b>	<b>\$250,000.00</b>

Please let me know if further information is required.

Yours sincerely,

  
Stephen Lo  
School Manager



UNSW SYDNEY NSW 2052  
A U S T R A L I A  
Telephone: +61 (2) 9385 4553  
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ABN 57 195 873 179



# Gemini Performance Indicators

Although the following information is for the financial year 2008/09, the observing semesters 2008B and 2009A on which statistics are based run from 1 Aug 2008 – 31 Jul 2009.

## Providing Research Infrastructure

In Semesters 2008B and 2009A both Gemini telescopes have continued to improve their operational efficiency. In light of this Gemini have recently reduced the acquisition overheads that must be factored in by all applicants, and acquisition times for all instruments and modes are now as good as, if not better than at comparable facilities elsewhere. Between 70% and 85% of the nights on each telescope were nominally allocated for science, with the remainder required for preventative maintenance and commissioning of new instruments. Delays in the delivery of some new instruments later freed up some of the commissioning time for science with existing instruments. A prolonged period of extreme winter weather on Mauna Kea in the first four months of 2009 resulted in over half the nights being unusable, hampering the completion of many programs on Gemini North. Conversely a run of exceptionally good weather over summer at Gemini South has enabled excellent progress on the planet search campaign being conducted with the newly-commissioned Near-Infrared Coronagraphic Imager (NICI).

The 2008/09 subscription paid by Australia for its 6.19% share of the Gemini partnership was:

<b>LIEF</b> \$903,331	<b>NCRIS</b> \$1,315,524	<b>Total</b>	\$2,218,855
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In addition, NCRIS supplied \$463,964 as Australia's share of the Aspen instrumentation program and \$253,000 for the costs of operating AusGO.

## Meeting Researcher Needs / Fostering Collaboration

A total of 55 astronomers (13 of whom were PhD students) from 11 Australian institutions were involved in submitting 52 proposals for observing time with Gemini in 2008/09. These are all up on the figures for 2007/08 (43 astronomers including 8 students from 8 institutions submitted 45 proposals). Collaborators from 67 foreign institutions (listed in Table 1) were involved, and the vast majority of proposals (88%) had investigators from one or more Australian institutions collaborating with investigators from one or more foreign institutions. Just 12% of proposals involved investigators from a single Australian institution only.

The oversubscription factor (ratio of hours requested to total hours available assuming no weather loss) for the year as a whole was 215%, similar to the demand in previous years. In total 51 astronomers from 10 institutions were allocated time in the Gemini queue bands (or classically-scheduled nights on the Subaru and Keck telescopes via a time exchange program), 12 of whom were PhD students. Table 2 lists the 26 papers published in refereed journals in the past year that have been based on Gemini data and involving Australian authors (up from 21 in 2007/08).



## Table 1 - List of foreign institutions represented in Australian Gemini proposals

Aarhus University	Queens University Kingston
Astrophysikalisches Institut und Universitäts-Sternwarte	Rice University
California Institute of Technology	South African Astronomical Observatory
Columbia University	Tata Institute of Fundamental Research
Consejo Superior de Investigaciones Científicas	Tuorla Observatory
Cyprus College	Universidad de Chile
European Southern Observatory	Universidad de Valencia
Gemini Observatory	Universidad Nacional de La Plata
Georg-August-Universität Göttingen	Universidade do Porto
Harvard-Smithsonian Centre for Astrophysics	University College Cork
Herzberg Institute of Astrophysics	University College London
Imperial College London	University of Bristol
Instituto de Astrofísica de Andalucía	University of British Columbia
Instituto de Astrofísica de Canarias	University of California Berkeley
Istituto di Astrofisica Spaziale e Fisica Cosmica	University of California Santa Cruz
Johns Hopkins University	University of Cambridge
Las Cumbres Observatory	University of Chicago
Lawrence Livermore National Laboratory	University of Colorado
Max-Planck-Institut für Astronomie	University of Durham
McGill University	University of Edinburgh
Michigan State University	University of Exeter
National Astronomical Observatory of Japan	University of Gent
National Optical Astronomy Observatory	University of Groningen
Observatoire Astronomique de Marseille Provence	University of Hertfordshire
Observatoire de Grenoble	University of Leicester
Observatoire de Strasbourg	University of Madrid
Observatoire Midi-Pyrénées	University of Michigan
Osservatorio Astronomico di Bologna	University of Montreal
Osservatorio Astronomico di Torino	University of Oxford
Pennsylvania State University	University of Szeged
Pomona College	University of Texas
Princeton University	University of Victoria
Queen Mary and Westfield College	Yale University
	York University



## Table 2 - Papers published in refereed journals in the last year that have been based on Gemini data and involve Australian authors (shown in bold face)

Eisner, J. A., Monnier, J. D., **Tuthill, P.**, Lacour, S. (2009). *Spatially Resolved Mid-Infrared Imaging of the SR 21 Transition Disk*, *Astrophysical Journal Letters*, 698, p. L169-173.

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Riffel, R. A., Storchi-Bergmann, T., **McGregor, P. J.** (2009). *The Dusty Nuclear Torus in NGC 4151: Constraints from Gemini Near-Infrared Integral Field Spectrograph Observations*, *Astrophysical Journal*, 698, p. 1767-1770.

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Steele, P. R., Burleigh, M. R., Farihi, J., Gänsicke, B. T., Jameson, R. F., **Dobbie, P. D.**, Barstow, M. A. (2009). *PHL 5038: a spatially resolved white dwarf + brown dwarf binary*, *Astronomy & Astrophysics*, 500, p. 1207-1210.

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**Vlajić, M., Bland-Hawthorn, J., Freeman, K.** (2009). *The Abundance Gradient in the Extremely Faint Outer Disk of NGC 300*, *Astrophysical Journal*, 697, p. 361-372.

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Perley, D., Metzger, B., Granot, J., Butler, N., Sakamoto, T., Ramirez-Ruiz, E., Levan, A., Bloom, J., Miller, A., Bunker, A., Chen, H.-W., Filippenko, A., Gehrels, N., **Glazebrook, K.**, Hall, P., Hurley, K., Kocevski, D., Li, W., Lopez, S., Norris, J., Piro, A., Poznanski, D., Prochaska, J., Quataert, E., Tanvir, N. (2009). *GRB 080503: Implications of a Naked Short Gamma-Ray Burst Dominated by Extended Emission*, *Astrophysical Journal*, 696, p. 1871-1885.

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Lodieu, N., **Dobbie, P.**, Deacon, N., Venemans, B., Durant, M. (2009). *Two distant brown dwarfs in the UKIRT Infrared Deep Sky Survey Deep Extragalactic Survey Data Release 2*, *Monthly Notices of the Royal Astronomical Society*, 395, p. 1631-1639.

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Burningham, B., Pinfield, D., Leggett, S., **Tinney, C.**, Liu, M., Homeier, D., West, A., Day-Jones, A., Huelamo, N., Dupuy, T., Zhang, Z., Murray, D., Lodieu, N., Barrado Y Navascus, D., Folkes, S., Galvez-Ortiz, M., Jones, H., Lucas, P., Calderon, M., Tamura, M. (2009). *The discovery of an M4+T8.5 binary system*, *Monthly Notices of the Royal Astronomical Society*, 395, p. 1237-1248.

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Damjanov, I., McCarthy, P., Abraham, R., **Glazebrook, K.**, Yan, H., Mentuch, E., LeBorgne, D., Savaglio, S., Crampton, D., Murowinski, R., Juneau, S., Carlberg, R., Jørgensen, I., Roth, K., Chen, H.-W., Marzke, R. (2009). *Red Nuggets at  $z \sim 1.5$ : Compact Passive Galaxies and the Formation of the Kormendy Relation*, *Astrophysical Journal*, 695, p. 101-115.

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Foley, R., Matheson, T., Blondin, S., Chornock, R., Silverman, J., Challis, P., Clocchiatti, A., Filippenko, A., Kirshner, R., Leibundgut, B., Sollerman, J., Spyromilio, J., Tonry, J., **Davis, T.**, Garnavich, P., Jha, S., Krisciunas, K., Li, W., Pignata, G., Rest, A., Riess, A., **Schmidt, B.**, Smith, R., Stubbs, C., **Tucker, B.**, Wood-Vasey, W. (2009). *Spectroscopy of High-Redshift Supernovae from the Essence Project: The First Four Years*, *Astronomical Journal*, 137, p. 3731-3742.

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Storchi-Bergmann, T., **McGregor, P.**, Riffel, R., Simes Lopes, R., Beck, T., Dopita, M. (2009). *Feeding versus feedback in NGC4151 probed with Gemini NIFS - I. Excitation*, Monthly Notices of the Royal Astronomical Society, 394, p. 1148-1166.

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**Miszalski, B.**, Acker, A., Moffat, A., Parker, Q., Udalski, A. (2009). *Binary planetary nebulae nuclei towards the Galactic bulge. I. Sample discovery, period distribution, and binary fraction*, Astronomy & Astrophysics, 496, p. 813-825.

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Dupuy, T., Liu, M., **Ireland, M.** (2009). *Dynamical Mass of the Substellar Benchmark Binary HD 130948BC*, Astrophysical Journal, 692, p. 729-752.

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**Spolaor, M., Proctor, R., Forbes, D., Couch, W.** (2009). *The Mass-Metallicity Gradient Relation of Early-Type Galaxies*, Astrophysical Journal Letters, 691, p. L138-L141.

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Bloom, J., Perley, D., Li, W., Butler, N., Miller, A., Kocevski, D., Kann, D., Foley, R., Chen, H.-W., Filippenko, A., Starr, D., Macomber, B., Prochaska, J., Chornock, R., Poznanski, D., Klose, S., Skrutskie, M., Lopez, S., Hall, P., **Glazebrook, K.**, Blake, C. (2009). *Observations of the Naked-Eye GRB 080319B: Implications of Nature's Brightest Explosion*, Astrophysical Journal, 691, p. 723-737.

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De Buizer, J., Redman, R., **Longmore, S., Caswell, J.**, Feldman, P. (2009). *SiO outflow signatures toward massive young stellar objects with linearly distributed methanol masers*, Astronomy & Astrophysics, 493, p. 127-143.

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Kankare, E., Mattila, S., **Ryder, S.**, Pérez-Torres, M.-A., Alberdi, A., Romero-Canizales, C., Díaz-Santos, T., Väisänen, P., Efstathiou, A., Alonso-Herrero, A., Colina, L., Kotilainen, J. (2008). *Discovery of a Very Highly Extinguished Supernova in a Luminous Infrared Galaxy*, Astrophysical Journal Letters, 689, p. L97-100.

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Kirkpatrick, J., Cruz, K., Barman, T., Burgasser, A., Looper, D., **Tinney, C.**, Gelino, C., Lowrance, P., Liebert, J., Carpenter, J., Hillenbrand, L., Stauffer, J. (2008). *A Sample of Very Young Field L Dwarfs and Implications for the Brown Dwarf "Lithium Test" at Early Ages*, Astrophysical Journal, 689, p. 1295-1326.

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**Yong, D.**, Meléndez, J., Cunha, K., **Karakas, A., Norris, J.**, Smith, V. (2008). *Chemical Abundances in Giants Stars of the Tidally Disrupted Globular Cluster NGC 6712 from High-resolution Infrared Spectroscopy*, Astrophysical Journal, 689, p. 1020-1030.

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Matsuoka, Y., **Peterson, B.**, Oyabu, S., Kawara, K., Asami, N., Sameshima, H., Ienaka, N., Nagayama, T., Tamura, M. (2008). *Optical to Near-Infrared Spectrum of a Massive Evolved Galaxy at  $z = 1.26$* , Astrophysical Journal, 685, p. 767-772.

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Pinfield, D., Burningham, B., Tamura, M., Leggett, S., Lodieu, N., Lucas, P., Mortlock, D., Warren, S., Homeier, D., Ishii, M., Deacon, N., McMahon, R., Hewett, P., Osori, M., Martin, E., Jones, H., Venemans, B., Day-Jones, A., **Dobbie, P.**, Folkes, S., Dye, S., Allard, F., Baraffe, I., Barrado Y Navascus, D., Casewell, S., **Chiu, K.**, Chabrier, G., Clarke, F., Hodgkin, S., Magazz, A., McCaughrean, M., Nakajima, T., Pavlenko, Y., **Tinney, C.** (2008). *Fifteen new T dwarfs discovered in the UKIDSS Large Area Survey*, Monthly Notices of the Royal Astronomical Society, 390, p. 304-322.





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Blondin, S., **Davis, T.**, Krisciunas, K., **Schmidt, B.**, Sollerman, J., Wood-Vasey, W., Becker, A., Challis, P., Clocchiatti, A., Damke, G., Filippenko, A., Foley, R., Garnavich, P., Jha, S., Kirshner, R., Leibundgut, B., Li, W., Matheson, T., Miknaitis, G., Narayan, G., Pignata, G., Rest, A., Riess, A., Silverman, J., Smith, R., Spyromilio, J., Stritzinger, M., Stubbs, C., Suntzeff, N., Tonry, J., **Tucker, B.**, Zenteno, A. (2008). *Time Dilation in Type Ia Supernova Spectra at High Redshift*, *Astrophysical Journal*, 682, p. 724-736.

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Rauch, M., Haehnelt, M., **Bunker, A.**, Becker, G., Marleau, F., Graham, J., Cristiani, S., Jarvis, M., Lacey, C., Morris, S., Peroux, C., Rttgering, H., Theuns, T. (2008). *A Population of Faint Extended Line Emitters and the Host Galaxies of Optically Thick QSO Absorption Systems*, *Astrophysical Journal*, 681, p. 856-880.

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Fekel, F., Hinkle, K., Joyce, R., **Wood, P.**, Howarth, I. (2008). *Infrared Spectroscopy of Symbiotic Stars. VI. Combined Orbits for Two S-Type Systems: V455 Scorpii and SS 73-90*, *Astronomical Journal*, 136, p. 146-158.



# Quality of Research Infrastructure

At the May 2009 Gemini Users meeting, the Associate Director of Science Operations at Gemini, Dr Dennis Crabtree, presented an updated benchmarking survey of Gemini publications. The total number of Gemini publications has now passed 540, and after 7 years of operation, the number of refereed papers published per year per Gemini telescope is now 66, cf. 75 for Subaru or Keck and 90 for the VLT. The percentage of Australian first-author Gemini publications (3.7%) is just over half the Australian share of observing time, but considering that nearly half of all Australian Gemini proposals each semester are joint with other partners, and led by an investigator from a larger partner, this is to be expected. The median impact factor per Gemini paper from 2007 (where impact factor is defined as the ratio of the number of citations received to date, to the median number of citations per 2007 paper in the *Astronomical Journal*) is similar to that for Keck, UKIRT, VLT, and the Hubble Space Telescope, but currently less than for CFHT, Magellan, or Subaru.

Another important benchmark for Australia's return on its Gemini investment is the fraction of Australian proposals allocated some time that are executed to completion (i.e. at least 80% of the allocated time is observed, since overheads may not be as large as expected). Programs are assigned to one of 3 queue bands with the following requirements:

Band 1	Top 30% of ranked proposals	90% of programs should be completed, by rolling over incomplete programs for up to two semesters if necessary.
Band 2	Middle 30% of ranked proposals	75% of programs should be completed each semester.
Band 3	Lower 40% of ranked proposals	80% of programs which are initiated should reach 75% of the minimum time required by the applicants.

On the basis that on average only 60% of the allocated hours each semester will be usable due to weather loss and faults, programs in Band 3 “overfill” the queue but enable science to be conducted under the full range of observing conditions encountered in any semester. As such, programs allocated time in Band 3 are encouraged to relax their constraints on observing conditions including image quality and cloud cover so as to facilitate their execution.

Despite the appalling winter weather at Gemini North, all 14 Australian programs in Band 1 in 2008B and 2009A were completed. Only half of the 8 programs in Band 2 were completed, while 7 of the 10 programs in Band 3 were completed. Indeed, Australian Gemini users have become quite adept at exploiting the full range of observing conditions at Gemini, resulting in a growing imbalance in partner share of time used which has to be paid back in future semesters.

## Collaborative Infrastructure Provision

There were no changes to the Gemini Partnership during 2008/09.





# Magellan Performance Indicators

Although the following information is for the financial year 2008/09, the observing semesters 2008B and 2009A on which statistics are based run from Aug 2008 – Jul 2009.

## Providing Research Infrastructure

In Semesters 2008B and 2009A both Magellan telescopes have performed reliably, with a number of improvements to instrument performance and documentation implemented by the Australian-funded Magellan Fellows. A new image-slicing reformatter (GISMO) for the IMACS camera and spectrograph is now available. Several new instruments are slated for deployment in the coming year, including a 36 CCD mosaic camera (MegaCam); a near-infrared imager and multi-object spectrograph (MMIRS); a wide-field infrared imager (FourStar); and an infrared echellette spectrograph (FIRE).

The cost of Australia's 15 nights on the Magellan telescopes during 2008/09 were not funded as part of the Astronomy NCRIS programme. Funding for this access came from the GSKA MNRF and AAL's reserves.

## Meeting Researcher Needs / Fostering Collaboration / Quality of Research Infrastructure

A total of 27 astronomers (4 of whom were PhD students) from 6 Australian institutions were involved in submitting 15 proposals for observing time with Magellan in 2008/09. Collaborators from 14 foreign institutions (listed in Table 3) were involved, with 8 proposals having investigators from a single Australian institution collaborating with investigators from one or more foreign institutions; 4 proposals with investigators from multiple Australian institutions plus foreign investigators; and three with investigators from a single Australian institution only.

The oversubscription factor (ratio of nights requested to total nights available) for the year as a whole was 233%, similar to the demand for Gemini. In total 13 astronomers from 4 institutions were allocated time on Magellan, 2 of whom were PhD students. Poorer than usual weather conditions meant that only 2/3 of the classically-scheduled nights were usable. Travel support for visiting Australian observers is usually provided by the Access to Major Research Facilities Program administered by ANSTO. Table 4 lists the 6 papers published in refereed journals in the past year that have been based on Magellan data and involving Australian authors, up from 2 in 2007/08 (Magellan access has only been offered since January 2007).



Table 3: List of foreign institutions represented in Australian Magellan proposals

Aarhus University	University of Arizona
Carnegie Institution	University of California San Diego
Harvard-Smithsonian Centre for Astrophysics	University of Cambridge
Instituto de Astrofísica de Canarias	University of Heidelberg
Max-Planck-Institut für Astronomie	University of Hertfordshire
Michigan State University	University of Liverpool
Observatoire Midi-Pyrénées	University of Toronto

Table 4: Papers published in refereed journals in the last year that have been based on Magellan data and involve Australian authors (shown in bold face)

**Bayliss, D.**, Weldrake, D., **Sackett, P.**, Tingley, B., **Lewis, K.** (2009). *The Lupus Transit Survey for Hot Jupiters: Results and Lessons*, *Astronomical Journal*, 137, p. 4368-4376.

Davies, G., Gilbank, D., **Glazebrook, K.**, Bower, R., Baldry, I., Balogh, M., **Hau, G.**, Li, I., McCarthy, P., Savaglio, S. (2009). *A spectroscopic measure of the star formation rate density in dwarf galaxies at  $z \sim 1$* , *Monthly Notices of the Royal Astronomical Society*, 395, p. L76-L80.

**Yong, D.**, Grundahl, F., D'Antona, F., **Karakas, A.**, **Lattanzio, J.**, **Norris, J.** (2009). *A Large C+N+O Abundance Spread in Giant Stars of the Globular Cluster NGC 1851*, *Astrophysical Journal Letters*, 695, p. L62-L66.

**Bryant, J.**, **Broderick, J.**, **Johnston, H.**, **Hunstead, R.**, **Gaensler, B.**, De Breuck, C. (2009). *A new search for distant radio galaxies in the Southern hemisphere - II. 2.2 micron imaging*, *Monthly Notices of the Royal Astronomical Society*, 394, p. 2197-2222.

**Bate, N.**, **Floyd, D.**, **Webster, R.**, **Wyithe, S.** (2008). *A microlensing study of the accretion disc in the quasar MG 0414+0534*, *Monthly Notices of the Royal Astronomical Society*, 391, p. 1955-1960.

**Yong, D.**, **Karakas, A.**, Lambert, D., Chieffi, A., Limongi, M. (2008). *Heavy Element Abundances in Giant Stars of the Globular Clusters M4 and M5*, *Astrophysical Journal*, 689, p. 1031-1043.

### Collaborative Infrastructure Provision

There were no changes to the Magellan Partnership during 2008/09.





# Astronomy Australia Ltd

## Code of Conduct

AAL is a public, non-profit company of limited liability, the principal object of which is the advancement of the science of astronomy within the principles of the National Collaborative Research Infrastructure Strategy (Constitution 3). AAL is ultimately controlled by the members, who appoint the board and vote on matters of community importance, normally at the annual general meeting.

This Code of Conduct establishes ethical standards for the conduct of AAL's directors, executives, and employees ("Officers" herein) as they strive to achieve the company objectives within this framework.

The Code stands beside but does not exclude or replace other legally binding obligations.

### Organisational Principles

- Officers will use their best efforts to pursue the furtherment of Australian Astronomy within Australia and abroad.
- Officers will treat all people with respect and will not discriminate on grounds of race, religion, gender, marital status or disability.
- Officers will observe all relevant laws and regulations in the execution of AAL business.
- Officers will at all times act with honesty and integrity, both internally and externally, when representing AAL.
- The company promotes a zero tolerance approach for any deliberate illegal acts such as but not limited to theft, fraud, embezzlement, bribery, or the receiving of bribes.
- Officers shall when actively engaged in AAL business be always unimpaired by alcohol or substance abuse.

### Good Standing of the Company

AAL is responsible to the astronomy community and to the Australian Government. It is paramount that the good standing of the company within the community be fostered and protected. Community lack of respect and credibility is failure.

### Public Image and Media Relations

- Officers must execute their duty with due care to the public image of AAL.
- Particular diligence must be observed in dealing with the news media.
- Officers must avoid making statements purporting to represent the views or position of AAL unless formally empowered to do so.
- An Officer may communicate with the news media as a representative of AAL strictly as formally empowered to do so.



## Confidentiality

It is the nature of AAL's business that Officers will share information of a sensitive nature. The confidentiality of our Members and of all affiliated bodies and third parties must be respected. Officers will make best efforts to protect confidentiality at all times. Leaks represent failure.

An Officer of the Company will not use such confidential information for personal gain or promotion.

## Conflict of Interest

- It is the nature of the Australian astronomical community that individuals will have many intersecting interests.
- Conflict of interest is inevitable and unavoidable within AAL's ambit. This must be recognised and dealt with accordingly.
- AAL will keep a register of Officers interests which should be reviewed at least annually.
- Officers will be aware of section 40 of the AAL Constitution pertaining to conflict of interest.
- If in the progress of a Board meeting a Director or Officer recognizes that a conflict exists, or might reasonably exist, he must declare this interest.
- Should a Member of the Board or Officer recognize that another Member or Officer has a conflict of interest, he must declare this to the Board without fear or favour.
- Any declared conflict of interest will be evaluated by the Board at the time. The Board will decide how to proceed. In the event that the Board is locked, the Chairman shall resolve the matter. (Such resolution will normally be positive but may include declaring a topic unresolved for reasons of conflict. Such should be minuted.)
- The conflicted Members and Officers may be asked to abstain from either discussion or voting.
- The conflicted Members and Officers may be asked to absent the meeting for the duration of entertainment of the identified item of conflict.





## Strategic Alliances

Many of AAL's highest goals involve alliances and partnerships.

Alliance partners should be treated with confidentiality, integrity, honesty, and openness.

Officers will represent AAL to strategic alliance partners strictly as formally empowered to do so.

## Dealing with Government

- It is the nature of AAL's business that Officers must interact with Government.
- Officers will represent AAL to Government strictly as formally empowered to do so.
- The highest standards of diligence are required.
- AAL must endeavor to present the most accurate possible information to Government, and to act upon the directions of Government visibly, properly, and accountably.

## Living Document


- This Code of Conduct should be reviewed annually by the Audit and Risk Management Committee.
- It can be extended or truncated provided this represents improvement.
- It can be improved at any time by the Board.



## Acronyms used in this report

2dF	Two-degree-Field
8m	8 metre class visible/infrared telescope such as Gemini
AAAAC	Australian Antarctic Astronomy Advisory Committee
AABoM	Australian Astronomy Board of Management
AAL	Astronomy Australia Limited
AAO	Anglo-Australian Observatory
AAT	Anglo-Australian Telescope
AATB	Anglo-Australian Telescope Board
AGM	Annual General Meeting
AGMTAC	Australian Giant Magellan Telescope Advisory Committee
AGMTPO	Australian Giant Magellan Telescope Project Office
AGS	Australian Gemini Scientist
AGSC	Australian Gemini Steering Committee
AGUSS	Australian Gemini Undergraduate Summer Studentships
AIPS	Astronomical Image Processing System
ALMA	Atacama Large Millimetre Array
ANRAC	Australian National Radio Astronomy Committee
ANSOC	Australian NCRIS Strategic Options Committee
ANSTO	Australian Nuclear Science and Technology Organisation
ANU	Australian National University
AO	Adaptive Optics
ARC	Australian Research Council
ASA	Astronomical Society of Australia
ASKAC	Australasian Square Kilometre Array Consortium Executive
ASKAP	Australian Square Kilometre Array Pathfinder
ATNF	Australia Telescope National Facility
ATSC	Australia Telescope Steering Committee
AusGO	Australian Gemini Office
BETA	Boolardy Engineering Test Array
CABB	Compact Array Broadband Backend
CCD	Charge-coupled device
CDR	Critical Design Review
CETC54	54th Research Institute of the China Electronics Technology Corporation
CFHT	Canada France Hawaii Telescope
COO	Chief Operating Officer
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DDP	Design and Development Phase
DGS	Deputy Gemini Scientist
DIISR	Department of Innovation, Industry, Science and Research
EIF	Education Investment Fund
EoR	Epoch of Re-ionisation
E-ELT	European Extremely Large Telescope
ESO	European Southern Observatory
ESOWG	European Southern Observatory Working Group
FIRE	Folded-port InfraRed Echellette
FPGA	Field Programmable Gate Arrays





GISMO	Gladders Image-Slicing MultiSlit Option
GPI	Gemini Planetary Imager
GMT	Giant Magellan Telescope
GMTIFS	Giant Magellan Telescope Integral-Field Spectrograph
GMTO	Giant Magellan Telescope Organization
GNIRS	Gemini Near Infra-Red Spectrograph
GSAOI	Gemini South Adaptive Optics Imager
GSKA	Gemini and SKA
HEEF	Higher Education Endowment Fund
HPCWG	High Performance Computing Working Group
HST	Hubble Space Telescope
HVAC	Heating, Ventilating, and Air Conditioning
ILUA	Indigenous Land Use Agreement
IMACS	Inamori Magellan Areal Camera and Spectrograph
IRIS2	InfraRed Imaging Spectrograph 2
LIEF	Linkage Infrastructure, Equipment and Facilities
LIRGS	Luminous Infrared Galaxies
MMIRS	MMT Magellan InfraRed Spectrograph
MNRF	Major National Research Facility (Gemini & SKA)
MRO	Murchison Radio-astronomy Observatory
MWA	Murchison Widefield Array
NCA	National Committee for Astronomy (of AAS)
NCRIS	National Collaborative Research Infrastructure Strategy
NGO	National Gemini Office
NICI	Near-Infrared Coronagraphic Imager
NIFS	Near-Infrared Integral Field Spectrograph
NSF	National Science Foundation
OH&S	Occupational Health and Safety
PANIC	Persson's Auxiliary Nasmyth Infrared Camera
PDR	Preliminary Design Review
PILOT	Pathfinder for International Large Optical Telescope
PTF	Parkes Testbed Facility
prepSKA	Preparatory Study for the SKA
RSAA	Research School of Astronomy and Astrophysics
RTS/RTC	Real-Time Computer/Software
SDSS	Sloan Digital Sky Survey
SKA	Square Kilometre Array radio telescope
SKAMP	Square Kilometre Array Molonglo Prototype
SPDO	SKA Project Development Office
SPIRAL	Segmented Pupil/Imaging Array Lenses
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TB	Terabyte
UKIRT	United Kingdom Infra-Red Telescope
VPH	Volume Phase Holographic
VLT	Very Large Telescope
WFMOs	Wide-Field Multi-Object Spectrograph
WBS	Work Breakdown Structure