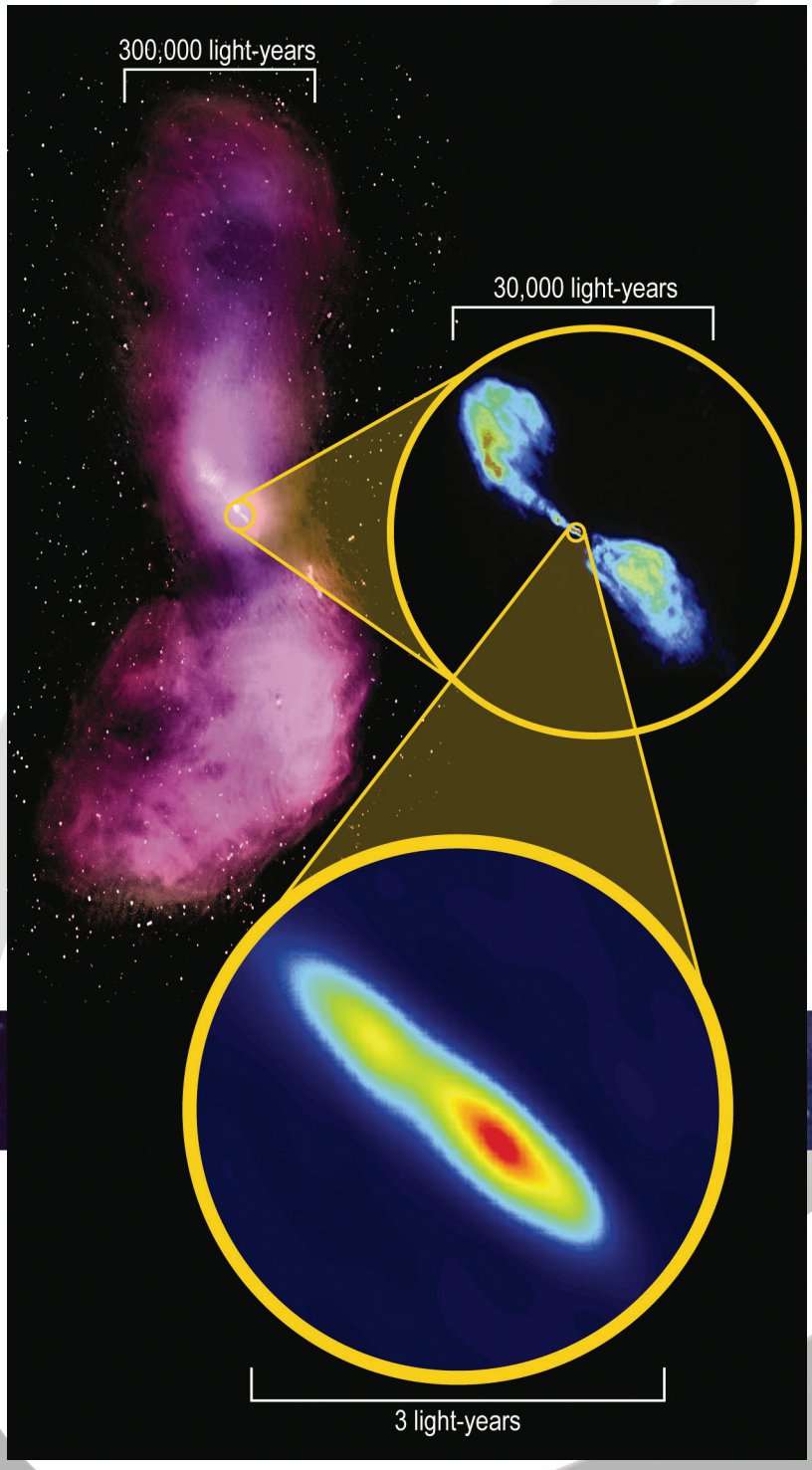
Astronomy Australia Ltd.



2009/10 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

Zooming in to the heart of galaxy Centaurus A, 14 million light-years away. This composite image shows the entire galaxy, as imaged by CSIRO radio telescopes; radio emission from a central part of the galaxy, imaged by a US radio telescope (the Very Large Array); and the innermost part of the galaxy, imaged by the new network of Australian and New Zealand radio telescopes, including the first Australian SKA Pathfinder dish at the Murchison Radio Observatory, along with ATCA, Parkes, Mopra, the University of Tasmania telescope, and the Auckland University of Technology telescope. Image Credits: Whole galaxy: I. Feain, T. Cornwell & R. Ekers (CSIRO/ATNF); ATCA northern middle lobe pointing courtesy R. Morganti (ASTRON); Parkes data courtesy N. Junkes (MPIfR). Inner radio lobes: NRAO / AUI / NSF. Core: S. Tingay (ICRAR) / ICRAR, CSIRO and AUT.

Background image

A portion of the GiggleZ simulation of cosmic structure showing the distribution of dark matter in a cubic-gigaparsec volume. This simulation consists of 10 billion particles and took 7 weeks to run and analyze on 992 cores of the Green machine at Swinburne University of Technology. Swinburne's new gSTAR supercomputer, to be funded from AAL's EIF grant, could complete this simulation in 5 days. Credit: Dr. Gregory Poole, Centre for Astrophysics and Supercomputing, Swinburne University of Technology.

The 3.9-m Anglo-Australian Telescope.
Image Credit: Fred Kamphues.

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10 A message from the Chairman

Completion of the 2009-10 financial year saw AAL turn three, and the National Collaborative Research Infrastructure Strategy (NCRIS) funded projects reach their final phase. In the previous financial year AAL secured a $10M grant from the Department of Innovation, Industry, Science and Research (DIISR) to invest in astronomy infrastructure between July 2011 to June 2013. In order to develop an investment plan for these funds, AAL called for expressions of interest from the community in November 2009. The outcome of this process of consultation and merit judgement resulted in the selection of nine new projects. These projects are described in the New Projects section of this report. In addition, AAL negotiated a contract with DIISR for $531,000 of NCRIS funding over the two years to enable AAL to manage the EIF grant.

The Antarctic Astronomy Advisory Committee (AAAC, formerly AAAAC) has been reconstituted under the chairmanship of Professor John Dickey at the University of Tasmania, to foster a closer relationship with the Australian Antarctic Division and to enhance international relationships and collaboration opportunities. AAL is most grateful to the previous Chair, Mr Brett Biddington, and all retiring members of the committee, for their valuable advice over the past three years. Also in Antarctic news, UNSW has received $330,000 from AAL's NCRIS reserves towards two new PLATOs. These PLATOs will support site-testing and astronomical instruments at Dome A and Dome F, and are to be deployed in Antarctica by Chinese and Japanese collaborators.

AAL also formed the Optical Telescopes Advisory Committee (OTAC). Chaired by Professor Joss Bland-Hawthorn of the University of Sydney, this committee provides a comprehensive approach to national facilities operating in the visible and infrared. The Australian GMT Advisory Committee (AGMTAC) role has been disbanded with the creation of both OTAC and ANU's GMT Science and Industry Working Group. AAL would like to thank the AGMTAC Chair, Professor Karl Glazebrook, and the members of AGMTAC for their valuable advice.

As previously announced by Minister Carr, Australia has committed, through an EIF grant, 10% of the construction funding for the GMT, in addition to having fully-funded 10% of the Design Development Phase. ANU and AAL will continue as equal 5% partners in the GMT Organisation (GMTO) with each providing a Director on the GMTO Board, while ANU will take responsibility for the management of the EIF funds.

AAL organised a "Challenges for the GMT" meeting at Swinburne University of Technology on 15th and 16th June 2010 attended by some eighty participants from Australia and overseas. This workshop explored key technical challenges for the GMT and related science, particularly regarding active and adaptive optics, high contrast imaging, and exploiting the full field of view. The meeting was jointly sponsored by DIISR, the AAO, ANU and AAL.

Progress by the European Southern Observatory (ESO) Working Group continues with a visit by Professor Jeremy Mould (Chair), Professor Brian Schmidt and Amanda Beasley to ESO Headquarters in Garching, Germany in May 2010. Meetings were held with the Director General Tim de Zeeuw and others, and useful information regarding joining ESO and potential benefits to Australia was obtained.

In the radio domain, satisfactory operation of phase one of the Murchison Widefield Array (MWA) 32-tile system has been verified and a project plan has been provided. As a result AAL has signed a contract with Curtin University of Technology providing $4.6M in NCRIS funding towards extending the array to 512 tiles.

AAL continues to monitor progress of the Australian SKA Pathfinder (ASKAP) as a whole and AAL is funding (from NCRIS) the digital platform of this project. AAL gratefully acknowledges that CSIRO through their ASKAP and Murchison Radio Observatory (MRO) activities is providing support to the MWA deployment.

AAL has assisted in securing $600,000 in National Computational Infrastructure (NCI) funding for two astronomy support staff, one at the NCI National Facility at ANU, the other at the Centre for Astrophysics and Supercomputing at Swinburne. These positions will run for two years and will assist the astronomy and astrophysics community to work in the areas of parallel computing, mass data processing and analysis, and data visualisation.

Professor Brian Schmidt chaired the 2009 AAL Nomination Committee and at the 2009 AGM, the AAL Board was delighted to welcome Professors Brian Boyle and Mark Wainwright as new Directors. AAL is grateful to Professors Elaine Sadler and Michael Barber, who retired as Directors at the AGM, for their three years of service.

During the past year AAL has appointed Ms Amanda Beasley to the position of Executive Officer. In addition to producing the various plans and reports published by AAL, she is assisting with the proposal for Australian membership of ESO. AAL has appointed Ms Catherine Andrews to the position of AAL Office Manager for 12 months while Ms Libby Armstrong is on maternity leave.

AAL's office is hosted by Swinburne University of Technology within its Centre for Astrophysics and Supercomputing. We remain extremely grateful to Professor Matthew Bailes for this accommodation. I also acknowledge with thanks the cooperation and support provided by the officers of the DIISR.

Dr Martin Cole, FTSE

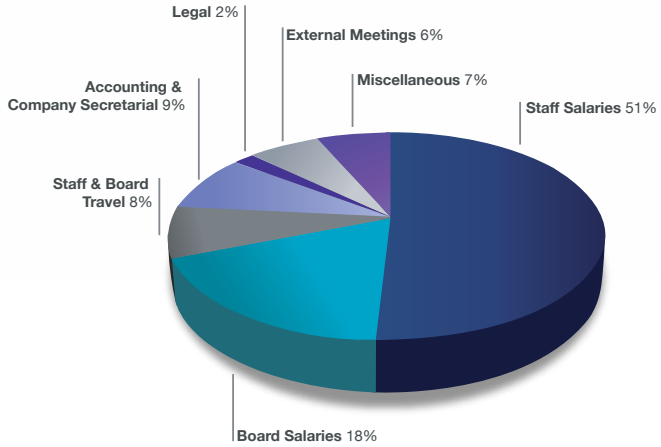
Chair

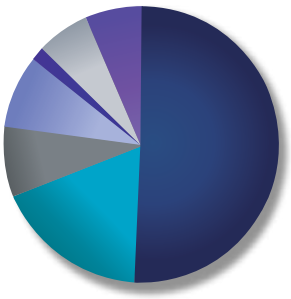
10 Financial summary

Note: All figures are GST exclusive

AAL operating expenses

Actual expenses for 2009/10 were $487,523





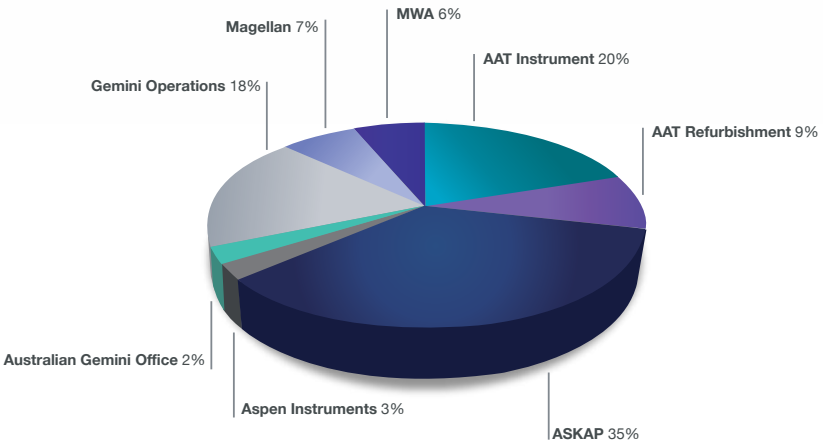
Staff salaries	**$247,554**	**51%**
Board salaries	**$88,129**	**18%**
Staff and Board travel	**$40,001**	**8%**
Accounting & company secretarial	**$41,916**	**9%**
Legal	**$8,137**	**2%**
External meetings	**$30,055**	**6%**
Miscellaneous	**$31,731**	**7%**

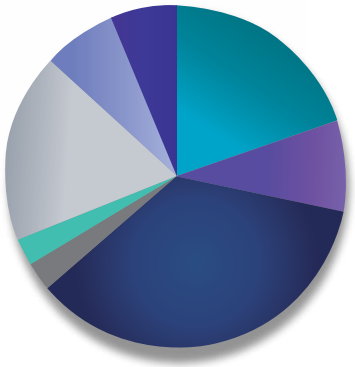
Grants received during 2009/10

AAL received two major grants during 2009/10:

Astronomy NCRIS (from DIISR):	**$12,757,000**
AAL management fee taken from Astronomy NCRIS	**($249,593)**
Gemini LIEF (from ARC):	**$900,000**
Total	**$13,407,407**

NCRIS and LIEF grants paid to projects during 2009/10





AAT instrument	**$2,500,000**
AAT refurbishment	**$1,100,000**
ASKAP	**$4,500,000**
Aspen instruments	**$348,123**
Australian Gemini Office	**$318,000**
Gemini operations	**$2,274,657**
Magellan	**$889,269**
MWA	**$796,492**
Total	**$12,726,541**

Grants re-allocated during 2009/10

To complete the allocations made during the Astronomy NCRIS strategic options allocation, $1,238,000 originally allocated to Aspen and $324,631 originally allocated to Gemini operations were re-allocated to purchase nights on the Magellan telescopes.

Balance of grants held by AAL as of 30th June 2010

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 2010

AAT instrument	**$1,350,000**
AAT refurbishment	**$400,000**
ASKAP	**$5,343,867**
Aspen instruments	**$834,042**
Australian Gemini Office	**$162,000**
Gemini operations	**$1,154,490**
Magellan	**$1,046,957**
MWA	**$1,703,508**
Total	**$11,994,864**

LIEF grant held by AAL as of 30th June 2010

Gemini:	**$3,700,000**

Reserves

AAL currently maintains two reserves:

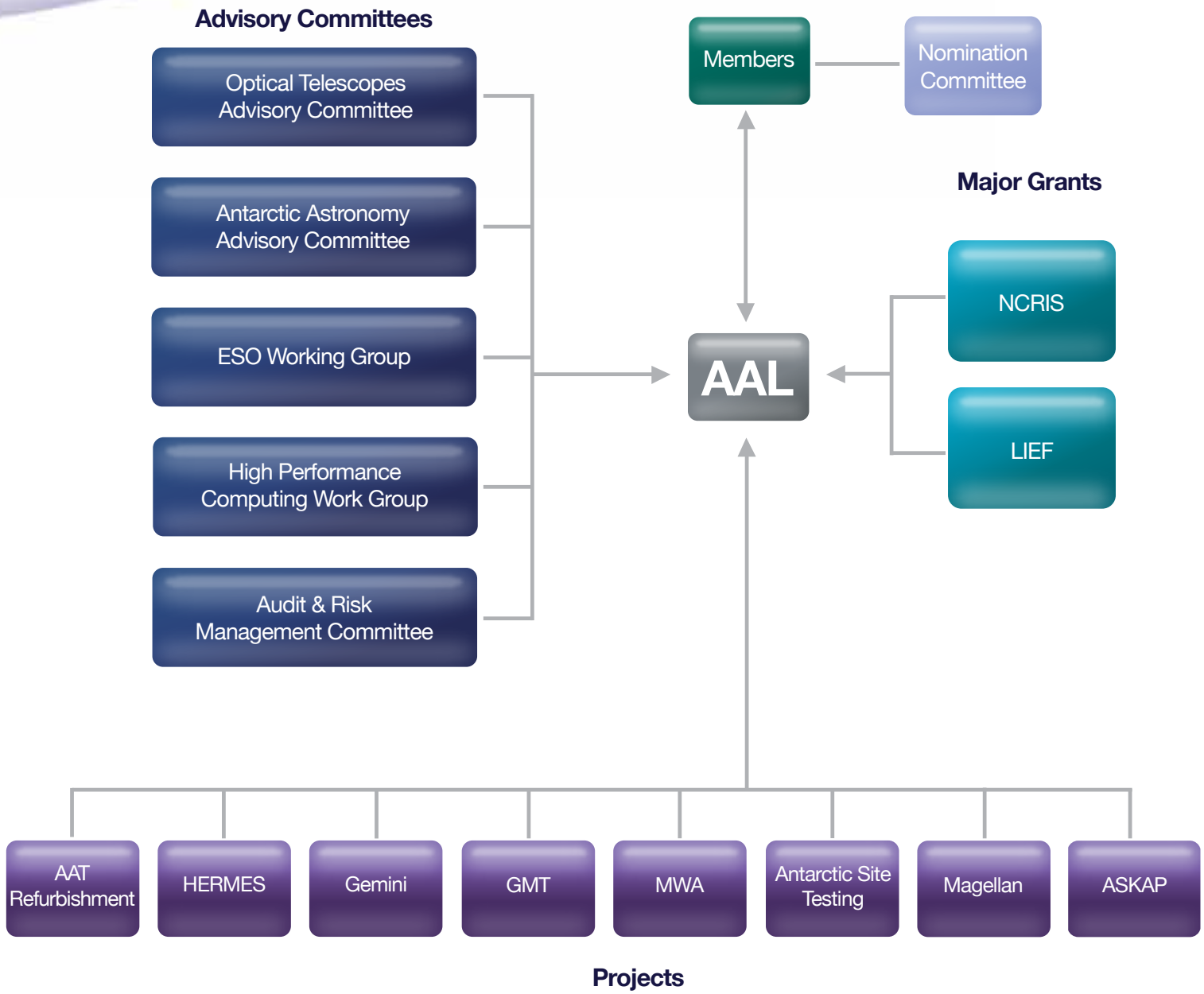
The Astronomy NCRIS reserve: $282,757 (balance as of 30th June 2010)
The Overseas Optical reserve: $3,934,929 (balance as of 30th June 2010)

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 2009/10 the primary use of the NCRIS reserve was $330,000 towards the cost of new PLATOs for Dome A and Dome F. In addition, $26,890 was used to support the Magellan Fellows scheme, $10,000 was allocated to UNSW to support travel to international Antarctic meetings, and $7,925 was contributed towards a GMT workshop in Melbourne.

The overseas optical reserve is primarily used to cover shortfalls in payments to overseas optical telescope facilities; no such payments were required during the financial year. During 2009/10 $23,526 was used to pay for the Australian Gemini Undergraduate Summer Scheme. AAL also draws down 1% of the balance of the reserve each year as a management fee ($37,564 during 2009/10).

Organisational chart 10

Organisational chart as of 30th June 2010



10 Board of Directors

Dr Martin Cole (Chair)
Appointed 18 April 2007
until 5th November 2010

Prof Michael Barber
Appointed 5 July 2007
until 5th November 2009

Prof Brian Boyle
Appointed 5th November 2009
until 2012 AGM

Prof Warrick Couch
Appointed 18 April 2007
until 5th November 2010

Prof Jeremy Mould
Appointed 30 September 2008
until 2011 AGM

Prof Elaine Sadler
Appointed 18 April 2007
until 5th November 2009

Prof Brian Schmidt
Appointed 18 April 2007
until 2011 AGM

Prof Mark Wainwright
Appointed 5th November 2009
until 2012 AGM

Dr David Warren
Appointed 5 July 2007
until 5th November 2010

Meetings attendance

Director	Directors	Board	Operations	Project	Nomination	AGM
Cole	6/6	1/1	0/0	-	-	1/1
Barber	2/3	-	-	-	-	0/1
Boyle	3/3	-	-	4/4	-	-
Couch	6/6	-	0/0	2/2	-	1/1
Mould	6/6	1/1	-	4/4	-	1/1
Sadler	3/3	-	-	-	-	1/1
Schmidt	6/6	-	-	6/8	1/1	1/1
Wainwright	3/3	-	-	-	-	-
Warren	6/6	1/1	0/0	6/8	-	1/1

Note:

The above table includes attendance by directors at the Australian GMT Advisory Committee (AGMTAC) (Chair: Prof Karl Glazebrook) which met during the 10/11 financial year but had disbanded by 30 June 2010. Informal meetings which are not minuted are not included in the above table.

Dr Martin Cole (Chair)

Prof Brian Boyle

Prof Jeremy Mould

Prof Warrick Couch

Prof Brian Schmidt

Prof Mark Wainwright

Dr David Warren

Images credit: Lisa Germany

10 Committee Membership

Committee membership as of 30 June 2010

Board Committees

Audit and Risk Management Committee

Chair
Dr David Warren

Members
Dr Martin Cole
Prof Jeremy Mould

Operations Committees

Executive Remuneration

Chair
Prof Mark Wainwright

Members
Dr Martin Cole
Prof Brian Schmidt

Nomination Committee

(For the 2009 AGM election)

Chair
Prof Brian Schmidt - Astronomy Australia Limited

Members
A/Prof John O'Byrne - University of Sydney
Prof John Dickey - University of Tasmania
Dr Alex Zelinsky - CSIRO
Prof Rachel Webster - University of Melbourne

Project Committees

Antarctic Astronomy Advisory Committee (AAAC)

Chair

Prof John Dickey, University of Tasmania, until 31 December 2011

Members

Dr Lewis Ball, CSIRO, until 31 December 2010

Prof Tom Bania, Boston University, until 31 December 2011 (External Advisor)

Prof Tim Bedding, University of Sydney, until 31 December 2010

Mr Brett Biddington, Principal, Biddington Research Pty Ltd, until 31 December 2010

Prof Matthew Colless, Director, Australian Astronomical Observatory, until 31 December 2010

Dr Marc Duldig, Australian Antarctic Division, until 31 December 2011

Dr Jon Lawrence, Macquarie University, until 31 December 2011

Prof John Storey, University of New South Wales, until 31 December 2010

Ms Christine Trousselot, Tasmanian Government Representative, until 31 December 2011

Dr David Warren, Astronomy Australia Limited, until 31 December 2011

European Southern Observatory Working Group (ESOWG)

Chair

Prof Jeremy Mould, Astronomy Australia Limited

Members

Prof Brian Boyle, National Committee for Astronomy

Mr David Luchetti, Department of Innovation, Industry, Science and Research (Observer)

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

Optical Telescopes Advisory Committee (OTAC)

Chair

Prof Joss Bland-Hawthorn, University of Sydney, until 31 December 2011

Members

Dr Michael Brown, Monash University, until 31 December 2010

Prof Gary Da Costa, Australian National University, until 31 December 2011

Prof Warrick Couch, Astronomy Australia Ltd, until 31 December 2010

Dr Scott Croom, University of Sydney, until 31 December 2011

Prof Karl Glazebrook, Swinburne University of Technology, until 31 December 2010

Prof Peter Quinn, University of Western Australia, until 31 December 2010

Dr Stuart Ryder, Australian Astronomical Observatory, until 31 December 2011

Prof Chris Tinney, University of New South Wales, until 31 December 2011

AAL Representation on External Committees

GMT Finance Committee: Mr Mark McAuley, Astronomy Australia Limited

Gemini Finance Committee: Mr Mark McAuley, Astronomy Australia Limited

GMTO Board: Prof Matthew Colless, Australian Astronomical Observatory

10 Members and their representatives

Members and their representatives on 30th June 2010

Australian Astronomical Observatory	**Prof Matthew Colless**
Australian National University	**Prof Harvey Butcher**
Commonwealth Scientific and Industrial Research Organisation	**Dr Lewis Ball**
Curtin University of Technology	**Prof Steven Tingay**
James Cook University	**Dr Andrew Walsh**
Macquarie University	**A/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	**Assoc Prof Peter Tuthill**
University of Tasmania	**Prof John Dickey**
University of Western Australia	**Prof Peter Quinn**

Project Reports

Parliamentary Secretary Richard Marles addressing the "Challenges for the GMT" workshop.

Image credit: Peter Buchholz.

10 Project reports

The Australia Telescope Compact Array has been equipped with sensitive receivers enabling it to detect radio waves as short as 3.5 millimetres. The new receivers incorporate special CSIRO-designed chips, made of the high-performance material indium phosphide. The new systems mean that the Compact Array will be the only set of telescopes in the southern hemisphere operating at these short wavelengths until the Atacama Large Millimetre Array telescope in Chile becomes operational at the end of this decade.

Image Credit: David Smyth.

New Projects

In May 2009 the Australian Government awarded Astronomy Australia Limited an Education Investment Fund (EIF) grant of $10M for the two year period commencing 1st July 2011. During 2009/10, to assist in developing an investment plan for this grant, Expressions of Interest were called for from the astronomy community. In December 2009 the AAL Board met to review the submissions and give consideration to strategic significance, project maturity, alignment with the current Australian astronomy Decadal Plan, and scientific return for the proposed investment of each proposed project. The following paragraphs describe the projects to be funded under the AAL EIF grant.

National Facilities

HERMES

The Australian Astronomical Observatory (AAO) is building an NCRIS-funded multi-object spectrograph HERMES, and $1,670,000 from EIF will allow a fourth, near infra-red, arm to be added to the instrument. HERMES will be used for galactic archaeology – the process of discovering the evolutionary history of the galaxy. The fourth arm of HERMES will allow the full objectives of galactic archaeology to be realised, and will be an excellent instrument to follow up the results of the Gaia space mission.

AAOmega

$710,000 of the EIF grant will also be used at the AAO for the upgrade of the AAOmega optical spectrograph. The greater efficiency of AAOmega will allow the current generation of large multi-object spectroscopic surveys to be expanded to earlier cosmic epochs.

ATCA

The C/X receiver systems of the Australia Telescope Compact Array (ATCA) will be upgraded with $1,471,000 from EIF. The C/X upgrade is one part of an overall upgrade to the ACTA to enable a broadband capability for the array. One advantage of the upgrade is the significant scientific gains in the areas of deep wide-field polarimetric imaging.

International Facilities

Gemini

Maintaining access to 8m class optical telescopes is a priority from the 2005 Decadal Plan. As a result, $688,160 from EIF will be used towards Australia's Gemini instrumentation payment.

Pierre Auger Observatory

Pierre Auger Observatory is actively involved in investigating the origins of the highest-energy cosmic rays. Australia's contribution to the observatory is through the cloud monitoring system, run by the University of Adelaide. $50,860 of the EIF grant will be used for replacement cloud monitoring equipment for the observatory.

New Opportunities

gSTAR

Graphics Processing Unit (GPU)-based computers are part of the next generation of High Performance Computing technology. The gSTAR GPU-based supercomputer, based at Swinburne University of Technology, will be funded with $1,040,000 from EIF and is expected to be able to tackle next generation computational problems in theoretical and observational astronomy not currently possible with existing CPU architectures.

Antarctica

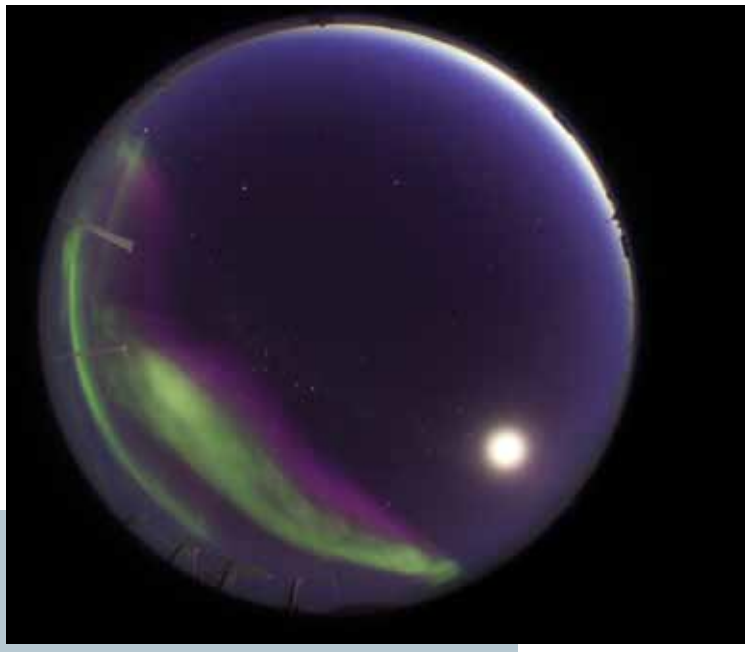
International collaborations are seen as the key to future projects in Antarctica. UNSW will work with the US to deploy a new PLATO robotic observatory to Ridge-A, and work with China to contribute to the new AST-3 telescope at Dome A. $1,000,000 of the EIF grant will go towards this project.

SKA Pathfinder

$3,070,000 of the EIF grant has been allocated towards furthering projects associated with the Australian SKA. One such project, through Curtin University of Technology, is the extension of MWA from its current 32-tile prototype to a full 512-tile array, such an array being capable of making a meaningful measurement of the epoch of re-ionization.

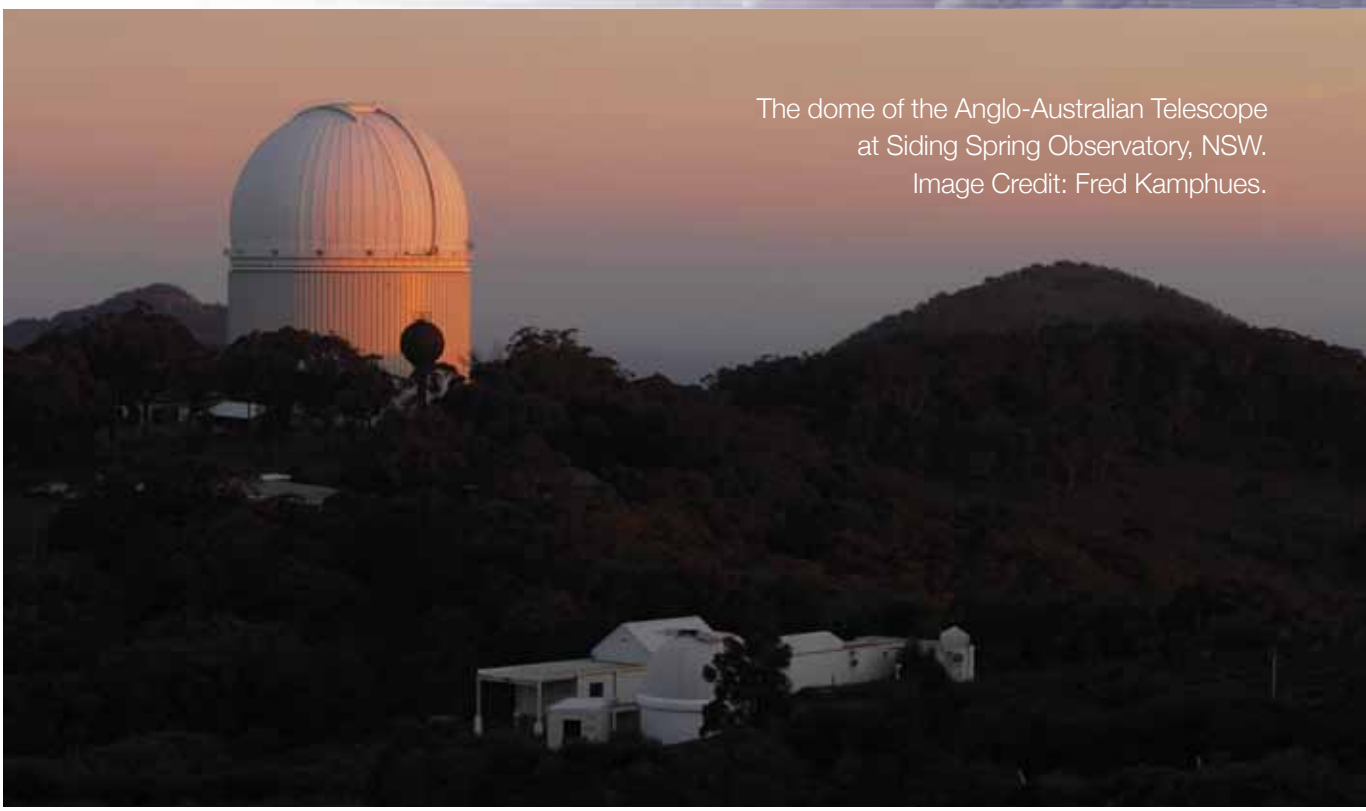
Data access and infrastructure for Astronomy EIF projects

Developing computing infrastructure, both hardware and software, was seen as an important component to the various EIF projects. $300,000 of EIF funding has been allocated to explore options for a long term data management infrastructure solution for data generated by astronomy EIF projects.



Credit: Daniel Luong-Van, Michael Ashley and the PLATO collaboration.

All-sky image taken with HRCAM (High Resolution CAMera) on PLATO at Dome A. HRCAM takes images of the sky above Dome A every few minutes for the purpose of determining the cloud cover, sky brightness, sky transparency, and aurora distribution.



The dome of the Anglo-Australian Telescope at Siding Spring Observatory, NSW. Image Credit: Fred Kamphues.

Upgrade for the Anglo-Australian Telescope

The NCRIS-funded project to refurbish the Anglo-Australian Telescope (AAT) is progressing well with a significant amount of work being carried out on the telescope and associated infrastructure.

The telescope has received new drive systems for RA, DEC, focus and Coude 5. The original direct current system was replaced with a state-of-the-art alternating current drive system. The new system comprises “duty” and “standby” systems that can be switched between in the event of a failure during the night. This has been a major step forward, as it has enabled the telescope and dome to be connected to the new emergency stop and lock-off facility.

The telescope’s original gearbox lubrication system consisted of two separate systems, both located on the telescope structure. This has been replaced with a single system lubricating both RA and DEC gearboxes and mounted off the telescope structure, thereby significantly reducing vibration transmitted to the telescope.

The telescope mirror elevator has had a new drive and control system installed. The new system will allow the elevator to rise to pre-set positions and activate a locking mechanism to enable staff to safely work from the platform while at an elevated position. The elevator drive system is also torque limited, designed to prevent damage to either the elevator or the telescope in the event of a collision.

The emergency brakes on the AAT main shutter have proven to be unreliable over the years, an issue also for the similarly designed Kitt Peak telescope in Arizona

and the Blanco telescope in Chile. A conceptual design has been developed by the AAO for a new emergency brake system, and the AAO is currently collaborating with NOAO to try to resolve this shared problem.

The AAT building has also received various upgrades to its infrastructure, including some air conditioning systems located on the third floor. These systems have been replaced and relocated to provide space for the HERMES cryogenic cooling system. The controls for the new air conditioning have also been replaced with a modern PLC (programmable logic control) system that will eventually be monitored and controlled via a building management system.

The control room has been modernized with new lighting and layout. A number of electronics racks have been rationalised and the remaining racks relocated to provide space for an area within the control room for a comfortable rest area for astronomers and staff.

As part of a long-term plan, the controls and drive system for the three lifts in the AAT building have been scheduled for replacement. The main personnel lift drive and controls were replaced in December 2009; the remaining lifts are to be upgraded in subsequent years.

Work has commenced on replacing the original standby electricity generator. This is a joint venture with the ANU and is scheduled to be completed by the end of 2010. The ANU has agreed in principle to also replace the high-voltage switchgear when funds become available.

The aluminising plant is currently going through a major overhaul, with work being done to improve the vacuum integrity of the pumping system. This has involved the replacement of “O” ring seals used throughout the roughing and backing lines in the pumping system, as well as the refurbishment of butterfly valves. Work has also started on the replacement of the unreliable pneumatic rams used for clamping the chamber door. Image credit: Steven Lee, AAO.

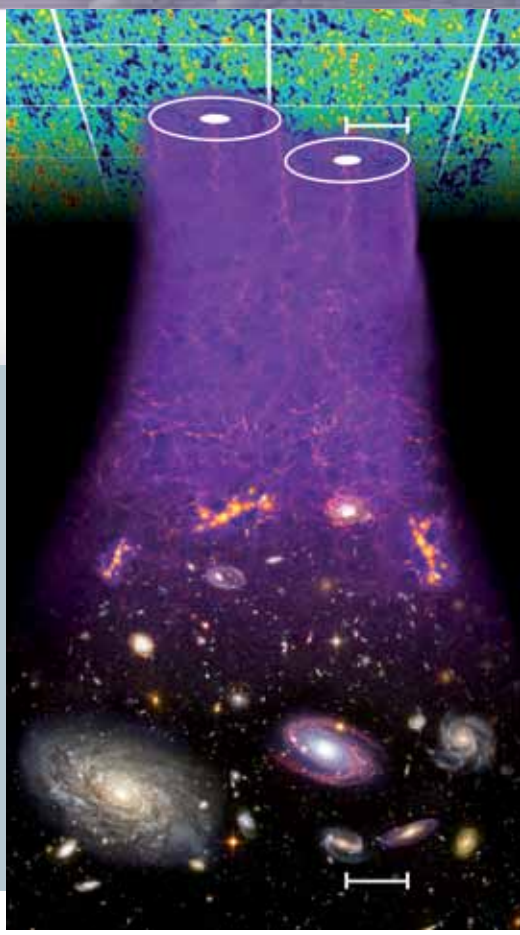
AAT Science

In semester 2010A two of the three Anglo-Australian Telescope (AAT) Large Projects concluded.

In December 2009 the WiggleZ survey project announced its first data release of 100,000 distant star-forming galaxies. The survey aims to measure the effects of the mysterious 'dark energy' during the period in which the expansion of the universe started to accelerate. To do this, the survey must detect tiny 'wiggles' in the galaxy distribution that act as a 'standard ruler' for measuring the geometry of the universe. The WiggleZ spectra were used to show that the target galaxies are mostly extreme starburst galaxies, and HST imaging shows that a large fraction are interacting or distorted systems.

Meanwhile, the GAMA (Galaxy And Mass Assembly) project obtained over 130,000 galaxy spectra, including 120,000 unique new spectra, for relatively nearby galaxies. The GAMA first data release was announced at the AAO Symposium "Celebrating the AAO" on 25 June 2010. Initial measurements of the multiwavelength and Hα luminosity functions, the galaxy stellar mass function, and dust obscuration properties of galaxies as a function of their stellar masses, are currently being prepared for publication. The GAMA project aims to continue with a second phase, in a proposal to be submitted for the coming semester, to achieve the full survey goals of 360 square degrees of coverage, and about 350,000 spectra.

The third AAT Large Project, the Anglo-Australian Planet Search (AAPS) continues to identify planets in new regions of parameter space, pushing out to more distant orbits and lower-mass planets. Over the past 12 months AAPS has published 5 papers, with highlights including the detection of a Jupiter-mass planet in a 14 year orbit around a solar-type star (Jones et al. 2010, MNRAS, 403, 1703); the detection of two Neptunes and a Super -Earth around a solar-type star (Vogt et al. 2010, ApJ, 708, 1366); and the first measurement of the frequency of low-mass exoplanets to include and account for the selection effects and observational biases inherent in Doppler velocity planet searches.



Schematic showing how baryon acoustic oscillations produced in the early universe are reflected in the galaxy distribution today.

Image credit: Swinburne Astronomy Productions, vr.swin.edu.au.

An analysis of a massive protostellar cluster using IRIS2 narrowband imaging on the AAT and Mopra radio observations of molecular gas (Barnes et al. 2010, MNRAS, 402, 73) led to the discovery of one of the largest known gravitational infall regions. This suggests that this object is one of the most massive protostellar clusters yet caught in the process of forming some of the most massive stars in our Galaxy. A press release describing this result was picked up by over 20 newspapers nationally and internationally, and led to several media interviews, including an appearance by Australian Gemini Scientist Stuart Ryder on the ABC's "Starstuff".

HERMES

The financial year 2009-10 has been busy for the HERMES project, which has continued to progress since the Configuration Design Review in June 2009. A Management Review (MR) was carried out in October 2009, AAL's funding for the 4th arm of HERMES was announced in December 2009, and the Preliminary Design Review (PDR) was performed in February 2010. The MR and PDR evaluated the progress and health of the project using external reviewers, and the project received formal review reports and responded to the issues raised by the reviewers with action plans. The end of the 2009-10 financial year sees the project progressing rapidly towards the Final Design Review (FDR) later in 2010.

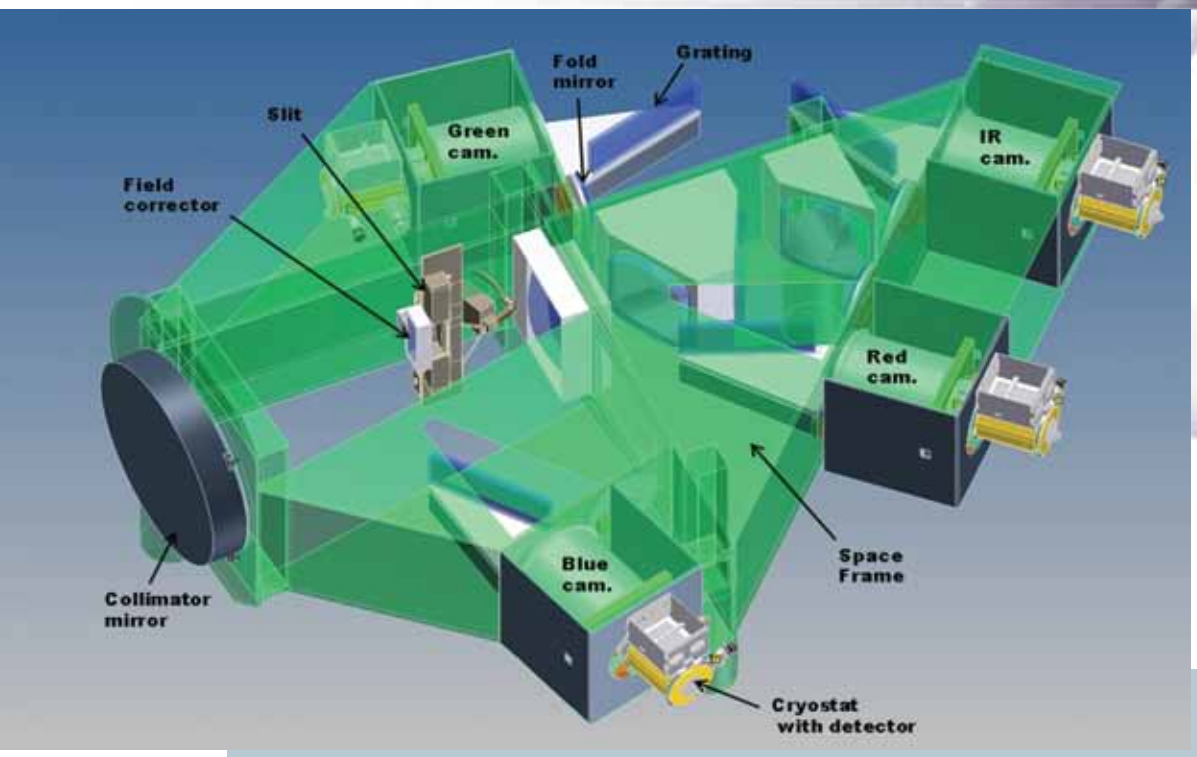
On the technical front, the HERMES science requirements were finalised and have been evolved into performance specifications for the collimator, camera optics, fold mirrors, slit, test cryostats, prototype gratings, beam splitters, CCD detectors, spectrograph base and data reduction system. All these specifications have now been reviewed. The important decision was made to proceed with the dual-fibre option for the instrument, implemented via the installation of two new fibre cables (each with 800 fibres).

Other significant milestones include the construction of an end-to-end simulation for the instrument, and the development of the Product Breakdown Structure (PBS), the Assembly, Integration and Testing (AIT) plan, and the project safety management plan. A detailed plan for the HERMES staging area at Epping was produced and approved. This staging area, ready by the end of 2010, will utilise part of the workshop space at Epping, which is being substantially re-organised and refurbished. At the AAT, a physical model for the instrument has been constructed to test the plan for the location of HERMES within the Coude area. This area will also be re-modelled appropriately, with a permanent partition wall to be erected in the Coude West room to separate AAOmega and HERMES.

A number of the major components for HERMES that have long lead times are being ordered, so as to minimise the construction time for the instrument. All parts for the test cryostat have been received. Expressions of interest and formal quotations have been received for a number of components, and the following items have been ordered: collimator, camera optics, slit lens, shutters, beam splitters, fold mirrors, CCD detectors, fibre cable and cryocoolers.

HERMES Super Science Fellowships

In 2009, DIISR introduced a new Super Science Fellowship (SSF) funding scheme, under the aegis of the Super Science Initiative. A successful SSF proposal for maximising the scientific return from the HERMES instrument was made in November2009 by a team of five researchers involved in the HERMES project – Daniel Zucker (First Investigator; Macquarie University / AAO), Kenneth Freeman (ANU), Joss Bland-Hawthorn (Sydney), John Lattanzio (Monash) and Samuel Barden (AAO).



The layout of the HERMES spectrograph, showing the four arms for the blue, green, red and near-infrared channels, with their individual volume-phase holographic gratings and beam-splitters, the large collimator mirror and the slit assembly.

Image credit: AAO

As a result, beginning in 2011, three 3-year SSF postdoctoral positions will be hosted at Macquarie University, filling roles essential for HERMES operations:

- design and testing of an automated data reduction and analysis pipeline;
- development of a target catalogue for the planned million-star HERMES Galactic Archaeology survey, and determination of initial stellar parameters, using photometric data from the SkyMapper survey;
- design and execution of a HERMES Magellanic Clouds survey.

In addition to laying the groundwork for observing with HERMES, the three Super Science Fellows will forge strong collaborative links between the five partner institutions in the area of Galactic Archaeology – a rapidly-growing field in the astronomical communities of Europe and North America – and thereby establish a powerful Australian research network for studying the structure and history of the Milky Way and its stellar populations.

HERMES Science

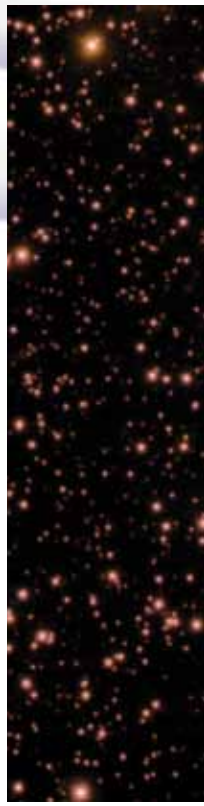
The primary science driver for HERMES is the million-star Galactic Archaeology Survey. The stars of our Galaxy contain within themselves vast amounts of fossil information on its formation and evolutionary history. The goal of Galactic Archaeology (Freeman & Bland-Hawthorn. 2002, ARAA, 40, 487) is to unravel this fossil information in order to reconstruct the lost substructures of the protogalaxy, thereby obtaining a detailed physical picture of the formation of the Galaxy. Such chemical and dynamical fossil stellar substructures are signposts to an array of evolutionary events, from in-falling satellites and dissolving stellar aggregates to effects of spiral arm resonances. Disentangling their relative contribution is fundamental for developing a physical sequence of events that led to the Milky Way, and other large spiral galaxies.

HERMES provides an extraordinary and unprecedented opportunity to undertake such a large-scale one million star survey. This multi-year observational program will obtain detailed elemental abundances and precise radial velocities for each targeted star. Elemental abundances representing the main nucleogenesis processes in both dwarf and giant stars will allow chemical tagging (De Silva et al. 2007, AJ, 133, 1161) of the individual stars to their original formation event, and accurate velocities will permit differentiation of stars by their dynamics. The resulting data sets will yield a comprehensive view of the formation and evolution of the Galactic disk, enabling the reconstruction of the original stellar building blocks and address the following basic questions:

- What were the conditions of star formation during the assembly of the Galaxy?
- When, where and what drove the major episodes of star formation in the disk?
- To what extent is the Galactic disk composed of stars from merger events?
- Under what conditions and in what systems did the accreted stars form?
- How have stars that formed together in the disk evolved dynamically since?
- Where are the solar siblings that formed together with our Sun?

HERMES will also present a tremendous opportunity for scientific synergies with the European Space Agency's Gaia mission. Gaia is □500 million astrometric satellite scheduled for launch by 2012 that will measure precise distances and tangental motions for most HERMES Galactic archaeology survey stars. Precise distances from Gaia will yield accurate ages for a significant fraction of those stars, which will allow direct determination of the evolution of elemental abundances with time in the disk of the Milky Way, as well as providing critical information for studies of stellar astrophysics. Transverse velocities, in conjunction with the radial velocities measured by HERMES, will give a complete picture of the stars' space motions, and hence identify spatially-mixed stars with a common origin through their similar dynamics. The combination of HERMES abundances and radial velocities with Gaia astrometry will provide a truly extraordinary legacy for unravelling the history of the Galaxy. A HERMES science workshop is scheduled for September 2010.

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. ANSOC funding has enabled the continuation of an agreement through until July 2011 with the Carnegie Institution for Science to purchase 15 nights per year on the twin 6.5 metre Magellan telescopes at the Las Campanas Observatory in Chile that provide complementary instrumentation to Gemini; this is partly paid for by the provision of two Magellan Fellows seconded from the AAO to Las Campanas Observatory.

The Australian Gemini Office (AusGO), operated by the AAO under contract to AAL supports Australia's use 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 on how to reduce and analyse new and archival data; and helping promote Australian science from Gemini and Magellan to the media and general public.

AusGO now comprises seven 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 four Magellan Fellows. New fellows Dr Francesco Di Mille and Dr Shane Walsh are based in Chile, and 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. They replaced Dr David Floyd and Dr Ricardo Covarrubias, who are now spending the third year of their Fellowships at their Australian host institutions (University of Melbourne and AAO, respectively).

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. AusGO also runs an annual 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.

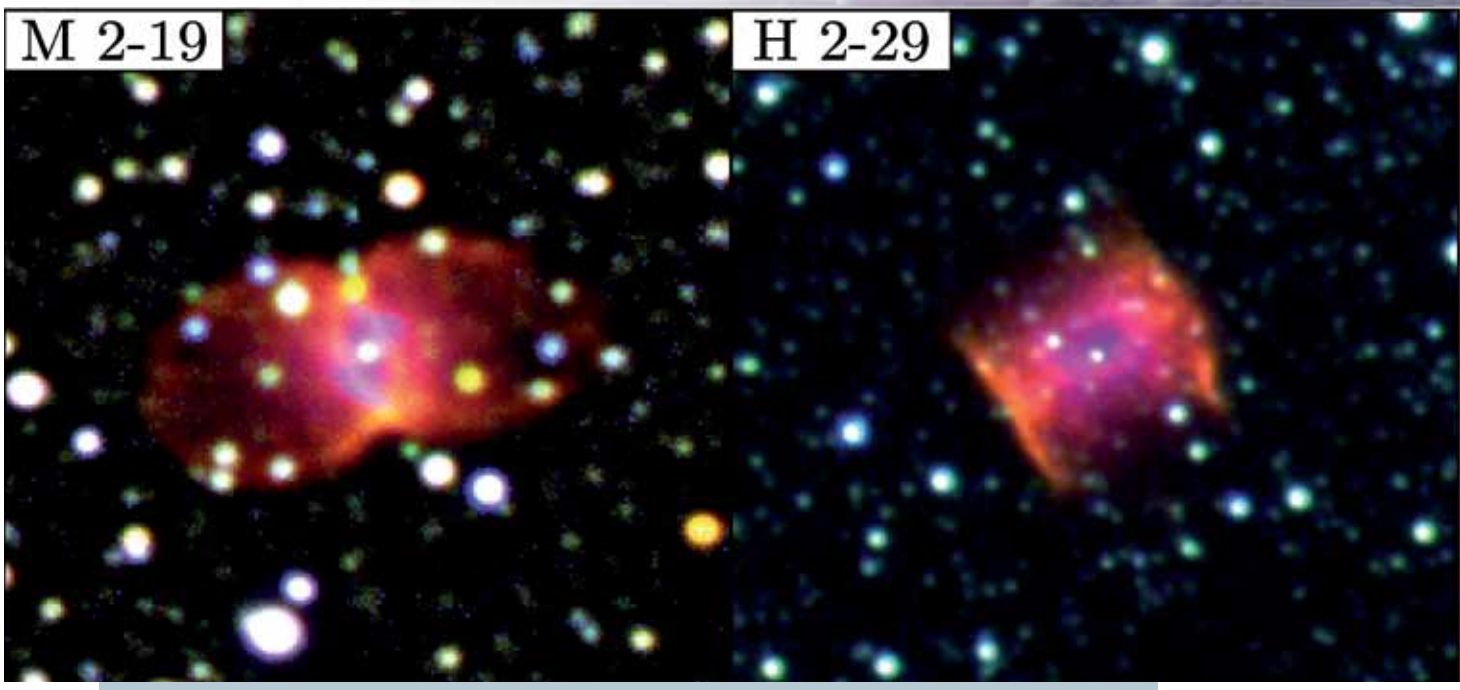
The winner of the 2009 International Year of Astronomy Gemini School Astronomy Contest, PAL College Year 10 student Daniel Tran, proposed this planetary nebula NGC 6751, nicknamed the "Glowing Eye". This is a composite of images taken in three optical narrow-band filters, which isolated the H-alpha (yellow), [S II] (red), and [O III] (blue) emission lines, as captured with the Gemini Multi-Object Spectrograph (GMOS) on the night of 24 July 2009.

Image credit: Daniel Tran (PAL College), Travis Rector (U. Alaska, Anchorage), Terry Bridges (Queen's University), and the Australian Gemini Office.

Instrumentation

Australia plays a key role in providing state-of-the-art instrumentation for the Gemini telescopes. The Near-infrared Integral Field Spectrograph (NIFS) instrument is routinely used with both the natural and the laser guide star adaptive optics systems on Gemini North to dissect the cores of active galactic nuclei, track jets spurting from newborn stars, and see the assembly of galaxies in the early Universe. The long-awaited delivery in early-2010 of the 50 W laser system needed to drive the rest of the multi-conjugate adaptive optics system on Gemini South means that commissioning of the Gemini South Adaptive Optics Imager (GSAOI) can finally get underway. Both GSAOI and NIFS were designed and built by RSAA at ANU.

The AAO, in partnership with several Australian universities, was successful in its bid for a LIEF grant to construct an OH-suppressing J band fibre-feed (GNOSIS) for the IRIS2 spectrograph on the AAT. Once successfully demonstrated on the AAT, LIEF funding for phase 2 of GNOSIS will be sought, to deliver a J+H band OH-suppressing fibre-feed for the refurbished GNIRS spectrograph on Gemini North.



Gemini GMOS colour-composite images of the binary central star planetary nebulae M 2-19 and H 2-29 made from H-alpha +[N II] (red), [S II] (green) and [O III] (blue) filters, revealing bipolar nebulae with equatorial rings.

Image credit: Brent Miszalski, AAO.

Gemini Science Highlight

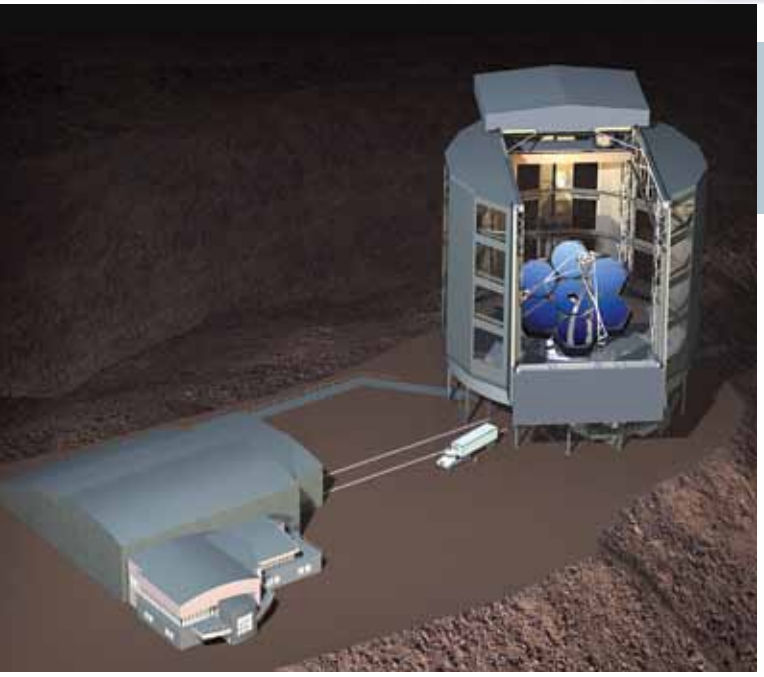
It has long been hypothesised that a companion star orbiting a hot white dwarf star may be responsible for shaping bipolar ("butterfly") planetary nebulae during a common envelope phase when both stars share gas back and forth. Macquarie University PhD student Brent Miszalski (now a postdoctoral researcher at the University of Hertfordshire) and collaborators obtained narrow-band imaging with GMOS on Gemini South of a sample of planetary nebulae whose central stars showed evidence for periodic variability, consistent with being binary systems (Miszalski et al. 2009, A&A, 505, 249). They found that between 30% and 60% of these systems have bipolar nebulae (depending on the viewing geometry assumed), the strongest evidence yet linking a common envelope in the central star system to the nebula morphology. Interestingly, the main focus of Miszalski's GMOS program was spectroscopy of the central star system, but he was able to make good scientific use of the images obtained as part of the acquisition process.

Magellan Science Highlight

As more and more extrasolar planets are discovered, it has been found that the likelihood of a star hosting giant planets increases with the abundance of heavier elements in the star's atmosphere. ANU astronomer Jorge Meléndez (now at U. Porto) and collaborators used the MIKE high-resolution optical spectrograph on the Clay 6.5 metre Magellan telescope to compare spectra of the Sun (reflected from the asteroid Vesta) with 10 solar analogs (dwarf stars with spectral type G0–G5) and 11 solar "twins" (stars with physical parameters identical to the Sun). The Sun appears to be depleted in refractory elements relative to the solar twins and to solar analogs known to have giant planets from radial velocity surveys, and is in fact more similar to the solar analogs found not to have giant planets. This suggests that dust condensation may influence the formation of terrestrial planets (Meléndez et al. 2009, ApJ, 704, L66). One exciting consequence of this is that it may be possible to infer the existence of terrestrial-mass planets on the basis of stellar abundance measurements alone.

Australian Magellan Fellow Dr Ricardo Covarrubias standing in front of the primary mirror of one of the Magellan 6.5-metre telescopes at Las Campanas Observatory in Chile. After 2½ years of supporting visiting Magellan observers, Dr Covarrubias has now relocated to the AAO for his final research year.

Image credit:
Ricardo Covarrubias, AAO.



Artist's impression of the GMT.
Image credit: Giant Magellan Telescope - GMTO Corporation.

Giant Magellan Telescope

The Giant Magellan Telescope (GMT) Project is an international effort to design and build a next-generation optical telescope capable of exploring currently unanswered questions such as the nature of dark matter and dark energy, the origin of the first stars and first galaxies, and the mysteries of star formation. To be located at Las Campanas, Chile and spanning 25 metres with seven 8.4 metre mirrors, the GMT will be larger and more powerful than any previous optical telescope.

The Giant Magellan Telescope Organization (GMTO) headquartered in Pasadena, California, USA, is a nonprofit organisation founded to design, build and operate the GMT on behalf of an international partnership (US, Australia and South Korea) that includes Astronomy Australia Ltd and the Australian National University. A Founders Agreement was signed by a representative of each of the GMT partners to establish the GMTO Corporation on 20 March 2009.

The GMT project is well into its design development phase with a planned Preliminary Design Review (PDR) in April 2012. Conceptual design studies are underway for six potential first generation instruments and, in parallel, work is going on towards the design of a facility fiber optics system. The first primary mirror segment will be completed in November 2010 and the glass for the second primary mirror segment has been ordered. The construction phase will start in April 2012 and the commissioning of the GMT is planned to start in 2018.

Australian News

In 2009/10 ANU was awarded an Education Investment Fund (EIF) grant towards funding the construction of the GMT. The EIF funding enables both the ANU and AAL to realise their goals of 5% shares in the project and also provides funding for the Australian GMT Project Office, in kind contributions to scientific instrumentation and the development of the second stage of the Advanced Instrumentation and Technology Centre at Mt Stromlo Observatory.

The GMTIFS (GMT Integral Field Spectrograph) instrument from the ANU has been chosen as one of six GMT instruments for which conceptual design studies are being undertaken. GMTIFS will be used with GMT's Laser Tomography Adaptive Optics system, and will address most of the adaptive optics science cases for GMT. The primary instrument is an adaptive-optics-corrected near-infrared integral-field spectrograph. ANU will also participate with the University of Arizona to undertake an Adaptive Optics (AO) Concept

The proposed adaptive secondary mirror for the GMT, the same design as used on the Large Binocular Telescope (LBT). This image is of the LBT's mirror during its installation in the Arcetri lab showing the 672 tiny magnets spread over the back of the mirror. The reflecting face of the mirror is face down. The upper portion contains the electro-mechanical devices that control the magnets.

Image credit: R. Cerisola.

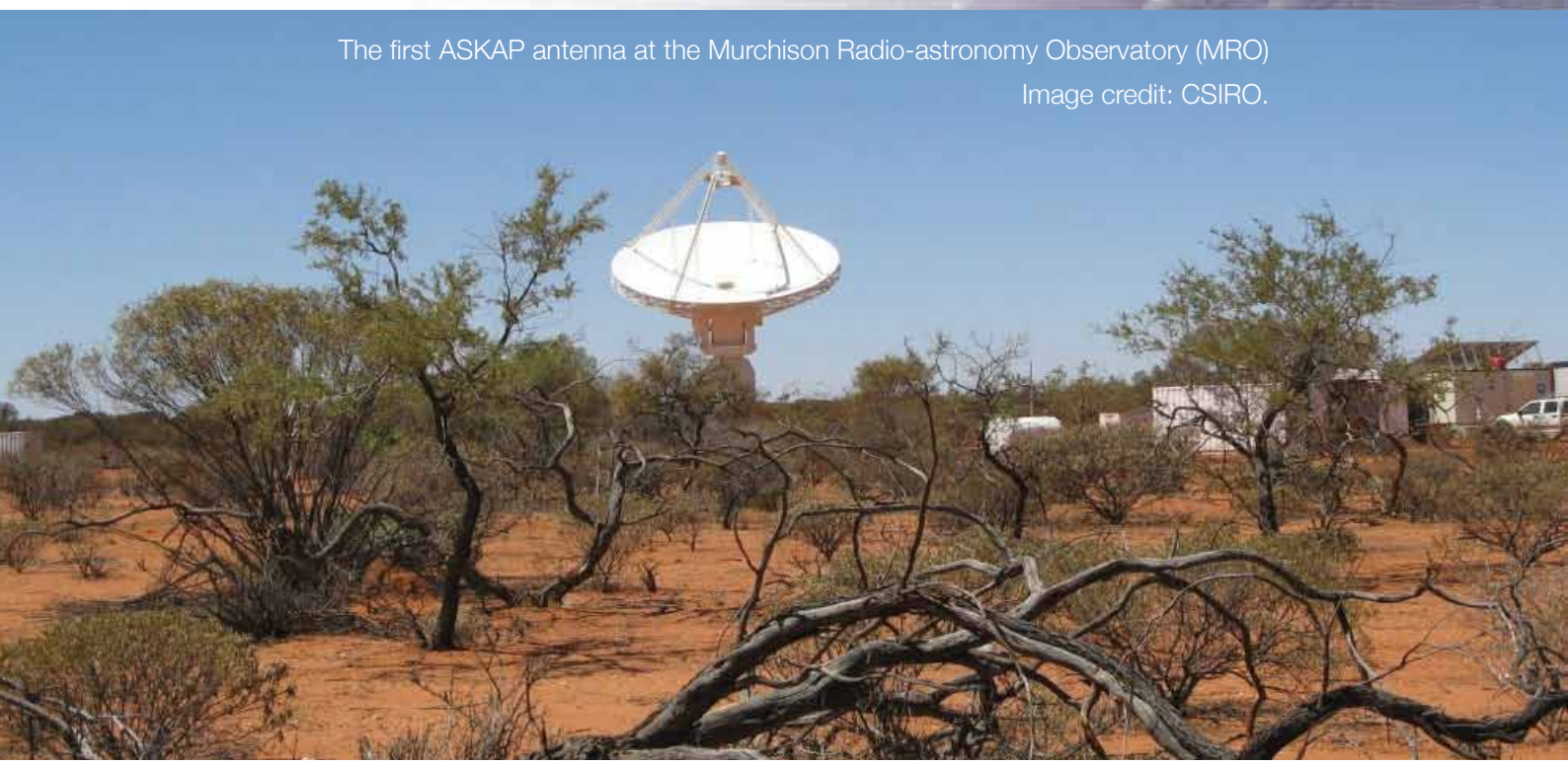
Design Study that includes a large Adaptive Secondary Mirror. A joint project was started between the ANU and EOS Australia to build an AO demonstrator at Mt Stromlo.
A facility for the telescope recommended for further development is the AAO proposed MANIFEST (MANy-Instrument FibrE SysTem). MANIFEST is a general-purpose fibre-positioning system to feed GMT instruments such as GMACS (the proposed optical imaging spectrograph), NIRMOS (the proposed near-infrared imaging spectrograph) and G-Clef (high resolution optical spectrograph). MANIFEST allows the spectrographs to observe more objects (because the spectra can be efficiently packed together), over a wider field (the full GMT 20' field of view). Together, these at least double the speed of GMT for survey spectroscopy, making it the fastest of the proposed ELTs.

The instrument concept design studies are to be completed by June 2011 to be in line with the planned Instrument Concept Design Review (CoDR) in Sept 2011 and the down-selection of instruments prior to the CoDR.

In June 2010 AAL organised a workshop at Swinburne University of Technology with around 80 attendees from Australia and overseas. The aim of the workshop was to explore the key technical challenges for the GMT and the related science. Of particular focus was active and adaptive optics, high contrast imaging, and exploiting the full field of view of the telescope. The meeting was jointly sponsored by DIISR, the AAO, ANU and AAL.

Delegates at the "Challenges for the GMT" Meeting at Swinburne University of Technology.

Image credit: Peter Buchholz.



The first ASKAP antenna at the Murchison Radio-astronomy Observatory (MRO)
Image credit: CSIRO.

Australian SKA Pathfinder

Construction of CSIRO's Australian Square Kilometre Array Pathfinder (ASKAP) radio telescope is on track in Western Australia and technical developments continue to make good progress.

The first of 36 identical 12-metre antennas that will make up ASKAP was assembled over the Australian summer (Jan 2010) at the Murchison Radio-astronomy Observatory (MRO) in the Mid West region of Western Australia. The next five antenna foundations are in place and the antennas are expected to be operational later this year.

By April 2010, the first ASKAP antenna was linked to existing CSIRO antennas in NSW and a new antenna in New Zealand, linking up over a distance of 5500 km for the first time. The linked telescope was used to peer into the heart of the Centaurus A galaxy, 14 million light-years away (see cover image).

The link-up was collaboration between CSIRO's Astronomy and Space Science division, the International Centre for Radio Astronomy Research (ICRAR) at Curtin University of Technology in Western Australia, and AUT University in New Zealand.

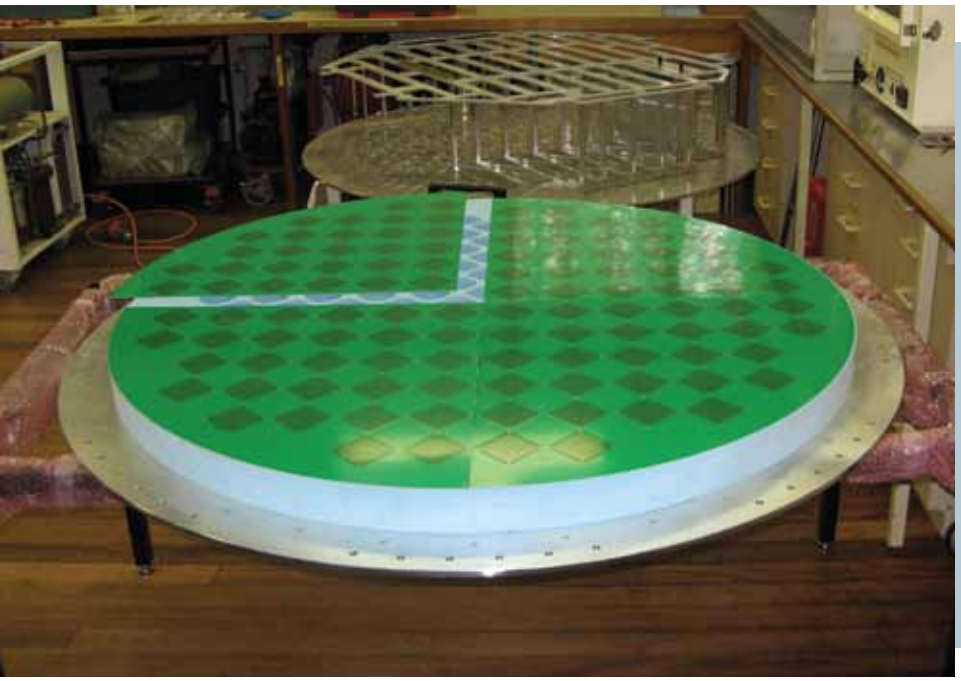
Lurking in the Centaurus A galaxy is a black hole that shoots out jets of radio-emitting particles at close to the speed of light. The galaxy was observed for 10 hours with the resulting data recorded and analysed by ICRAR to make an image.

The resolution of the new image of Centaurus A is 100,000 times higher than that of a ground-breaking radio image made by CSIRO last year, which is itself the most detailed image ever made of the whole galaxy.

Showing Australia and New Zealand can link telescopes this way strengthens the two countries' joint bid to host the future international Square Kilometre Array (SKA) telescope. The giant $2.5 billion SKA will have several thousand antennas, up to 5500 km apart, working together as one telescope.

The ASKAP phased array feed (or "radio camera") is currently being developed at CSIRO and the next prototype will be tested this winter at the Parkes Test Facility (where CSIRO Astronomy and Space Science operates the Parkes 64-metre antenna). The first pre-production units will be built to be included on the first 6 antennas at the MRO and operated as an early engineering and science array beginning early 2011. Phased array feeds from CSIRO's collaborators in the Netherlands at ASTRON will also be included in order to test different technologies directly and to achieve a "community-best" radio camera for ASKAP and the SKA.

Construction of ASKAP's remaining antennas will proceed quickly with the complete ASKAP system expected to be finished by 2013. Once built, ASKAP will be operated by CSIRO as part of the Australia Telescope National Facility.



Test assembly for the ASKAP pre-production phased array feeds. The "checkerboard" in the front are the antenna receiver elements (and give the array its moniker), while the assembly behind it is the phased array feed card-cage assembly for the receiver cards. The diameter is about 1 metre.

Image credit: CSIRO.

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 Radio-astronomy Observatory (MRO) in Western Australia. The MWA has been officially been designated as an SKA Precursor (an SKA Pathfinder on one of the two candidate sites). As 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. The MRO was chosen due to the very low levels of Radio Frequency Interference (RFI) affecting the site.

Primary science goals of the MWA are investigations of the Epoch of Reionisation (EoR), Solar, Heliospheric and Ionospheric (SHI) phenomena, transient radio sources and Galactic and Extragalactic (GEG) 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 such as DIISR, the Australian Research Council (ARC) and US National Science Foundation. In Australia, funding has been secured via NCRIS, the Education Investment Fund (EIF), ARC Super Science Fellowships, the Australia India Strategic Research Fund (AISRF) and the ARC Centres of Excellence (CoE) program.

NCRIS and EIF funds, augmented with funds from the US, are to support extension of the prototype 32-tile system to the intended final 512-tile configuration and commissioning of the instrument into operations.

Progress during 2009/2010

Over the past 12 months MWA has seen significant progress and a number of successes. During that time, development of the prototype 32-tile (each tile being a four-by-four regular grid of dual polarization dipole elements) instrument was completed, including development, integration testing and deployment of the 32 antennas, four receivers, field programmable gate array-based correlator, monitor and control system and the real-time imaging and calibration system. Following this the system was successfully demonstrated during the project's Test and Verification Programme between December 2009 and January 2010. This demonstration represented a major milestone for MWA, involving many project staff, often in arduous conditions during the Australian summer. Completion of this work principally concluded Phase 1 as defined in the MWA Project Plan, which was achieved through a great deal of hard work by MWA team members.

A second significant milestone was also achieved when MWA submitted a revised and Board-approved Project Management Plan (PMP) to both AAL and the National Science Foundation (NSF) – a plan, in part, detailing realisation of the full 512-tile array.

Building on the above successes, Australian funds for extending the MWA to a 512-tile system have been allocated via the Australian Government's EIF program – administered by AAL. EIF funds add to NCRIS funds already allocated to MWA, as well as new funding provided via an International Centre for Radio Astronomy Research (ICRAR) project – an initiative of the Government of Western Australia. Additional successes include the award of the Australia-India Strategic Research Fund (AISRF) and a number of Super Science Fellowships through Curtin University and the University of Melbourne. Recently an Australian Research Council Centre of Excellence for All-sky Astrophysics (CAASTRO) was awarded to The University of Sydney, and partners. The CoE budget provides for some support of the MWA project.

During this same period, two new members of the project management team were appointed, namely, Project Manager, Wayne Arcus (ICRAR) and the Project Engineer, Robert Goeke (MIT).

The MWA project team has now embarked on Phase 2 of the project, construction of the full 512-antenna array, using the valuable experience gained with the 32-tile prototype. Activities to date include, but are not limited to, completion of the field-prototype receiver enclosure design and its advanced state of construction, planning MRO site infrastructure upgrades and engagement of subcontractors, ongoing supporting field-trips and conduct of requirements capture and design review workshops as necessary pertaining to the 512-tile design changes.

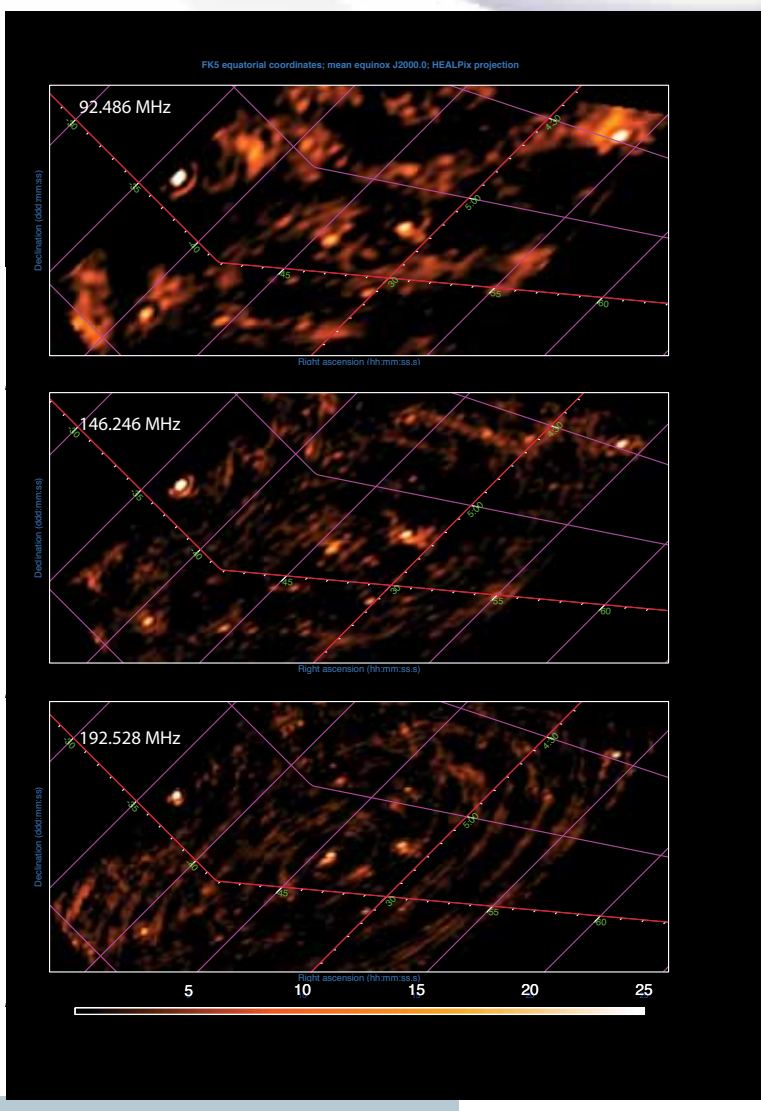
MWA continues to work closely with its CSIRO colleagues and consortium members to understand various inter-project dependencies, MRO RFI monitoring program impacts and facilities interfaces and support, amongst others.

During this period, a Statement of Intent (SoI) and a Statement of Collaboration (SoC) have been completed and executed at all MWA partner organisations. The SoI and SoC guide the governance of the MWA project.

Technical Challenges

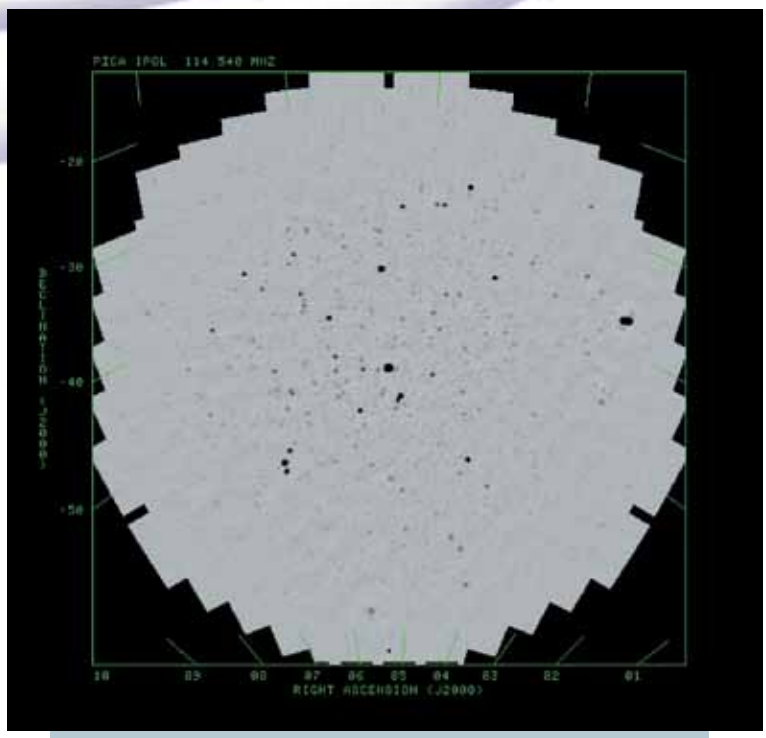
There are many technical challenges in a project the size and complexity of the MWA along with logistical challenges in deploying to a location as remote as the MRO although much technical risk has since been retired as a result of Phase 1 outcomes.

A number of the bigger technical challenges stem from handling the inherent data volumes from such a large antenna array in real time and the design considerations and system trade-offs that need to be considered. Throughput performance of the various subsystems in the data pipeline is demanding, including the processing and storage requirements of the RTC/RTS subsystem and ultimately the distribution of the resulting data off-site. Data rates of up to approximately 7 Gbytes per second are expected for the 512-tile configuration. Related challenges also include scaling up of the correlator capacity to suit the data throughput requirements.



An image, integrated for six hours, of a field containing the very bright radio source Pictor A. The Pictor A signal has been removed by the MWA's real-time imaging and calibration system that has a cadence of eight seconds, leaving visible the signals from the weaker radio sources in the field.

Image Credit: Ord, Mitchell and Bernardi (Harvard-Smithsonian Centre for Astrophysics).



A full field of view image from the Murchison Widefield Array, spanning 30 deg x 30 deg on the sky. The field is centred on the bright radio galaxy Pictor A and reveals many faint radio sources that have been cross-identified with other surveys. The image was produced from the 32 antenna MWA prototype with a bandwidth of 32 MHz centred on 114 MHz, using image facets in the AIPS data reduction package.

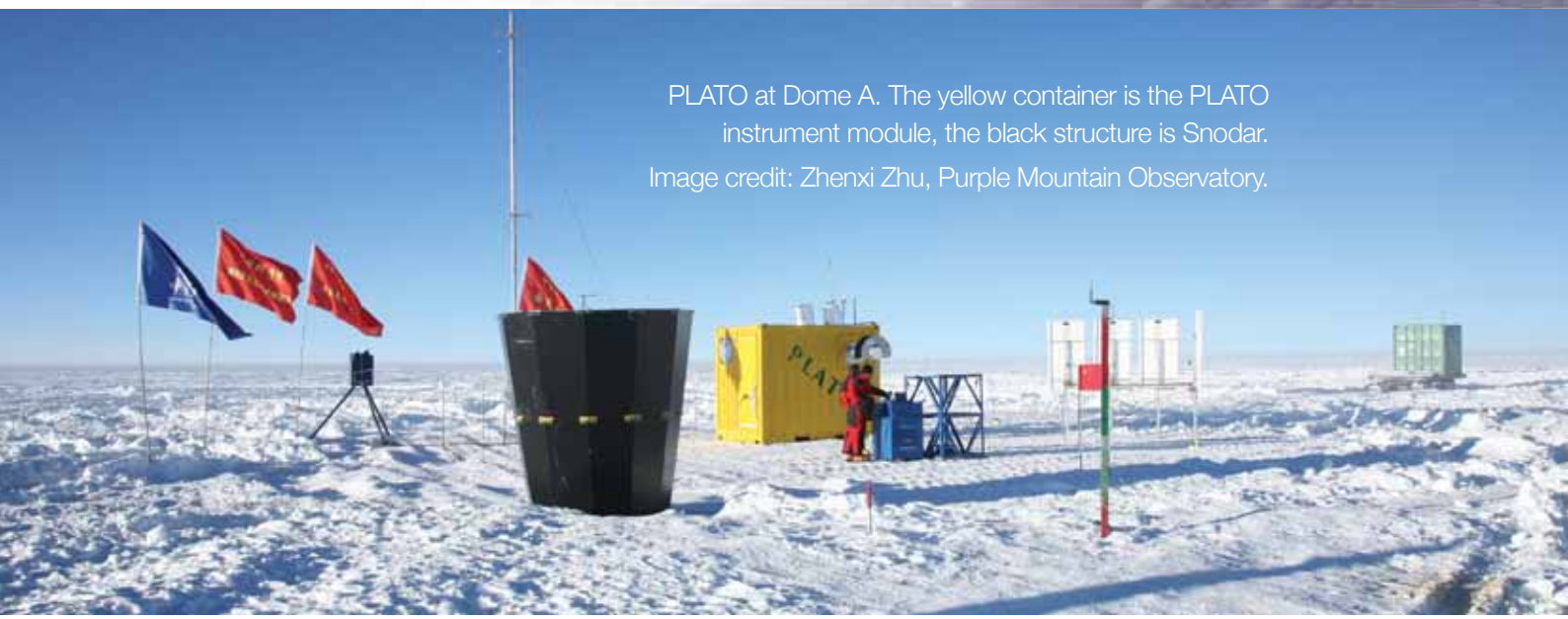
Image credit: Professor Frank Briggs (ANU) and the MWA Team.

MWA Science Highlight

During the Test and Verification Programme a wealth of useful data were collected from the prototype 32-tile system and the science teams continue to be busy reducing and exploring the resultant data sets.

During the recent project meeting in Sydney a 32-tile system image was presented depicting the full field-of-view image from the MWA 32-tile system on the sky showing the bright radio-galaxy Pictor A. This is only one of many such interesting data products generated to date and demonstrates that the overall MWA system performs well and reproduces the radio sky accurately at this level. This result, and others, gives high confidence that the hardware and software systems employed in the 32-tile configuration are a good basis on which to extend the system to 512-tiles.

Additional datasets obtained from the 32-tile system that capture solar activity are being prepared for publication. Over the next 12 months the MWA team expects to realise several publications based on 32-tile data.



PLATO at Dome A. The yellow container is the PLATO instrument module, the black structure is Snodar.
Image credit: Zhenxi Zhu, Purple Mountain Observatory.

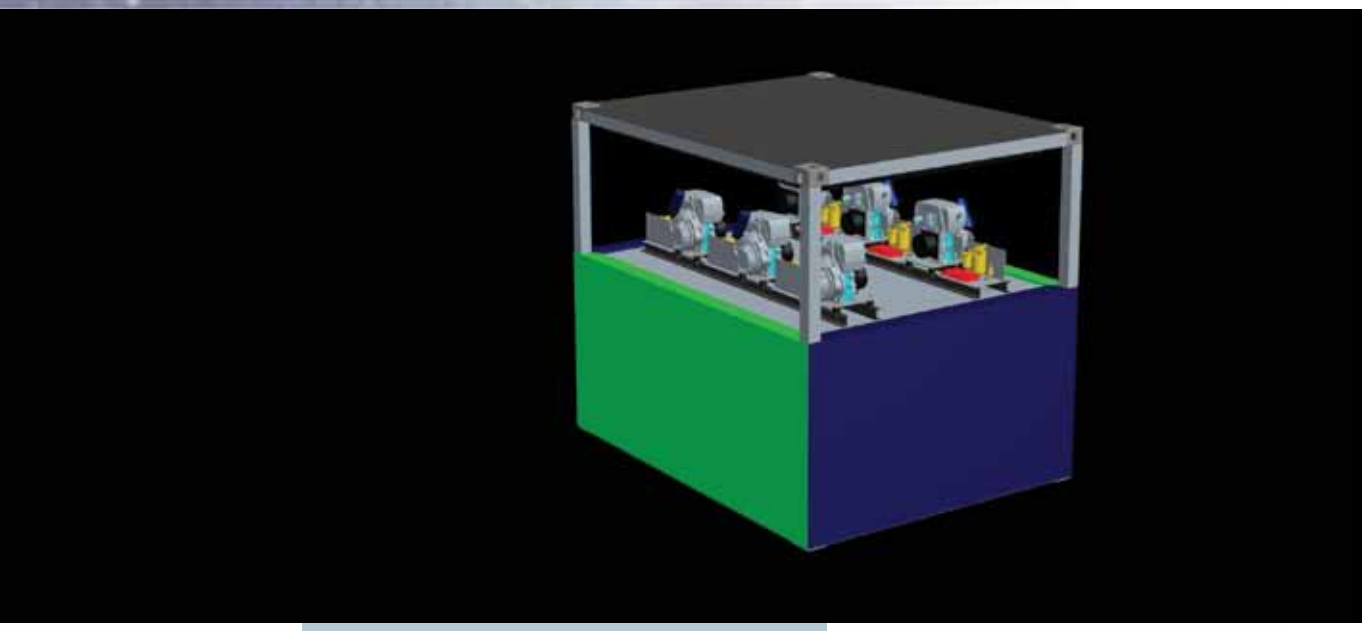
Antarctic Site Testing

PLATO (PLATeau Observatory) is a University of New South Wales designed and manufactured robotic astronomical observatory for Antarctica. The first PLATO was deployed in 2008 by the Polar Research Institute of China (PRIC) and the Chinese Academy of Sciences. It is designed to support scientific instruments for astronomy and atmospheric site testing on the highest point on the Antarctic Plateau, Dome A (4093m).

PLATO supplies heat, power and computer control for its scientific instruments, and also provides a satellite communications link. It is designed to run unattended for periods of up to one year, and consists of two separate modules.

The instrument module contains the core control, communication, computing and power conversion electronics for PLATO. Each instrument is provided with its own customisable power, communication, and thermal control.

The engine module provides up to 1kW of power to supplement solar arrays during summer and is the primary power source between April and August when the sun is below the horizon at Dome A. The module contains six diesel engines, four thousand litres of Jet-A1 fuel, and power management and control electronics. The module is heavily insulated with 200mm thick polyurethane foam panels, enabling it to maintain internal temperatures up to 80°C above ambient using only the waste heat from the engines.



CAD drawing of the new PLATO engine module, showing the six diesel engines.
Image credit: Campbell McLaren, UNSW.

Progress during 2010

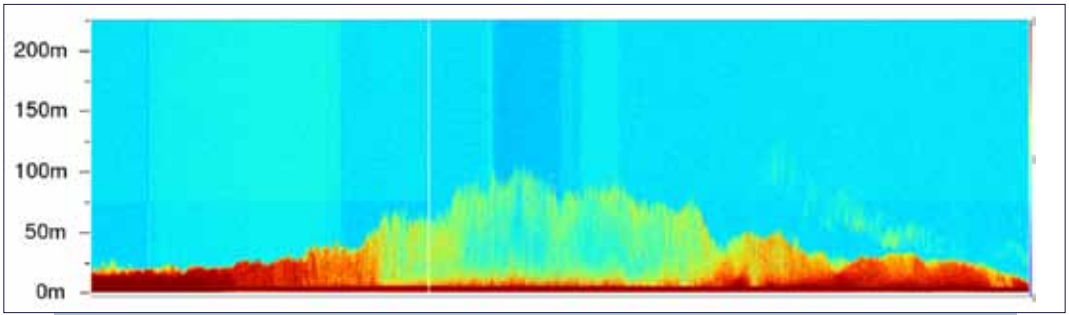
Other potential plateau observatory sites in Antarctica include the French/Italian station at Dome C, the Japanese station at Dome F, and Ridge A, a remote site yet to be traversed. NCRIS funding will allow the PLATO at Dome A to be replaced by an upgraded model, and a new PLATO to be deployed by the Japanese National Institute of Polar Research to Dome F.

Japanese astronomers visited UNSW twice in the first half of 2010 to coordinate the design of PLATO-F. A Japanese PhD student was also seconded to UNSW for two months to work on the construction of a new Snodar for Dome F.

The new PLATOs will use a stainless steel frame and removable fiberglass/foam sandwich panels, creating a much lighter structure than the shipping container construction used in the original PLATO. The 6,000 litres of fuel will be contained in a light, flexible bladder. This will particularly important for the Dome F deployment, as each component will need to be lifted from the ship by helicopter when it arrives at the Antarctic coast.

PLATO Science Highlight

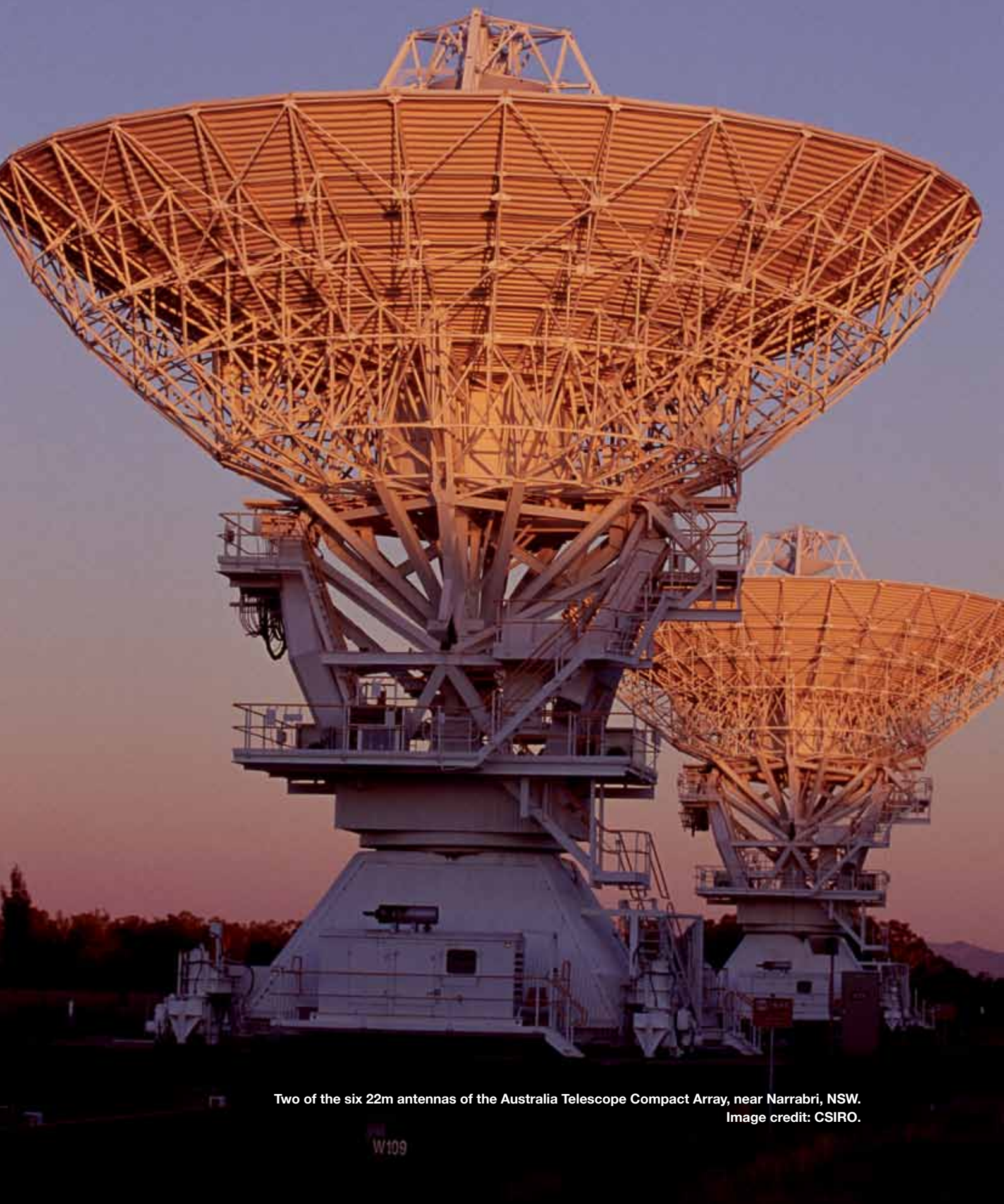
The instruments supported by the existing PLATO have already shown that Dome A will be an exceptional site for both optical/infrared and terahertz astronomical observations. For example, the Chinese “CSTAR” instrument on PLATO has produced the first detailed catalogue of the time variation of stars in a 4.5 degree field around the South Celestial Pole. The US “PreHEAT” instrument found that the atmosphere above Dome A, when viewed at sub-millimetre wavelengths, is the driest and clearest on Earth. And an Australian-New Zealand instrument, “Snodar”, has measured the height of the atmosphere’s turbulent boundary layer above the ground at Dome A, finding it to be just a few metres thick. With a median height of only 13.9 metres, the boundary layer is much thinner than that anywhere else on earth (it is typically hundreds of metres thick at temperate sites). This means that only a small tower is needed to place a future telescope into the free atmosphere, where it can enjoy unparalleled seeing conditions.



The boundary layer at Dome A over a 24 hour period in summer, showing how the heat from the sun causes the layer to “blow up” in the middle of the day. During the long, dark winter the turbulence collapses down to form the thin but intense layer seen at the beginning and ends of the plot.

Image credit: Colin Bonner, UNSW.

Directors' Report and Financial Statements



Two of the six 22m antennas of the Australia Telescope Compact Array, near Narrabri, NSW.
Image credit: CSIRO.

10 Directors' report and financial statements

Directors' Report

Astronomy Australia Limited

A.B.N 19 124 973 584

Your directors present this report on the company for the financial year ended 30 June 2010. Astronomy Australia is a company limited by guarantee and is an income tax exempt charitable institution.

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 (retired 5th November 2009)
Prof. Brian P. Schmidt
Prof. Michael N. Barber (retired 5th November 2009)
Dr. David M. Warren (appointed 5th July 2007)
Prof. Jeremy R. Mould (appointed 30th September 2008)
Emeritus Prof. Mark S. Wainwright AM (appointed 5th November 2009)
Prof. Brian J. Boyle (appointed 5th November 2009)

The above 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 $352,117 (2009 loss of - $592,596).

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 agreements with the Commonwealth of Australia, Department of Innovation, Industry, Science and Research (DIISR), for the receipt of funds over five years to 2011 to enable the implementation of an investment plan for the National Collaborative Research Infrastructure Strategy Capability (NCRIS), known as Radio

and Optical Astronomy. This NCRIS funding has now been extended to June 2013 with the Education Investment Fund (EIF) Grant.

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:
Dr Cole has served on astronomy committees for more than 10 years and is an ASA member. He chaired the Australian Astronomy Board of Management, Co-chaired the Australian SKA Consortium, and is foundation Chair of AAL. As a member of the Prime Minister's Science, Engineering & Innovation Council 1999-2007, he chaired the PMSEIC Working Group on Astronomy, the output of which proved a vital step towards Australian participation in the Square Kilometre Array (currently as ASKAP) and ELT (now GMT). On PMSEIC he gained valuable insight on the setting of national research priorities and how to influence funding. He is also a member of the ASKAP Science and Technology Advisory Group (STAG).

Dr Cole served on the National Council of Engineers Australia (EA) for 21 years, becoming National President in 2000 and 2001 after holding six successive portfolios as a National Vice (or Deputy) President (EA has 80,000 members). He was also Chairman Victoria Division 1990, and was founding National President of the Society of Fire Safety 1994-99.

Currently he is Managing Director of Cole Innovation & Design Pty. Ltd. and its subsidiary imRAC Pty. Ltd. Upon graduation he had founded IEI Pty. Ltd. in Melbourne, 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, with sales offices in UK, USA, NZ and around Australia. He has invented and patented many electronic 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 at Boeing, CERN and NASA. His pioneering of this field was recognized by a Clunies-Ross National Science & Technology Award. More 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.

He was awarded the Australian Centenary Medal for service to society and engineering.

Special Responsibilities:

Chair	AAL Board of Directors
Member	Executive Remuneration Committee
Member	Audit & Risk Management 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:
Prof. Couch has a research career spanning 30 years in optical astronomy, 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.)

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).

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.

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	Australian Giant Magellan Telescope Advisory Committee
Member	Gemini Finance Committee
Member	Optical Telescopes Advisory Committee
Member	Executive Remuneration Committee (2009)

Directors' Report

Information on Directors

Prof. Elaine M. Sadler
(Non Executive Director) - Retired 5th November 2009

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

Experience:
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.

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.

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.

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:

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:
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.

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 of the Murchison Widefield Array, has served as the Chair of the ATNF Time assignment committee, and as a member of the ASKAP Survey Science Proposal Committee.

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.

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.

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	Nomination Committee (for 2009 AGM)
Member	High Performance Computing Working Group
Member	European Southern Observatory Working Group
Member	Executive Remuneration Committee

Directors' Report

Information on Directors

Prof. Michael N. Barber
(Non Executive Director) - Retired 5th November 2009

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

Experience:
Prof. Michael Barber brings to the Board extensive experience. 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.

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.

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:

Directors' Report

Information on Directors

Dr. David M. Warren (Non Executive Director)

Qualifications:
Bachelor of Science with Honours
HonsDSc

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 Committee (2009)
Member	Antarctic Astronomy Advisory Committee

Directors' Report

Information on Directors

Prof. Jeremy R. Mould (Non Executive Director)

Qualifications:
Bachelor of Science with Honours
Doctor of Philosophy

Experience:
Prof. Jeremy Mould is currently a Professorial Fellow at the University of Melbourne. He has extensive astronomical observatory management experience including a six year term as the Director of the National Optical Astronomy Observatory in Arizona, beginning in 2001. Prior to this Prof. Mould was Director of Mt Stromlo Observatory at the Australian National University for eight years.

Prof Mould is a cosmologist and is the author of over 400 scientific publications. He was part of the team that won the prestigious Gruber Cosmology Prize in 2009, recognising their leadership in determining the Hubble Constant through their Hubble Space Telescope Key Project on the Extragalactic Distance Scale.

He has received numerous professional awards and honours, including the Newton Lacey Pierce Prize in Astronomy in 1984 by the American Astronomical Society and the Oort Professorship in 1998 by Leiden University in the Netherlands. He is a fellow of the Royal Astronomical Society and the Australian Academy of Science.

Special Responsibilities:

Chair	European Southern Observatory Working Group
Member	Audit & Risk Management Committee

Information on Directors

Emeritus Prof. Mark S. Wainwright AM FTSE (Non Executive Director) - Appointed 5th November 2009

Qualifications:
Bachelor of Applied Science (Honours) (Applied Chemistry)
Master of Applied Science (Chemical Engineering)
Doctor of Philosophy (Chemical Engineering)
Doctor of Science,
Doctor of Science (honoris causa)
FTSE, FIEAust, FIChemE, FRACI

Experience:
Emeritus Professor Wainwright was Vice-Chancellor and President of the University of New South Wales for two years from 1 July 2004. Prior to that appointment, Professor Wainwright had been the Acting Vice-Chancellor of the University from mid April 2004. He was Deputy Vice-Chancellor (Research and International) from January 2001.

In 2006 he was appointed by the Department of Foreign Affairs and Trade of the Australian Government to the position of Chair of the Australia-China Council for a period of five years. In the same year, he was appointed Chair of the New South Wales General Sir John Monash Awards Panel. In 2007 he was appointed Chair of the National Computational Infrastructure Steering Committee by the Department of Innovation Industry, Science and Research.

He is Chair of INTERSECT, a not-for-profit e-research company, and Chair of The New Horizons Project at Monash University. He is a member of the Queensland University of Technology Council and a member of the board of Engineering Aid Australia.

Professor Wainwright holds an Honours Degree in Applied Chemistry and a Master of Applied Science in Chemical Engineering from the University of Adelaide, a PhD in Chemical Engineering from McMaster University in Canada and a DSc for his research into skeletal catalysts from the University of South Australia. In 2007 he was awarded a Doctor of Science (honoris causa) by the University of New South Wales.

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Directors' Report

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His academic career at UNSW commenced in 1974 as a lecturer in the School of Chemical Technology in the then Faculty of Applied Science and, in 1989, he was awarded a personal chair for his research in catalytic reaction engineering. In 1991 he was appointed Dean of Australia's largest Faculty of Engineering, a position he held until the end of 2000. During 1998 and 1999 he was also Pro-Vice-Chancellor (Research). Professor Wainwright is an Honorary Fellow of Engineers Australia, a Fellow of the Australia Academy of Technological Sciences and Engineering, a Fellow of the Institution of Chemical Engineers and a Fellow of the Royal Australian Chemical Institute.

In 2000 he was awarded the Centenary Medal for service to Australian society in research policy and management and engineering education. In 2004, Professor Wainwright was made a Member of the Order of Australia (AM) for his service to chemical engineering as a researcher and academic, and to tertiary education.

Special Responsibilities:

Chair	Executive Remuneration Committee
Chair	Nomination Committee

Information on Directors

Prof. Brian J. Boyle
(Non Executive Director) - Appointed 5th November 2009

Qualifications:
Bachelor of Science (Honours)
Doctor of Philosophy
FAA, FAICD

Experience:
Prof. Brian Boyle was Director of the CSIRO Australia Telescope National Facility from July 2003 to February 2009. This is the largest cm-wavelength radio astronomical observatory in the Southern Hemisphere. He has experience with many aspects of cm-wave length radio astronomy technology, and has pioneered the use of 'image stacking' at radio wavelengths to extend the flux limits of current surveys. He is currently CSIRO SKA Director, with a secondment in the Department of Innovation, Industry, Science and Research for 40% of his time.

He was Director of the Anglo-Australian Observatory for seven years, from 1996-2003. During that period, he oversaw the successful commissioning of the 2-degree field instruments and was the Australian-based leader of the 2dF QSO survey. He led the development of a strategy that saw the AAO become an instrumentation provider to international observatories. He has published over 130 refereed papers, principally in the field of optical astronomy, but also including X-ray and radio survey, infrared imaging and gamma-ray bursts.

During his career he has initiated and led six international scientific collaborations, including most recently the 2QZ survey and ATLAS program (now led by Ray Norris – due to his availability). He was also chairman of the International Square Kilometre Array (SKA) Steering Committee from 2006-2008.

Prof. Brian Boyle has been a Fellow of the Australian Institute of Company Directors since 2005.

As Chairman of the National Committee for Astronomy, he initiated and led the development of the Decadal Plan for Australian Astronomy 2006-15. He was also the facilitator for the NCRIS investment plan for optical and radio astronomy. This was, in effect, the implementation of the strategies outlined in the Decadal Plan.

As a member of CSIRO's Executive Management Council, he has also played a role in the implementation of CSIRO's 2003-07 strategy and the development of the 2007-11 strategy.

Prof. Boyle is chairman of the Australian New Zealand SKA Coordination Committee and leads the development and implementation of the Australian/New Zealand bid strategy for the SKA.

Special Responsibilities:

Member European Southern Observatory Working Group

Directors' Report

Register of Directors interests

Prof. Brian J. Boyle

1. Employed by CSIRO
2. Member, CSIRO Executive Council
3. Member, ICRAR Board
4. Chair, Australia/New Zealand SKA Coordination Committee
5. Member, ANSZCC Strategy and Bid Working Group
6. Member, Pawsey HPC Centre for SKA Science Steering Committee
7. Member, CSIRO ASKAP Steering Committee

Prof. Michael N. Barber (retired 5th November 2009)

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

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. Warrick J. Couch

1. Employed by Swinburne University of Technology
2. Chair, Anglo-Australian Telescope Board (only up until 30 June 2010)
3. ARC Grant holder and ARC Professorial Fellow
4. Fellow of the Australian Academy of Science
5. Fellow and Immediate Past President of the ASA
6. Member, ARC College of Experts (from 1 Jan 2010)
7. Member, Australian GMT Project Oversight Committee (from 1 Jan 2010)

Directors' Report

Register of Directors interests

Prof. Jeremy R. Mould

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

Prof. Elaine M. Sadler (retired 5th November 2009)

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)

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 and Fellowship holder
6. Member, Australia Telescope Steering Committee
7. Member (2011 onwards), LIGO Program Advisory Committee
8. Member, Australian Academy's National Committee of Astronomy

Register of Directors interests

Emeritus Prof. Mark S. Wainwright

1. Fellow, Australian Academy of Technological Sciences and Engineering
2. Honorary Fellow, Engineers Australia, (formerly Institution of Engineers Australia)
3. Fellow, Institution of Chemical Engineers (IChemE)
4. Fellow, The Royal Australian Chemical Institute (RACI).
5. Chair, Australia-China Council
6. Chair, NSW Selection Panel, General Sir John Monash Awards
7. Chair, National Computational Infrastructure Steering Committee ANU
8. Chair, Intersect Australia Limited
9. Chair, New Horizons Project Collaborations Committee Monash University / CSIRO
10. Director, Engineering Aid Australia Limited
11. Member, Queensland University of Technology Council
12. Chair, TAFE NSW Higher Education Governing Council
13. Chair, Smart Services CRC Board
14. Chair, National Institute for Experimental Arts
15. Member, International Advisory Committee, Hong Kong Polytechnic University

Dr. David M. Warren

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

Directors' report

Meetings of Directors

	Directors Meetings		Board Committee Meetings	
	No. Eligible to Attend	No. Attended	No. Eligible to Attend	No. Attended
Name:				
Dr. Martin T. Cole	6	6	1	1
Prof. Warrick J. Couch	6	6	-	-
Prof. Elaine M. Sadler	3	3	-	-
Prof. Brian P. Schmidt	6	6	-	-
Prof. Michael N. Barber	3	2	-	-
Dr. David M. Warren	6	6	1	1
Prof. Jeremy R. Mould	6	6	1	1
Prof. Brian J. Boyle	3	3	-	-
Emeritus Prof. Mark S. Wainwright	3	3	-	-

No person has applied for leave of Court to bring proceedings on behalf of the entity or intervene in any proceedings to which the entity is a party for the purpose of taking responsibility on behalf of the entity for all or any part of those proceedings. The entity was not a party of any such proceedings during the year.

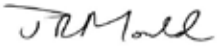
Auditors' Independence Declaration

A copy of the auditor's independence declaration as required under section 307C of the Corporations Act 2001 is set out on page 56. Signed in accordance with a resolution of the Board of Directors:

Director:

Dr. Martin T. Cole

Director:



Prof. Jeremy R. Mould

Dated this 26th day of August 2010

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

Auditor's Independence Declaration

I hereby declare, that to the best of my knowledge and belief, during the financial year ended 30 June 2010 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

Eric Townsend

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

Dated this 26th day of August 2010

Liability limited by a scheme approved under Professional Standards Legislation.

Statement of comprehensive income for the year ended 30 June 2010

	Note	2010 $	2009 $
Revenues including Government Grants	**2**	13,956,597	12,853,973
Less expenditure			
Grants paid		(13,116,957)	(12,964,911)
Auditor's remuneration	**3**	(3,800)	(4,800)
Bad and doubtful debt expenses		-	-
Depreciation and amortisation expenses		(2,719)	(3,834)
Employee benefits expenses		(309,823)	(243,543)
Finance costs		-	-
Other expenses		(171,181)	(229,481)
Surplus (Deficit) before income tax attributable to members of the entity	**4**	**352,117**	**(592,596)**
Income Tax		-	-
Surplus (Deficit) after income tax attributable to members of the entity		**352,117**	**(592,596)**
Other comprehensive income		**Nil**	**Nil**
Total comprehensive income for the year attributable to members of the entity	**4**	**352,117**	**(592,596)**

The Company is an income tax exempt charitable institution

The accompanying notes form part of these financial statements

Statement of Financial Position as at 30 June 2010

	Note	2010 $	2009 $
CURRENT ASSETS			
Cash and cash equivalents	**5**	19,722,755	18,192,029
Trade and other receivables	**6**	295,124	772,820
TOTAL CURRENT ASSETS		20,017,879	18,964,849
NON-CURRENT ASSETS			
Property, plant and equipment	**7**	6,215	5,968
TOTAL NON-CURRENT ASSETS		6,215	5,968
TOTAL ASSETS		20,024,094	18,970,817
CURRENT LIABILITIES			
Trade and other payables	**8**	15,729,595	15,038,424
Short-term Provisions payable	**9**	14,085	4,096
TOTAL CURRENT LIABILITIES		15,743,680	15,042,520
TOTAL LIABILITIES		15,743,680	15,042,520
NET ASSETS		4,280,414	3,928,297
EQUITY			
Reserves		4,217,686	3,871,231
Retained earnings		62,728	57,066
TOTAL EQUITY		4,280,414	3,928,297

The accompanying notes form part of these financial statements

Statement of changes in equity for the year ended 30 June 2010

	Note	Retained Earnings $	NCRIS Reserve Account $	Overseas Optical Reserve Account $	Total $
Balance at 30 June 2008		**72,519**	**809,635**	**3,638,739**	**4,520,893**
Surplus attributable to equity members		(592,596)	-	-	(592,596)
Allocated to Reserves		(1,510,844)	865,358	645,486	-
Transfers from Reserves		2,087,987	(1,560,150)	(527,837)	-
Balance at 30 June 2009		**57,066**	**114,843**	**3,756,388**	**3,928,297**
Surplus attributable to equity members		352,117	-	-	352,117
Allocated to Reserves		(782,360)	542,729	239,631	-
Transfers from Reserves		435,905	(374,815)	(61,090)	-
Balance at 30 June 2010		**62,728**	**282,757**	**3,934,929**	**4,280,414**

The accompanying notes form part of these financial statements

Statement of cash flows for the year ended 30 June 2010

		2010 $	2009 $
Cash Flows from Operating Activities:			
Receipts from Grants/Members		15,236,341	12,640,988
Interest Received		1,343,489	780,374
Payments to Suppliers, Employees &Taxes		(968,690)	(816,021)
Payments of Grants		(14,077,448)	(13,618,396)
Net Cash Provided by (Used in) Operating Activities	Note 10	1,533,692	(1,013,055)
Cash Flows from Investing Activities:			
Proceeds from Sale of Property, Plant & Equipment		-	-
Payment for Property, Plant & Equipment		(2,966)	(1,705)
Net Cash Provided (Used in) Investing Activities		(2,966)	(1,705)
Cash Flows from Financing Activities:			
Proceeds from Borrowings		-	-
Repayment of Borrowings		-	-
Distributions/Dividend by Chief Entities		-	-
Net Cash Provided (Used in) Financing Activities		-	-
Net Increase (Decrease) in Cash Held		1,530,726	(1,014,760)
Cash at Beginning of the financial year		18,192,029	19,206,789
Cash at 30th June 2010	Note 5	19,722,755	18,192,029

The accompanying notes form part of these financial statements

Notes to the financial statements for the year ended 30 June 2010

The financial statements cover Astronomy Australia Limited as an individual entity. It is a company limited by guarantee incorporated and domiciled in Australia and is a not-for-profit income tax exempt charitable institution.

1 Summary of Significant Accounting Policies

Basis of Preparation

The financial statements are general purpose financial statements that have been prepared in accordance with Accounting Standards, including Australian Accounting Interpretations and the Corporations Act 2001.

Australian Accounting Standards set out accounting policies that the AASB has concluded would result in financial statements containing relevant and reliable information about transactions, events and conditions. Material accounting policies adopted in the preparation of these financial statements are presented below and have been consistently applied unless otherwise stated.

Reporting basis and conventions

The financial statements have been prepared on an accruals basis and are based on historical costs modified where applicable by the measurement at fair value of selected non-current assets, financial assets and financial liabilities.

Accounting Policies

Revenue

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

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

Grants are recognised at fair value where there is reasonable assurance that the grant will be received and all grant conditions will be met. Grants relating to expense items are recognised as income over the periods necessary to match the grant to the costs they are compensating. Grants relating to assets are credited to deferred income at fair value and are credited to income over the expected useful life of the asset on a straight-line basis

All revenue is stated net of the amount of Goods and Services Tax (GST)

Goods and Services Tax (GST)

Revenues, expenses and assets are recognized 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 recognized 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 group.

Key estimates – Impairment

The company assesses impairment at each reporting date by evaluating conditions specific to the entity 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 a key estimates.

No impairment has been recognized in respect of this financial year.

Income Taxation

The company is endorsed by the Taxation Office as a Charitable Institution. Therefore no income tax is payable by the company.

Property, Plant and Equipment

Buildings, Motor Vehicles, Office Furniture and Equipment and Plant and Equipment

Buildings, Motor Vehicles, Office Furniture and Equipment and Plant and Equipment are carried at cost or fair value less, where applicable, any accumulated depreciation and impairment losses.

Property

Freehold land is at cost.

Depreciation

The depreciable amount of Buildings (but not freehold land), Motor Vehicles, Office Furniture and Equipment and Plant and Equipment are depreciated on a written down value (WDV) or a straight line 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.

The depreciation rates used for each class of depreciable assets are:

Class of Fixed Assets	Depreciation rate	Method
Office Furniture & Equipment	15% to 50%	Written down value

The assets' residual values and useful lives are reviewed, and adjusted if appropriate, at each balance sheet date.

An asset's carrying amount is written down immediately to its recoverable amount if the asset's carrying amount is greater than its estimated recoverable amount.

Gains and losses on disposals are determined by comparing proceeds with the carrying amount. These gains or losses are included in the income statement. When revalued assets are sold, amounts included in the revaluation reserve relating to that asset are transferred to retained earnings.

Leases

Leases of fixed assets where substantially all the risks and benefits incidental to the ownership of the asset, but not the legal ownership that are transferred to the company, are classified as finance leases.

Finance leases are capitalized by recording an asset and a liability at the lower of the amounts equal to the fair value of the leased property or the present value of the minimum lease payments, including any guaranteed residual values. Lease payments are allocated between the reduction of the lease liability and the lease interest expense for the period.

Leased assets are depreciated on a straight-line basis over the shorter of their estimated useful lives or the lease term.

Lease payments for operating leases, where substantially all the risks and benefits remain with the lessor, are charged as expenses in the periods in which they are incurred.

Lease incentives under operating leases are recognized as a liability and amortized on a straight-line basis over the life of the lease term.

Financial Instruments

Recognition

Financial instruments are initially measured at cost on trade date, which includes transaction costs, when the related contractual rights or obligations exist. Subsequent to initial recognition these instruments are measured as set out below.

Financial assets at fair value through profit and loss

A financial asset is classified in this category if acquired principally for the purpose of selling in the short term or if so designated by management and within the requirements of AASB 139: Financial Instruments: Recognition and Measurement. Derivatives are also categorized as held for trading unless they are designated as hedges. Realized and unrealized gains and losses arising from changes in the fair value of these assets are included in the income statement in the period in which they arise.

Loans and receivables

Loans and receivables are non-derivative financial assets with fixed or determinable payments that are not quoted in an active market and are stated at amortized cost using the effective interest rate method.

Held-to-maturity investments

These investments have fixed maturities, and it is the entity's intention to hold these investments to maturity. Any held-to-maturity investments held by the entity are stated at amortized cost using the effective interest rate method.

Available-for-sale financial assets

Available-for-sale financial assets include any financial assets not included in the above categories. Available-for-sale financial assets are reflected at fair value. Unrealized gains and losses arising from changes in fair value are taken directly to equity.

Financial liabilities

Non-derivative financial liabilities are recognized at amortized cost, comprising original debt less principal payments and amortization.

Derivative instruments

Derivative instruments are measured at fair value. Gains and losses arising from changes in fair value are taken to the income statement unless they are designated as hedges.

Fair value

Fair value is determined based on current bid prices for all quoted investments. Valuation techniques are applied to determine the fair value for all unlisted securities, including recent arm's length transactions, reference to similar instruments and option pricing models.

Impairment

At each reporting date, the company assesses whether there is objective evidence that a financial instrument has been impaired. In the case of available-for-sale financial instruments, a prolonged decline in the value of the instrument is considered to determine whether impairment has arisen. Impairment losses are recognized in the income statement.

As a not-for-profit entity the value in use of an asset may be equivalent to the depreciated replacement cost of that asset when the future economic benefits of the asset is not primarily dependent on the asset's ability to generate net cash inflows and where the entity would, if deprived of the asset, replace its remaining future economic benefits.

Provisions

Provisions are recognized 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.

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.

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.

Unspent Grant Funds

Unspent Grant Funds available as revenue or liable to be returned to the grant provider in the following year are recognised as a current liability in the balance sheet. They are not treated as an operating surplus or profit.

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 totalling $37,564 (2009 - $36,387) has been transferred from the Reserve.

Grant payments totaling $23,527 (2009 - $491,450) have been transferred from the Reserve.

AASB 101 – Presentation of Financial Statements

There have been changes in the Australian Accounting Standards Board (AASB) standards AASB101 that requires changes to the presentation of certain information within the financial statements. Below is an overview of the key changes and their impact on these financial statements.

Disclosure impact

Terminology changes:- The revised version of AASB 101 contains a number of terminology changes, including to the names of the primary financial statements. Put simply the Profit and Loss Statement is now termed the 'Statement of Comprehensive Income' and the Balance Sheet is now the 'Statement of Financial Position'.

Reporting changes in equity:– The revised AASB 101 requires all changes in equity arising from transactions with owners, in their capacity as owners, to be presented separately from "non-owner" changes in equity. "Non-owner" changes are shown in the Statement of Comprehensive Income and "Owner changes" are shown in the Statement of Changes in Equity.

Other comprehensive income:- AASB 101 introduces the concept of 'Other Comprehensive Income" which is income and expense items that are not required to be shown in the Profit and Loss under other Australian Accounting Standards.

New Accounting Standards for Application in Future Periods

The AASB has issued new and amended accounting standards and interpretations that have mandatory application for future accounting periods. The entity has decided against early adoption of these standards.

Notes to the financial statements for the year ended 30 June 2010

			2010 $	2009 $
2	**Revenue including Government Grants**			
	Operating activities			
	NCRIS and LIEF Grants		12,726,541	10,913,461
	Administration Grant		249,593	243,340
	Gemini Reserve received		-	157,356
	Members subscriptions		190,919	177,650
	Other income		2,200	1,100
	Interest received – General Account		4,685	7,577
	Interest received – Grants Account		543,029	865,358
	Interest received – Overseas Optical Reserve Account		239,630	488,131
	Total revenue		13,956,597	12,853,973
	Movement in Grants Allocation for the Year			
	NCRIS Grants received in advance yet to be Allocated			
	Opening Balance		11,313,998	10,772,469
	Grants Paid		(11,826,541)	(10,010,131)
	Grants Received		12,507,407	10,551,660
	Closing Balance	(Note 8)	11,994,864	11,313,998
	LIEF Grants received in advance yet to be Allocated			
	Opening Balance		3,700,000	3,703,331
	Grants Paid		(900,000)	(903,331)
	Grants Received		900,000	900,000
	Closing Balance	(Note 8)	3,700,000	3,700,00
3	**Auditor's Remuneration**			
	Audit Services		3,800	4,800

Notes to the financial statements for the year ended 30 June 2010

		2010 $	2009 $
4	**Revenue and Expense items**		
	Bad and doubtful debts		
	Trade Receivables	-	-
	Total bad and doubtful debts	-	-
	Rental expense on operating leases		
	Operating Lease Minimum Lease Payment	-	-
	Significant Revenue and Expense items		
	The following significant revenue and expense items are relevant in explaining the financial performance		
	Additional grants not paid (paid)	1,661,034	(1,993,950)
	Gemini Reserve Received	(157,356)	(3,354,676)
	(Less) More Interest received	(573,722)	367,122
	Salaries and Directors Fees	(57,228)	(68,559)
	Meeting and Travel expenses	56,042	(55,702)

Notes to the financial statements for the year ended 30 June 2010

		2010 $	2009 $
5	**Cash and Cash Equivalents**		
	Reconciliation of cash		
	Cash at the end of the financial period as shown in the cash flow statement is reconciled to the related items in the statement of financial position as follows:		
	Current		
	Cash on Hand	55	55
	Term Deposit - Grant Account	6,500,000	12,500,000
	Term Deposit - Overseas Optical Reserve Account (Secured)	-	1,000,000
	Term Deposit - Grant Account USD	4,589,269	1,903,448
	Cash at Bank - General Account	2,007	6
	Cash at Bank - General Maximiser Account	69,825	62,653
	Cash at Bank - Grant Account	60,763	99
	Cash at Bank - Grant Maximiser Account	8,500,836	2,725,768
		19,722,755	18,192,029
6	**Trade and Other Receivables**		
	Current		
	Trade Debtors	691	1,100
	Other Debtors	24,547	580,692
	GST Receivable	269,886	191,028
		295,124	772,820
7	**Property, Plant and Equipment**		
	PLANT AND EQUIPMENT		
	Office Furniture and Equipment		
	Opening Balance	5,968	8,097
	Purchases	2,966	1,705
	Accumulated depreciation	(2,719)	(3,834)
	Closing Balance at 30th June 2010	6,215	5,968

Notes to the financial statements for the year ended 30 June 2010

		2010 $	2009 $
	Movement in the carrying amounts for each class of property, plant and equipment		
		Office furniture & equipment	**Total**
	2008		
	Carrying amount at end year	**8,097**	**8,097**
	2009		
	Additions at cost	1,705	1,705
	Disposals		
	Depreciation Expense	(3,836)	(3,836)
	Carrying amount at end year	**5,968**	**5,968**
	2010		
	Additions at cost	2,966	2,966
	Disposals		
	Depreciation Expense	(2,719)	(2,719)
	Carrying amount at end year	**6,215**	**6,215**
8	**Trade and Other Payables**		
	Current		
	NCRIS Grants to be allocated	11,994,864	11,313,998
	LIEF Grants to be allocated	3,700,000	3,700,000
	Other Creditors	34,731	24,426
	GST Payable	-	-
		15,729,595	15,038,424
9	**Provisions**		
	Provision for Recreational Leave	14,085	4,096
	Total provisions	**14,085**	**4,096**
	Analysis of Total Provisions		
	Current	14,085	4,096
		14,085	4,096
	Opening balance	**4,096**	**7,275**
	Additional provisions raised during year	9,989	-
	Amount used	-	3,179
	Balance at end of period	14,085	4,096

Notes to the financial statements for the year ended 30 June 2010

		2010 $	2009 $
10	**Cash Flow Information**		
	Reconciliation of Cash flow from Operations with Surplus after Income Tax		
	Surplus from ordinary activities after tax	352,117	(592,596)
	Non-cash flows in surplus (deficit)		
	Depreciation	2,719	3,834
	Changes in assets and liabilities, net of the effects of purchase and disposal of subsidiaries		
	(Increase)/decrease in trade and other receivables	477,696	(772,820)
	Increase/(decrease) in trade and other payables	691,171	351,706
	Increase/(decrease) in current provisions	9,989	(3,179)
	Cash flow from operations	**1,533,692**	**(1,013,055)**

11 Events After the Balance Sheet Date

There have been no material non-adjusting events after the reporting date, nor has any information been received about conditions at reporting date that have not been included in this report.

12 Capital & Leasing Commitments

There are no Capital or Lease Commitments.

13 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.

14 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 to 2011 of which a portion is for the company's operating costs and the majority is for projects to be undertaken by third parties. This agreement has been added to for a receipt of $10,000,000 over 2 years to June 2013.

15 Financial Risk Management

The entity's financial instruments consist mainly of deposits with banks, local money market instruments, short-term investments, accounts receivable and payable, loans and borrowings and mortgages.

The totals for each category of financial instruments, measured in accordance with AASB 139 is as follows:-

	2010 / $	2009 / $
Financial assets		
Cash and cash equivalents	19,722,755	18,192,029
Loans and Receivables	295,124	772,820
Total financial assets	**20,017,879**	**18,964,849**
Financial liabilities		
Financial liabilities at amortised cost		
- Trade and other payables	34,731	24,426
Grants yet to be allocated	15,694,864	15,013,998
Total financial liabilities	**15,729,595**	**15,038,424**

Financial risk management policies

The directors' overall risk management strategy is to assist the entity in meeting its financial targets, whilst minimising potential adverse effects or financial performance. Risk management policies are approved and reviewed by the Board of Directors on a regular basis. These include credit risk policies and future cash flow requirements.

The entity does not have any derivative instruments at the end of the reporting period.

Notes to the financial statements for the year ended 30 June 2010

Specific Financial Risk Exposures and Management

The main risks the entity is exposed to through its financial instruments are interest rate risk, liquidity risk and credit risk.

(a) Credit risk

Credit risk is the risk that parties that owe money do not pay it.

The maximum exposure to credit risk, excluding the value of any collateral or other security, at balance date to recognised financial assets, is the carrying amount, net of any provisions for impairment of those assets, as disclosed in the statement of financial position and notes to the financial statements.

The entity does not have any significant concentration of credit risk exposure to any single, or group, of counter-parties under financial instruments entered into by the entity. A profile of credit risk appears above under the Note on 'Trade and Other Receivables'.

(b) Liquidity risk

Liquidity risk arises due the possibility that the entity might encounter difficulty in settling its own debts or other liabilities. The entity manages this risk by managing credit risk on amounts owed to it, monitoring forecast cash flows and ensuring that adequate unutilized borrowing facilities are maintained.

Notes to the financial statements for the year ended 30 June 2010

Financial liability and financial asset maturity analysis

	Within 1 year		1 to 5 years		Over 5 years		Total	
	2010 / $	**2009 / $**	**2010 / $**	**2009 / $**	**2010 / $**	**2009 / $**	**2010 / $**	**2009 / $**
Financial liabilities due for payment								
Trade and other payables (excluding employee benefit provisions and deferred income)	34,731	24,426					34,731	24,426
Grants yet to be allocated	15,694,864	15,013,998					15,694,864	15,013,998
Total expected outflows	15,729,595	15,038,424					15,729,595	15,038,424
Financial assets – cash flows realizable								
Cash and cash equivalents	19,722,755	18,192,029					19,722,755	18,192,029
Trade and other receivables	295,124	772,820					295,124	772,820
Total anticipated inflows	20,017,879	18,964,849					20,017,879	18,964,849
Net inflow (outflow) on financial instruments	4,288,284	3,926,425					4,288,284	3,926,425

(c) Market Risk

Interest rate risk

Exposure to interest rate risk arises whereby future changes in interest rates will affect future cash flows or the fair value of financial assets and liabilities.

Foreign exchange risk

Exposure to foreign exchange risk may result in the fair value or future cash flows of a financial instrument fluctuating due to movement in the foreign exchange rates of currencies in which the entity holds financial instruments other than the Australian Dollar (AUD) functional currency of the entity.

The following table shows the foreign currency risk of the entity

Net financial assets (liabilities) in AUD.	2010 / $	2009 / $
Term Deposit – Grant Account USD	4,589,269	1,903,448

Forward US Dollar Contracts

The company has purchased forward dollar contracts with maturity dates between 1st July 2010 and 1st July 2011 totalling US$983,657 (AUD$1,151,149) for forward overseas commitments of present and future NCRIS Grants (2009 - US$2,926,981 (AUD$3,425,373)) secured with a Term Deposit of $1,000,000 maturing on 30th June 2010.

Price Risk

Price risk relates to the risk that the fair value or future cash flows of a financial instrument will fluctuate because of changes in their market price.

Notes to the financial statements for the year ended 30 June 2010

Sensitivity analysis

The following table illustrates sensitivities to the entity's expose in interest rates and equity prices (if equities held). The table indicates the impact on how profit and equity values reported at the end of the reporting period would have been affected by changes in the relevant risk variable that management considers to be reasonably possible. These sensitivities assume that the movement in any particular variable is independent of other variables.

	2010 / $		2009 / $	
Year ended 30th June 2009		**Profit $'000**		**Equity $'000**
+ or – 2% in interest rates	+/-	343	+/-	343
+ or - 10% in listed investments	+/-		+/-	
+ or - 5% in $A / $US	+/-	95		95
Year ended 30th June 2010				
+ or – 2% in interest rates	+/-	393	+/-	393
+ or - 10% in listed investments	+/-		+/-	
+ or - 5% in $A / $US	+/-	229	+/-	229

Net Fair Values

The net fair values of listed investments have been valued at the quoted market bid price at balance date adjusted for transaction costs expected to be incurred. For other assets and other liabilities the net fair value approximates their carrying value. No financial assets and financial liabilities are readily traded on organized markets in standardized form other than listed investments.

The differences between fair values and carrying values of financial instruments with fixed interest rates are due to the change in discount rates being applied by the market to those instruments since their initial recognition by the entity. Most of these instruments which are carried at amortised cost (e.g. trade receivables, loan liabilities) are to be held until maturity and therefore their current net fair values bear little relevance to the entity.

As appropriate the net fair values and carrying amounts of financial assets and financial liabilities are disclosed in the Statement of Financial Position and in the notes to the financial statements.

16 Key Management Personnel Compensation

The total of remuneration paid to key management personnel (KMP) of the entity during the year is as follows:

	2010 / $	2009 / $
Short-term employee benefits	214,735	193,937
Post-employment benefits	-	-
Other long-term benefits	-	-
Termination benefits	-	-
	214,735	193,937

17 Contingent Liability/Forward Commitments

To be taken from the NCRIS Reserve.
$19,858 during 2010/11 towards the costs of hiring two support astronomers from the Magellan telescopes to conduct research at an Australian-based institution.

To be taken from the Overseas Optical Reserve.
AUD$1,550,562 (USD$1,380,000) during 2010/11 and 2011/12 to purchase time for Australia -based astronomers on the Magellan telescopes. The time purchased is expected to average 7.5 nights per semester during observing semesters 2011B, 2012A, 2012B and 2013A.

18 Member's Guarantee

Astronomy Australia Limited is a company limited by guarantee. Every member of the company undertakes to contribute to the assets of the company in the event of its being wound up while he/she is a member or within one year after he or she ceases to be a member for the payment of the debts and liabilities of the company contracted before he/she ceases to be a member and the costs, charges and expenses of winding up and for the adjustment of the rights of the contributories among themselves such amount as may be required not exceeding 10 dollars.

19 Related Party Transactions

Transactions between related parties are on normal commercial terms and conditions no more favorable than those available to the other parties unless otherwise stated.

20 Company Details

The registered office of the company is:

Swinburne University
John Street
Hawthorn. Vic. 3122.

The principal place of business is:

Swinburne University
John Street
Hawthorn. Vic. 3122.

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

Directors' Declaration

The directors of the company declare that:

1. The financial statements and notes, as set out on pages 40-78, 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 2010 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. Jeremy R. Mould

Dated this 26th day of August 2010

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

Independent Auditor's Report to the members of Astronomy Australia Limited

Report on the Financial Report

I have audited the accompanying financial statements of Astronomy Australia Limited, which comprises the statement of financial position as at 30 June 2010, and the statement of comprehensive income, statement of changes in equity and statement of cash flows for the year ended on that date, a summary of significant accounting policies and other explanatory notes and the director's declaration.

Directors' Responsibility for the Financial Report

The directors of the company are responsible for the preparation and fair presentation of the financial statements 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 statements that are 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.

Auditors' Responsibility

My responsibility is to express an opinion on the financial statements 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 statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditors' judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditors consider internal control relevant to the entity's preparation and fair presentation of the financial statements 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 director, as well as evaluating the overall presentation of the financial statements.

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 your directors and included in the financial statements, would be in the same terms if provided to the directors as at the date of this auditors' report.

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

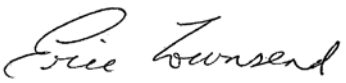
Independent Auditor's Report to the members of Astronomy Australia Limited

Auditors' Opinion

In my opinion:

- the financial statements present fairly, in all material respects the financial position of Astronomy Australia Limited as at 30th June 2010 and its financial performance and cash flows for the year then ended in accordance with the Corporations Act 2001 and Australian Accounting Standards (including Australian Accounting Interpretations).

Name of Firm: E. Townsend & Co.



Name of Auditor Eric Townsend, Chartered Accountant

Address 35 Mereweather Avenue, Frankston. Vic. 3199

Dated this 26th day of August 2010

Liability limited by a scheme approved under Professional Standards Legislation.

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

Profit and Loss Statement for the year ended 30 June 2010

	2010 $	2009 $
REVENUE		
Administration Grant - NCRIS	249,593	243,340
Membership Subscriptions - Level 1	175,010	156,750
Membership Subscriptions - Level 2	15,909	20,900
Administrative Services	2,200	1,100
Gemini Reserve Received	-	157,356
Grants Allocated	12,726,541	10,913,461
	13,169,253	11,492,907
LESS: GRANTS PAID		
Grants Paid	12,726,541	10,913,461
Grants Paid from Reserves	390,416	2,051,450
	13,116,957	12,964,911
GROSS SURPLUS FROM TRADING	52,296	(1,472,004)
OTHER INCOME		
Interest Received - General Account	4,685	7,577
Interest Received - Grants Account	543,029	865,358
Interest Received - Overseas Optical Reserve Account	239,630	488,131
	787,344	1,361,066
	839,640	(110,938)

The accompanying notes form part of these financial statements

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

Profit and Loss statement for the year ended 30 June 2010

	2010 $	2009 $
Expenses		
Accountancy	26,184	28,342
Auditor's Remuneration	3,800	4,800
Bank Charges	1,093	1,087
Company Secretarial Fees	15,732	17,028
Contract Staff	20,835	14,882
Depreciation	2,719	3,834
Filing Fees	40	40
Fringe Benefits Tax	1,029	-
Insurance	6,236	6,229
Legal Costs	8,137	9,791
Meeting Expenses	30,055	49,486
Printing & Stationery	11,696	13,263
Office Expenses	-	2,686
Salaries	208,824	166,689
Salaries - Board	70,219	55,126
Software	-	500
Subscriptions	731	727
Superannuation - Board	12,885	5,258
Superannuation Contributions	17,895	16,470
Telephone	2,549	1,991
Training/Conference	1,018	818
Travel - Staff	8,911	18,692
Travel - Board	31,090	48,700
Travel - Board - Salary	5,025	14,245
Workcare	820	974
	487,523	481,658
Surplus before income tax	**352,117**	**(592,596)**

The accompanying notes form part of these financial statements

Appendix
Astronomy NCRIS Progress Report

Artist's impression of ASKAP. Illustration: Swinburne Astronomy Productions, CAD data: CSIRO

10 Appendix

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

- AAL Management- $531,000 of additional NCRIS funding has been provided by DIISR to fund AAL’s management of the Astronomy EIF grant during 2011/12 and 2012/13.
- Antarctic Site Testing - $330,000 of NCRIS interest earnings have been provided by AAL to UNSW towards new robotic observatories for Dome A and Dome F.
- MWA - Following the review of the MWA project, phase 2 of MWA has been de-scoped from a 1,024 tile array to 512 tiles. Any extension of MWA beyond 512 tiles is beyond the scope of NCRIS and the viability of MWA beyond 512 tiles would need to be assessed should funding become available.

Progress against Milestones

A. Governance

Milestone	Due	Completed	Comments
Quarterly newsletter published (Q1)	Sep 2009	Sep 2009	Confidential update sent to Members only
Tenth board meeting held	Sep 2009	Jul 2009	
AAL contract signed with Curtin University for a MWA Project Manager	Sep 2009	May 2009	
2008/09 Annual report published and made available on AAL website	Sep 2009	Sep 2009	
2008/09 Astronomy NCRIS progress report submitted to DIISR and made available on AAL website	Sep 2009	Sep 2009	
Poster presentation at the Annual Meeting of the ASA	Sep 2009	Jul 2009	
Quarterly newsletter published (Q2)	Dec 2009	Dec 2009	
Eleventh board meeting held	Dec 2009	Nov 2009	
2009 Annual General Meeting held	Dec 2009	Nov 2009	
Appointment of 2 board members at the AGM	Dec 2009	Nov 2009	
Quarterly newsletter published (Q3)	Mar 2010	May 2010	
Twelfth board meeting held	Mar 2010	Feb 2010	
Quarterly newsletter published	Jun 2010	Jun 2010	
Thirteenth board meeting held	Jun 2010	Jun 2010	
2010/11 Astronomy NCRIS business plan submitted to DIISR	Apr 2010	Jun 2010	

Progress against Milestones cont.

B. Research Infrastructure

AAO – Refurbishment of facilities

Milestone	Due	Completed	Comments
Upgrade telescope hydraulic system	Sep 2009	Ongoing	Order placed for the equipment
Replace the telescope dec drive system	Sep 2009	Mar 2010	
Replace dome crane control system	Sep 2009	Ongoing	To be advertised on AusTend in August
Replace standby generator	Dec 2009	Ongoing	Work commenced
Replace the main high voltage electrical switch gear	Dec 2009	Ongoing	The ANU have in principle agreed to replacement of the high voltage switchgear and have engaged a Consultant to develop a design and specification
Replace the main UPS Stan inverter	Mar 2010	Ongoing	Deferred. Now due December 2010
Replace the main dry air system	Mar 2010	Sep 2009	
Upgrade the control system for the dome windscreen	Jun 2010	Dec 2009	
Upgrade the dome shutter and brake control systems	Jun 2010	Ongoing	Delayed due to the delay in the upgrade of the maintenance platform
Replace the lift controls in Lift passenger lift no2	Jun 2010	Dec 2009	

B. Research Infrastructure

AAT – New Instrument HERMES

Milestone	Due	Completed	Comments
Complete preliminary science requirements	Sep 2009	Jul 2009	
Place order for detectors	Sep 2009	Completed	
Complete preliminary design	Sep 2009	Mar 2010	
Deliver preliminary design report	Sep 2009	Mar 2010	
Complete instrument preliminary design review	Sep 2009	Mar 2010	
Commence instrument final design	Dec 2009	Completed	
Commence detector controller construction	Dec 2009	Completed	
Start preparing assembly and test facility at the AAO	Dec 2009	Mar 2010	
Place orders for large optics	Dec 2009	Jun 2010	
Place orders for VPH and other long lead time optics	Mar 2010	Jun 2010	
Commence production of fabrication drawings	Jun 2010	Completed	

B. Research Infrastructure

Australian Membership of the Gemini International Partnership

Milestone	Due	Completed	Comments
Support Australian involvement in 8m-class telescopes by: • managing the Australian time allocation process for 8m telescopes; • the Australian Gemini Scientist (AGS) and both Deputy Gemini Scientists (DGSs) performing specified Gemini support duties; • supporting Gemini instruments as required; • maintaining an up-to-date Australian Gemini Office (AusGO) web site.	Ongoing	Ongoing	
Promoting Australian science, and new opportunities with the Gemini and Magellan telescopes, by arranging a special session at the Astronomical Society of Australia Annual Scientific Meeting in Melbourne.	Sep 2009	Completed	
AGS attends Gemini Operations Working Group meeting in UK, July 2009.	Sep 2009	Completed	Done (AGS unavailable, so DGS Onken attended).
Recruit up to 3 Australian Gemini Undergraduate Summer Students (AGUSS) to spend Dec 2009 - Feb 2010 at Gemini South.	Sep 2009	Completed	
Unveil winning entry in the IYA Gemini School Astronomy Contest.	Sep 2009	Completed	
Coordinate Australian usage of FLAMINGOS-2 (a near-infrared multi-object spectrograph and imager) Science Verification time.	Dec 2009	Ongoing	FLAMINGOS-2 SV Call delayed until sometime in Semester 2010A.

B. Research Infrastructure

Australian Membership of the Gemini International Agreement

Milestone	Due	Completed	Comments
Coordinate AGUSS travel and projects with Gemini South.	Dec 2009	Completed	
Complete implementation of on-line database of all Australian 8m telescope proposals, to streamline reporting requirements.	Dec 2009	Jun 2010	
Organise AGUSS final seminars via video conference from Chile.	Mar 2010	Completed	
AGS attends Gemini Operations Working Group meeting in Hawaii, Jan 2010.	Mar 2010	Completed	
Coordinate Australian usage of GSAOI (near-infrared adaptive optics imager built by ANU) Science Verification time.	Jun 2010	Ongoing	GSAOI commissioning not due to start until Q2 2010/11.
Prepare to host Operations Working Group and NGO staff meeting at AAO in Jul 2010.	Jun 2010	Ongoing	Gemini cancelled NGO staff meeting, moved OpsWG meeting to Hilo 11-12 Aug.

Progress against Milestones cont.

B. Research Infrastructure

The AAL-Curtin subcontract was signed on 29th April 2010. The following three milestones are from that contract, but were not in the 2009/10 Annual Business Plan.

Murchison Widefield Array (MWA)

Milestone	Due	Completed	Comments
Commence Phase 2	Effective Date of contract (29th April 2010)	Completed	
Commence accelerated Procurement Point (e.g. Long Lead Items)	E.D + 1 week (7th May 2010)	Completed	
Update (first of two) on status of funding required to complete phase 2	June 10	Completed	

B. Research Infrastructure

ASKAP Digital System

Milestone	Due	Completed	Comments
BETA Digital System Design passes Critical Design Review.	Oct 2009	Nov 2010	ASKAP/BETA systems merged to Virtex 6 which resulted in the merging of the design reviews.
BETA Digital System Engineering System (ES1) prototype under test at ATNF.	Oct 2009	Completed	
ASKAP Digital System passes Preliminary Design Review.	Feb 2010	Nov 2010	ASKAP/BETA systems merged to Virtex 6 which resulted in the merging of the design reviews.
BETA Digital System (ES1) integration test with other IPTs systems.	Feb 2010	Ongoing	Delay from other IPTs impacted on testing and integration schedule of ES1 with other sub systems.
BETA Digital System manufacture commences.	Feb 2010	Completed	
BETA digital system deployed and verified operational.	Jun 2010	Ongoing	ES1 has a complete system, which is under test. ES2 has a full set of prototype boards, which are also under test and procurement underway for full system. Firmware is in full development.
Digital System installation at MRO (1st Antenna).	Jun 2010	Ongoing	Digital system is on target, however site infrastructure and BETA deployment will delay this by 6-9 months.
Digital System Integration test at MRO with all IPT's sub systems.	Jun 2010	Ongoing	Digital system is on target, however site infrastructure and BETA deployment will delay this by 6-9 months.
ASKAP Digital Systems pass Critical Design Review.	Jun 2010	Completed	

Progress against Milestones cont.

B. Research Infrastructure

ASKAP Overall

Milestone	Due	Completed	Comments
First foundation laid	Oct 2009	Completed	
Data/Signal Transport passes Preliminary Design Review	Oct 2009	Completed	
Phased Array Feeds (PAF) version 2 in-test at Parkes Testbed Facility (PTF)	Oct 2009	Completed	
Systems pass Preliminary Design Review	Oct 2009	Ongoing	System Design Reviews were largely contained within the individual team reviews. However, new staff and improved focus will go back and conduct the reviews. Delay of approx 15 months for actual review.
First antenna on site and verified operational	Feb 2010	Completed	
Data/Signal Transport passes Critical Design Review	Feb 2010	Ongoing	Given other priorities, this has been delayed by approx 12 months. The DST group has been reorganised into Network and a Signals groups.
Analogue Systems passes Critical Design Review	Feb 2010	Completed	
Systems pass Critical Design Review	Feb 2010	Ongoing	System Design Reviews were largely contained within the individual team reviews. However, new staff and improved focus will go back and conduct the reviews. Delay of approx 15 months.
Fibre link installed and verified operational	Feb 2010	Ongoing	Land access issues and contract negotiations delayed this. All agreements are now in place with expected completion in Q1 2011.
Analogue Systems pass Preliminary Requirements Review	Jun 2010	Ongoing	This is an on-going process with a commercial firm to conduct a requirements and manufacturability review. Initial set of documents are under review.

B. Research Infrastructure

GMT Design Development Phase

Milestone	Due	Completed	Comments
Proposals for GMT instrument concept studies due 31 August	Sep 2009	Oct 2009	
University of Chicago expected to sign GMT Founders' Agreement and commit funding	Dec 2009	Jun 2010	
Commencement of GMT instrument concept studies	Mar 2010	Apr 2010	• GMTIFS by ANU was selected as one of the six concept studies. • MANIFEST (not an instrument, but a telescope facility) also recommended by GMT Science Advisory Committee for further development.
Completion of the first of the seven 8-metre mirror components of the GMT primary	Jun 2010	Ongoing	Due December 2010.
Staffing of GMT Project Office reaches its full complement	Jun 2010	Ongoing	• approximately 75% of the way to full staffing in the project office. • expect that all of the top level positions will be filled by October 2010.

Antarctic Site Testing

Milestone	Due	Completed	Comments
The AAL-UNSW subcontract was signed on 29th April 2010. There are no milestones to report on in Financial Year 2009/10.			

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	Gemini operations	Payments - International Access	NSF (USA)		$1,123,108		$1,123,477
MIRA	MWA	Payments - Operating	Curtin Uni		$32,768		$32,768
Magellan	Magellan 2009B	Payments - International Access	Carnegie		$444,634		$444,634
MIRA	ASKAP	Payment - Capital	CSIRO		$1,500,000		$1,500,000
MIRA	MWA	Payment - Capital	Curtin Uni		$842,232		$763,724
AAO	AAT instrument	Payment - Capital	AATB		$280,000		$280,000
AAO	AAT refurbishment	Payments - Operating	AATB		$275,000		$275,000
Gemini	AusGO	Payments - Operating	AATB		$78,000		$78,000
Magellan	Magellan Fellows	Payments - International Access	AATB		$10,142		$0
AAO	AAT instrument	Payment - Capital	AATB		$1,300,000		$1,300,000
MIRA	MWA	Payment - Capital	Curtin Uni		$875,000		$0

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 refurbishment	Payments - Operating	AATB		$275,000		$275,000
Gemini	AusGO	Payments - Operating	AATB		$78,000		$78,000
MIRA	MWA	Receipts	NCRIS	$400,000		$400,000	
Gemini	AusGO	Receipts	NCRIS	$324,000		$324,000	
Gemini	Gemini operations	Receipts	NCRIS	$324,995		$324,995	
AAO	AAT refurbishment	Receipts	NCRIS	$950,000		$950,000	
Options	Strategic Options	Receipts	NCRIS	$1,238,000		$1,238,000	
Gemini	Gemini operations	Receipts	NCRIS	$1,400,389		$1,400,389	
AAO	AAT instrument	Receipts	NCRIS	$1,600,000		$1,600,000	
MIRA	MWA	Receipts	NCRIS	$2,100,000		$2,100,000	
MIRA	ASKAP	Receipts	NCRIS	$4,170,023		$4,170,023	
Magellan	Magellan 2010A	Payments - International Access	Carnegie		$444,635		$444,635
MIRA	ASKAP	Payment - Capital	CSIRO		$1,500,000		$1,500,000
MIRA	MWA	Payment - Capital	Curtin Uni		$875,000		$0
AAO	AAT instrument	Payment - Capital	AATB		$630,000		$630,000

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
AAO	AAT refurbishment	Payments - Operating	AATB		$275,000		$275,000
Gemini	AusGO	Payments - Operating	AATB		$81,000		$81,000
Gemini	Gemini operations	Receipts	ARC	$900,000		$900,000	
Gemini	Aspen	Payments - International Access	NSF (USA)		$397,185		$348,123
Gemini	Gemini operations	Payments - International Access	NSF (USA)		$900,000		$900,000
Gemini	Gemini operations	Payments - International Access	NSF (USA)		$251,185		$251,180
MIRA	ASKAP	Payment - Capital	CSIRO		$1,500,000		$1,500,000
MIRA	MWA	Payment - Capital	Curtin Uni		$875,000		$0
AAO	AAT instrument	Payment - Capital	AATB		$290,000		$290,000
AAO	AAT refurbishment	Payments - Operating	AATB		$275,000		$275,000
Gemini	AusGO	Payments - Operating	AATB		$81,000		$81,000
				$13,407,407	**$15,488,890**	**$13,407,407**	**$12,726,541**

The actual receipts are as budgeted. The actual payments are 82% relative to the budget. The significantly reduced payments throughout the year compared to budget are $2,703,508 for the MWA due to project delays and $49,062 for Aspen due to a more favourable AUD:USD exchange rate. These changes have resulted in an update of the Astronomy NCRIS summarised in the 2010/11 Astronomy NCRIS business plan.

The above payments of $12,726,541 are confirmed in the financial statements.
(See Note 2 to Financial Statements: sum of NCRIS Grants Paid plus LIEF Grants Paid.)

The above receipts of $13,407,407 are confirmed in the financial statements.
(See Note 2 to Financial Statements: sum of NCRIS Grants Received plus LIEF Grants received.)

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	Members	$173,056		$190,919	
AAL	AAL Operations	Receipts	NCRIS	$249,593		$249,593	
AAL	AAL Operations	Payments - Operating	AAL		$249,593		$249,593
AAL	AAL Operations	Payments - Operating	AAL		$173,056		$190,919
				$422,649	**$422,649**	**$440,512**	**$440,512**

The above receipts of $440,512 are confirmed in the financial statements. (See Note 2 to Financial Statements: Administration Grant plus Members subscriptions.)

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

Facility	Item	Transaction Type	From / To	Budget Receipts	Budget Payments	Actual Receipts	Actual Payments
AAO	AAT Instrument	Receipts	AATB	$0		$3,492,676	
AAO	AAT Instrument	Payments – Capital	AATB		$0		$3,492,676
				$0	**$0**	**$3,492,676**	**$3,492,676**

Following the HERMES PDR the AAO agreed to contribute more to the project than envisaged in the 2009/10 astronomy NCRIS business plan. This in-kind contribution is confirmed in the letter from the AAO (see letter below).

List of Astronomy NCRIS Reserve receipts & payments (GST exclusive)

Facility	Item	Transaction Type	From / To	Budget Receipts	Budget Payments	Actual Receipts	Actual Payments
Meetings	GMT	Payments - Operating			0		$7,925
Magellan	Magellan Fellows	Payments - International Access	AATB		$19,858		$26,890
Meetings	Antarctic	Payments - Operating	UNSW		$10,000		$10,000
PLATO	Antarctic	Payments - Operating	UNSW		$0		$330,000
Reserve	NCRIS reserve	Receipts	Interest	$225,000		$542,729	
				$225,000	**$29,858**	**$542,729**	**$374,815**

The amount of interest earned was 241% relative to budget. This was due to the timing of receipts and payments, decreased payments to MWA (noted above) and increasing interest rates. The major use of the Reserve not envisaged in the 2009/10 astronomy NCRIS business plan was $330,000 towards the cost of two new PLATOs.

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 $542,729 allocated to the Astronomy NCRIS Reserve is the Interest earned by the Astronomy NCRIS minus bank fees associated with the Astronomy NCRIS bank accounts.

AAO Statement confirming In-kind Contribution

Australian Government
Department of Innovation
Industry, Science and Research

Australian Astronomical Observatory

Professor Matthew Colless FAA FRAS
Director

P.O. Box 296, Epping
NSW 1710, Australia

Phone: +61 2 9372 4812
Fax: +61 2 9372 4880

Email: director@aao.gov.au

9 August 2010

Mr Mark McAuley
Chief Operating Officer
Astronomy Australia Limited
PO Box 2100
Hawthorn, VIC 3122

Dear Mark

The AAO confirms that the amount of its in-kind contribution to the HERMES instrumentation project for the Anglo-Australian Telescope through to the end of FY2009-10 was $3,492,676.

Yours,

Matthew Colless

Matthew Colless

Gemini Performance Indicators

Although the following information is for the financial year 2009/10, the observing semesters 2009B and 2010A on which statistics are based run from 1 Aug 2009 – 31 Jul 2010. The 2009/10 subscription paid by Australia for its 6.19% share of the Gemini partnership was:

LIEF $900,000 | **NCRIS** $1,374,657 | **Total** $2,274,657

In addition, NCRIS supplied the final payment of $348,123 as Australia's share of the Aspen instrumentation program and $318,000 for the costs of operating AusGO.

Providing Research Infrastructure

During Semesters 2009B and 2010A both Gemini telescopes have achieved new heights of operational efficiency. In Semester 2009B (the most recent complete semester for which statistics are available), 10 out of 11 Australian queue programs received 100% of their requested data. Considering that each Gemini partner is required to nominally overfill the queue so as to offer the maximum flexibility to the Gemini observer, this is an outstanding result and is testament to the efforts of the Gemini staff, as well as the flexibility of Australian Principal Investigators in being prepared to relax their observing condition constraints (particularly in lower-ranked queue bands) in order to maximise their chances of obtaining useful data. One PhD student even received more than 27 hours of useful data in the "Poor Weather" queue, for which Australia is not charged.

Meeting Researcher Needs / Fostering Collaboration

A total of 86 astronomers (26 of whom were PhD students) from 13 Australian institutions were involved in submitting 68 proposals for observing time with Gemini in 2009/10. These numbers are all up on the figures for 2008/09 (55 astronomers including 13 students from 11 institutions and 52 proposals). Collaborators from 83 foreign institutions (listed in Table 1) were involved, and the vast majority of proposals (93%) had investigators from one or more Australian institutions collaborating with investigators from one or more foreign institutions. Just 7% of proposals involved investigators from a single Australian institution only.

The over-subscription factor (ratio of hours requested to total hours available assuming no weather loss) for the year as a whole was 301%, a 40% increase on the demand in 2008/09. In total 44 astronomers from 9 institutions were allocated time in the Gemini queue bands (or classically-scheduled nights on the Subaru and Keck telescopes via a time exchange program), 15 of whom were PhD students. Table 2 lists the 17 papers published in refereed journals in the past year that have been based on Gemini data and involving Australian authors (down from 26 in 2008/09).

Quality of Research Infrastructure

An updated analysis of Gemini publication statistics for 2005–2008 by the Associate Director of Science Operations at Gemini, Dr Dennis Crabtree, yielded a couple of notable points. First, although Australia is a 6.2% partner in Gemini (with 5.7% of the observing time), papers based on programs to which ATAC contributed some or all of the observing time make up 8% of all Gemini publications. Even more impressive is that Australian Gemini publications have an impact factor (defined as the number of citations to a paper, relative to the median number of citations to all AJ papers in that same year) of 7.3, *the highest of all Gemini partners*, and more than twice that of US and UK Gemini papers.

Collaborative Infrastructure Provision

There were no changes to the Gemini Partnership during 2009/10, although the United Kingdom has foreshadowed their intention to withdraw at the end of 2012.

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

California Institute of Technology
Carnegie Institution of Washington
Cerro Tololo Inter-American Observatory
Consejo Superior de Investigaciones Científicas
Cyprus College
European Southern Observatory
Foundation for Research and Technology
Heraklion
Gemini Observatory
Harvard-Smithsonian Center for Astrophysics
Herzberg Institute of Astrophysics
Ibaraki University
Imperial College of Science Technology
and Medicine
Instituto de Astrofisica de Canarias
Instituto de Astronomia y Fisica del Espacio
Johns Hopkins University
Kapteyn Institute
Lawrence Berkeley National Laboratory
Lawrence Livermore National Laboratory
Max-Planck-Institut fur Astrophysik
Max-Planck-Institut fur Extraterrestrische Physik
McGill University
McMaster University
Michigan State University
Nagoya University
National Astronomical Observatory Japan
National Optical Astronomy Observatories
National Radio Astronomy Observatory
New Mexico State University
Observatoire de Strasbourg
Ohio State University
Osservatorio Astronomico di Torino
Pennsylvania State University
Pomona College
Queen's University Kingston
Saint Michaels College
Sejong University
South African Astronomical Observatory
Space Telescope Science Institute
Tata Institute of Fundamental Research
Trent University
Tuorla Observatory
Universidad de Chile
Universidad Nacional de La Plata
Universidade do Porto
Universitat Erlangen-Nurnberg
Universitat-Sternwarte Gottingen
Universite de Montreal
University College London
University of Bristol
University of Bochum
University of British Columbia
University of Calgary
University of California Berkeley
University of California Los Angeles
University of California Riverside
University of California Santa Barbara
University of California Santa Cruz
University of Cambridge
University of Chicago
University of Cologne
University of Crete
University of Durham
University of Edinburgh
University of Exeter
University of Florida
University of Georgia
University of Hawaii
University of Hertfordshire
University of Leicester
University of North Carolina
University of Notre Dame
University of Oxford
University of Pittsburgh
University of Southern California
University of Sussex
University of Texas
University of Toronto
University of Victoria
University of Washington
University of Waterloo
Valparaiso University
Victoria University of Wellington
Yale 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)

Amanullah, R., **Lidman, C.**, Rubin, D.. Aldering, G., Astier, P., Barbary, K., Burns, M., Conley, A., Dawson, K., Deustua, S., Doi, M., Fabbro, S., Faccioli, L., Fakhouri, H., Folatelli, G., Fruchter, A., Furusawa, H., Garavini, G., Goldhaber, G., Goobar, A., Groom, D., Hook, I., Howell, D., Kashikawa, N., Kim, A., Knop, R., Kowalski, M., Linder, E., Meyers, J., Morokuma, T., Nobili, S., Nordin, J., Nugent, P., Östman, L., Pain, R., Panagia, N., Perlmutter, S., Raux, J., Ruiz-Lapuente, P., Spadafora, A., Strovink, M., Suzuki, N., Wang, L., Wood-Vasey, W., Yasuda, N. (2010). *Spectra and Hubble Space Telescope Light Curves of Six Type Ia Supernovae at 0.511 < z < 1.12 and the Union2 Compilation*, Astrophysical Journal, 716, p. 712-738.

Fekel, F., Hinkle, K., Joyce, R., **Wood, P.** (2010). *Infrared Spectroscopy of Symbiotic Stars. VIII. Orbits for Three S-Type Systems: AE Arae, Y Coronae Australis, and SS 73-147*, Astronomical Journal, 139, p. 1315-1326.

Ryder, S., Illingworth, S., **Sharp, R.**, **Farage, C.** (2010). *The Nuclear Ring in the Barred Spiral Galaxy IC 4933*, Publications of the Astronomical Society of Australia, 27, p. 56-63.

Ural, U., Wilkinson, M., Koch, A., Gilmore, G., Beers, T., Belokurov, V., Evans, N., Grebel, E., Vidrih, S., **Zucker, D.** (2010). *Kinematic subpopulations in dwarf spheroidal galaxies,* Monthly Notices of the Royal Astronomical Society, 402, p. 1357-1368.

Storchi-Bergmann, T., Lopes, R., **McGregor, P.**, Riffel, R., Beck, T., Martini, P. (2010). *Feeding versus feedback in NGC4151 probed with Gemini NIFS - II. Kinematics*, Monthly Notices of the Royal Astronomical Society, 402, p. 819-835.

Davidge, T., Beck, T., **McGregor, P.** (2010). *Identifying Bright Stars in Crowded Environments Using Velocity Dispersion Measurements, and an Application to the Center of M32,* Publications of the Astronomical Society of the Pacific, 122, p. 241-247.

Levesque, E., Bloom, J., Butler, N., Perley, D., Cenko, B., Prochaska, X., Kewley, L., Bunker, A., Chen, H.-W., Chornock, R., Filippenko, A., **Glazebrook, K.**, Lopez, S., Masiero, J., Modjaz, M., Morgan, A., Poznanski, D. (2010). *GRB090426: the environment of a rest-frame 0.35-s gamma-ray burst at a redshift of 2.609*, Monthly Notices of the Royal Astronomical Society, 401, p. 963-972.

Mackey, A., Ferguson, A., Irwin, M., Martin, N., Huxor, A., Tanvir, N., Chapman, S., Ibata, R., **Lewis, G.**, McConnachie, A. (2010). *Deep Gemini/GMOS imaging of an extremely isolated globular cluster in the Local Group*, Monthly Notices of the Royal Astronomical Society, 401, p. 533-546.

Perley, D., Cenko, B., Bloom, J., Chen, H.-W., Butler, N., Kocevski, D., Prochaska, J., Brodwin, M., **Glazebrook, K.**, Kasliwal, M., Kulkarni, S., Lopez, S., Ofek, E., Pettini, M., Soderberg, A., Starr, D. (2009). *The Host Galaxies of Swift Dark Gamma-ray Bursts: Observational Constraints on Highly Obscured and Very High Redshift GRBs,* Astronomical Journal, 138, p. 1690-1708.

Mentuch, E., Abraham, R., **Glazebrook, K.**, McCarthy, P., Yan, H., O'Donnell, D., Le Borgne, D., Savaglio, S., Crampton, D., Murowinski, R., Juneau, S., Carlberg, R., Jørgensen, I., Roth, K., Chen, H.-W., Marzke, R. (2009). *A Near-Infrared Excess in the Continuum of High-redshift Galaxies: A Tracer of Star Formation and Circumstellar Disks?*, Astrophysical Journal, 706, p. 1020-1035.

Scarlata, C., Colbert, J., Teplitz, H., Bridge, C., **Francis, P.**, Palunas, P., Siana, B., Williger, G., Woodgate, B. (2009). *He II Emission in Ly-alpha Nebulae: Active Galactic Nucleus or Cooling Radiation?*, Astrophysical Journal, 706, p. 1241-1252.

Tanvir, N., Fox, D., Levan, A., Berger, E., Wiersema, K., Fynbo, J., Cucchiara, A., Krühler, T., Gehrels, N., Bloom, J., Greiner, J., Evans, P., Rol, E., Olivares, F., Hjorth, J., Jakobsson, P., Farihi, J., Willingale, R., Starling, R., Cenko, B., Perley, D., Maund, J., Duke, J., Wijers, R., Adamson, A., Allan, A., Bremer, M., Burrows, D., Castro-Tirado, A., Cavanagh, B., de Ugarte Postigo, A., **Dopita, M.**, Fatkhullin, T., Fruchter, A., Foley, R., Gorosabel, J., Kennea, J., Kerr, T., Klose, S., Krimm, H., Komarova, V., Kulkarni, S., Moskvitin, A., Mundell, C., Naylor, T., Page, K., Penprase, B., Perri, M., Podsiadlowski, P., Roth, K., Rutledge, R., Sakamoto, T., Schady, P., **Schmidt, B.**, Soderberg, A., Sollerman, J., Stephens, A., Stratta, G., Ukwatta, T., Watson, D., Westra, E., Wold, T., Wolf, C. (2009). *A Gamma Ray burst at a redshift of z~8.2*, Nature, 461, p. 1254-1257.

Miszalski, B., Acker, A., **Parker, Q.**, Moffat, A. (2009). *Binary planetary nebulae nuclei towards the Galactic bulge. II. A penchant for bipolarity and low-ionisation structures,* Astronomy & Astrophysics, 505, p. 249-263.

Mortlock, D. J., Patel, M., Warren, S. J., Venemans, B. P., McMahon, R. G., Hewett, P. C., Simpson, C., **Sharp, R.**, Burningham, B., Dye, S., **Ellis, S.**, Gonzales-Solares, E. A., Huélamo, N. (2009). *Discovery of a redshift 6.13 quasar in the UKIRT infrared deep sky survey,* Astronomy & Astrophysics, 505, p. 97-104.

Blum, R., **McGregor, P.** (2009). *High Angular Resolution Imaging Spectroscopy of the Galactic Ultracompact H II Region K3-50A*, Astronomical Journal, 138, p. 489-501.

Pracy, M., Kuntschner, H., **Couch, W.**, **Blake, C.**, **Bekki, K.**, **Briggs, F.** (2009). *The kinematics and spatial distribution of stellar populations in E+A galaxies,* Monthly Notices of the Royal Astronomical Society, 396, p. 1349-1369.

Dupuy, T., Liu, M., **Ireland, M.** (2009). *Keck Laser Guide Star Adaptive Optics Monitoring of the M8+L7 Binary LHS 2397aAB: First Dynamical Mass Benchmark at the L/T Transition*, Astrophysical Journal, 699, p. 168-185.

Magellan Performance Indicators

Although the following information is for the financial year 2009/10, the observing semesters 2009B and 2010A on which statistics are based run from Aug 2009 – Jul 2010. The costs of Australia's 15 nights on the Magellan telescopes was $889,269, funded by NCRIS.

Providing Research Infrastructure

In Semesters 2009B and 2010A, three new instruments were commissioned on the Magellan telescopes, including a 36 CCD mosaic camera (Magacam); a near-infrared imager and multi-object spectrograph (MMIRS); and the Planet Finding Spectrograph (PFS). Two new Magellan Fellows, Dr Francesco Di Mille and Dr Shane Walsh, took up their two-year research and observing support posts in Chile, replacing the previous Magellan Fellows Dr Ricardo Covarrubias and Dr David Floyd. Just over half of Australia's nights on Magellan were usable, with the rest lost to poor weather.

Meeting Researcher Needs / Fostering Collaboration / Quality of Research Infrastructure

A total of 48 astronomers (8 of whom were PhD students) from 11 Australian institutions were involved in submitting 20 proposals for observing time with Magellan in 2009/10. These numbers represent nearly a factor of two increase on 2008/09. Collaborators from 19 foreign institutions (listed in Table 3) were involved, with 7 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; 8 with investigators from a single Australian institution only; and one proposal with investigators from multiple Australian institutions only.

The oversubscription factor (ratio of nights requested to total nights available) for the year as a whole was 350%, similar to the demand for Gemini. In total, 17 astronomers from 5 institutions were allocated time on Magellan, 4 of whom were PhD students. 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, similar to that for 2008/09 (note that Magellan access has only been offered since January 2007).

Collaborative Infrastructure Provision

There were no changes to the Magellan Partnership during 2009/10.

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

Carnegie Institution of Washington	University of Durham
Harvard-Smithsonian Center for Astrophysics	University of Edinburgh
Johns Hopkins University	University of Hertfordshire
Lick Observatory	University of Michigan
Spitzer Science Centre	University of North Carolina
Stanford University	University of Oxford
University of Arizona	University of Toronto
University of Bochum	University of Washington
University of Cambridge	University of Waterloo
University of Cape Town	

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)

Stanford, L., **Da Costa, G.**, **Norris, J.** (2010). *Abundances of C, N, Sr, and Ba on the Red Giant Branch of Omega Centauri*, Astrophysical Journal, 714, p. 1001-1014.

Alves-Brito, A., Meléndez, J., Asplund, M., Ramírez, I., **Yong, D.** (2010). *Chemical similarities between Galactic bulge and local thick disk red giants: O, Na, Mg, Al, Si, Ca, and Ti,* Astronomy and Astrophysics, 513, A35.

Floyd, D., Thomas-Osip, J., Prieto, G. (2010). *Seeing, Wind, and Outer Scale Effects on Image Quality at the Magellan Telescopes*, Publications of the Astronomical Society of the Pacific, 122, p. 731-742.

Bochanski, J., Hennawi, J., Simcoe, R., Prochaska, X., West, A., Burgasser, A., Burles, S., Bernstein, R., Williams, C., **Murphy, M.** (2009). *MASE: A New Data-Reduction Pipeline for the Magellan Echellette Spectrograph,* Publications of the Astronomical Society of the Pacific, 121, p. 1409-1418.

Meléndez, J., Asplund, M., Gustafsson, B., **Yong, D.** (2009). *The Peculiar Solar Composition and Its Possible Relation to Planet Formation,* Astrophysical Journal, 704, p. L66-L70.

Floyd, D., Bate, N., Webster, R. (2009). *The accretion disc in the quasar SDSS J0924+0219*, Monthly Notices of the Royal Astronomical Society, 398, p. 233-239.

Astronomy Australia Ltd Code of Conduct

AAL is a public, non-profit company of limited liability, the principle 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 recognized 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 or she must declare this interest.
- Should a Member of the Board or Officer recognize that another Member or Officer has a conflict of interest, he or she 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

AAAAC	Australian Antarctic Astronomy Advisory Committee
AAAC	Antarctic Astronomy Advisory Committee
AABoM	Australian Astronomy Board of Management
AAL	Astronomy Australia Limited
AAO	Australian Astronomical Observatory (Prior to 1 July 2010 the Anglo-Australian Observatory)
AAPS	Anglo-Australian Planet Search
AAT	Anglo-Australian Telescope
AATB	Anglo-Australian Telescope Board
ABC	Australian Broadcasting Corporation
AGM	Annual General Meeting
AGMTAC	Australian Giant Magellan Telescope Advisory Committee
AGS	Australian Gemini Scientist
AGUSS	Australian Gemini Undergraduate Summer Students
AIPS	Astronomical Image Processing System
AISRF	Australia India Strategic Research Fund
AIT	Assembly, Integration and Testing
ANSOC	Astronomy NCRIS Strategic Options Committee
ANU	The Australian National University
ANZSCC	Australia - New Zealand SKA Coordination Committee
AO	Adaptive Optics
ARC	The Australian Research Council
ASA	The Astronomical Society of Australia
ASKAP	Australian Square Kilometre Array Pathfinder
ASTRON	Netherlands Institute for Radio Astronomy (Stichting Astronomisch Onderzoek in Nederland)
ATAC	Australian Time Assignment Committee
ATCA	Australia Telescope Compact Array
ATNF	Australia Telescope National Facility
AUI	Associated Universities, Inc
AURA	Association of Universities for Research in Astronomy
AusGO	Australian Gemini Office
AUT	Auckland University of Technology
BETA	Boolardy Engineering Test Array
CAASTRO	Centre of Excellence for All-Sky Astrophysics
CAD	Computer-aided design
CCD	Charge coupled device
CoDR	Concept Design Review
CPU	Central Processing Unit
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSTAR	Chinese Small Telescope Array
DEC	Declination
DGS	Deputy Gemini Scientist
DIISR	Department of Innovation, Industry, Science and Research
DSP	Digital Signal Processing
DST	Data/Signal Transport
EA	Engineers Australia
ED	Effective Date
EIF	Education Investment Fund

ELT	Extremely Large Telescope
EoR	Epoch of Re-ionization
ESO	European Southern Observatory
ESOWG	European Southern Observatory Working Group
FAA	Fellow of the Australian Academy of Science
FAICD	Fellow of the Australian Institute of Company Directors.
FDR	Final Design Review
FIEAust	Fellow of the Institution of Engineers Australia
FIEChemE	Fellow of the Institution of Chemical Engineers
FRACI	Fellow of the Royal Australian Chemical Institute
FRST	Foundation for Research, Science and Technology
FTSE	Fellow of the Australian Academy of Technological and Engineering Sciences
GAMA	Galaxy And Mass Assembly
GEG	Galactic and Extragalactic
GMACS	Giant Magellan Areal Camera and Spectrograph
GMOS	Gemini Multi-Object Spectrograph
GMT	Giant Magellan Telescope
GMTIFS	Giant Magellan Telescope Integral-Field Spectrograph
GMTO	Giant Magellan Telescope Organisation
GNOSIS	Gemini Near-infrared OH Suppression IFU System
GNRIS	Gemini Near Infra-Red Spectrograph
GPU	Graphics Processing Unit
GSAOI	Gemini South Adaptive Optics Imager
GST	Goods and Services Tax
gSTAR	GPU Supercomputer for Theoretical Astrophysics Research
HERMES	High Efficiency and Resolution Multi-Element Spectrograph
HPCWG	High Performance Computing Working Group
HRCAM	High Resolution Camera
HST	Hubble Space Telescope
IAU	International Astronomical Union
ICRAR	International Centre for Radio Astronomy Research
IRIS2	InfraRed Imaging Spectrograph 2
ITP	Integrated Project Team
IYA	International Year of Astronomy
LBT	Large Binocular Telescope
LIEF	Linkage Infrastructure Equipment and Facilities
LOFAR	Low Frequency Array
MANIFEST	Many-Instrument Fibre System
MIKE	Magellan Inamori Kyocera Echelle
MIT	Massachusetts Institute of Technology
MMIRS	MMT Magellan Infra-Red Spectrograph
MNRF	Major National Research Facility
MPIfR	Max-Planck-Institut für Radioastronomie
MR	Management Review
MRO	Murchison Radio-astronomy Observatory
MWA	Murchison Widefield Array
NCI	National Computational Infrastructure
NCRIS	National Collaborative Research Infrastructure Strategy

NGO	National Gemini Office
NIFS	Near-Infrared Integral-Field Spectrograph
NIRMOS	Near Infrared Multiple Object Spectrograph
NOAO	National Optical Astronomy Observatory
NRAO	National Radio Astronomy Observatory
NSF	National Science Foundation
OTAC	Optical Telescopes Advisory Committee
PBS	Product Breakdown Structure
PDR	Preliminary Design Review
PFS	Planet Finding Spectrograph
PLATO	Plateau Observatory
PLC	Programmable Logic Control
PMSEIC	The Prime Minister's Science, Engineering and Innovation Council
PreHEAT	(Prototype) High Elevation Antarctic Terahertz
PRIC	Polar Research Institute of China
PTF	Parkes Testbed Facility
RA	Right Ascension
RFI	Radio Frequency Interference
RSAA	Research School of Astronomy and Astrophysics (ANU)
RTC/RTS	Real Time Computer/Software
SHI	Solar, Heliospheric and Ionospheric
SKA	Square Kilometre Array
Snodar	Surface layer Non-Doppler Acoustic Radar
SoC	Statement of Collaboration
SoI	Statement of Intent
SSF	Super Science Fellowship
UNSW	University of New South Wales
UPS	Uninterruptable Power Supply
UTAS	University of Tasmania
UWA	University of Western Australia
VLT	Very Large Telescope
VPH	Volume Phase Holographic