

# Astronomy NCRIS: 2008/09 Business Plan

31<sup>st</sup> July 2008

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## Executive Summary

At the end of 2007/08, funding from the Astronomy NCRIS grant will cease to flow to two out of the seven projects (PILOT and GMT) until the decision regarding the future of the NCRIS Strategic Options funds is made. However, the PILOT science office has additional funding from the University of New South Wales and the AAL Board has agreed to contribute additional funding to the PILOT and GMT Project Offices to maintain momentum for both of these projects until the Strategic Options decision is finalised. For this reason, both projects are included in this Business Plan for 2008/09.

The management of AAL, the AAT refurbishment and new instrument, and membership of the Gemini International Partnership are all progressing according to schedule. An additional government grant awarded to significantly increase the overall investment in the ASKAP project resulted in a change to the NCRIS cash flow to ASKAP, and NCRIS is now funding the ASKAP digital subsystem.

## Material Changes

There are several material changes for the Astronomy NCRIS at this time relative to the Astronomy NCRIS Funding Agreement.

1. The PILOT project has been de-scoped from a *detailed* design with error margins of 10% to a *concept* design with error margins of 35%.
2. The Anglo-Australian Observatory will receive a cash advance of \$1.5M during 2008/09. This funding has been allocated from the AAT Instrument project and will cover the shortfall in the AAO operations budget while an alternate source of funding is secured. The funding for the AAT Instrument project will need to be re-allocated if that project is to be completed.
3. Phase 1 of the MWA project is currently behind schedule and may impact the NCRIS funded Phase 2.
4. The Aspen program has been de-scoped with the Precision Radial Velocity Spectrograph (PRVS) instrument cancelled and only *design studies* for the WFMOS instrument funded.

## Risks and their Mitigation

A key financial risk for the astronomy NCRIS lies in the substantial percentage of the programme due in US dollars. The astronomy NCRIS grant assumes an exchange rate of 0.75 and AAL would not have sufficient funds to complete all projects if the exchange rate falls below this. This risk has been partially mitigated by hedging the 2008, 2009 and 2010 Gemini Operations payments at an exchange rate of 0.8545 and purchasing GMT DDP year one at an exchange rate of 0.9000. The remaining US\$ commitments (Aspen, GMT DDP years 2 and 3, and 2011 Gemini Operations) are currently subject to exchange rate fluctuations. As the US\$ exchange rate is currently significantly higher than 0.75, and gains relative to budget have already been secured for 2008, 2009 and 2010 Gemini Operations and GMT DDP year one, the total exchange rate risk for the Astronomy NCRIS is now very low.

Although it does not currently impact the astronomy NCRIS program directly, the AAO is facing a shortfall in its operations budget due to the UK withdrawal from the organisation. Any shortfall in AAO operational funding will have some impact on the benefits of the NCRIS-funded refurbishment and new instrument for the AAT. In an effort to mitigate this risk, AAL is working with the AAO and DIISR to help address any shortfall in AAO operational funding.

NCRIS funds for Phase 2 of the MWA project could start in 2008/09. However, the MWA project team have indicated that some Phase 1 items are either unfunded or behind schedule,

with potential flow-on effects to Phase 2. Positive aspects for the project are the hiring of the new project manager, and constructive developments with the MWA phase 2 science case that may require amendments to the Astronomy NCRIS funding agreement. At the time of writing, AAL is working with the MWA project team to identify the path forward.

## **Status as of 30<sup>th</sup> June 2008**

### **Astronomy Australia Limited (AAL)**

Since its incorporation in April 2007, AAL has continued to build its reputation amongst stakeholders within the Australian astronomy community to ensure its high level governance role is converted from theory into practice. The vast majority of institutes that undertake astronomical research in Australia are already members of the company.

The Platforms for Collaboration (PfC) component of NCRIS has approached AAL regarding possible funding opportunities within PfC for the astronomical community. AAL has facilitated the development of one proposal to acquire supercomputing support for the astronomy community, and contributed to the development of a second proposal to fund aspects of the Australian Virtual Observatory. The AAL Board has elected to endorse both concepts as they are presented to the different funding components within PfC.

One of the key milestones for the Astronomy NCRIS program in 2008/09 is finalising the decision about how the Strategic Options funds will be used. In preparation for this, AAL has developed the timeline for the process, formed the Astronomy NCRIS Strategic Options Committee (ANSOC), and decided upon the composition and the Terms of Reference for the committee. All of this has been endorsed by the advisory committees for the projects that will be affected by the Strategic Options outcome, and made public via the AAL website.

The requirement to increase the staffing level for AAL identified in the 2007/08 Business Plan has been implemented by recruiting a 0.4EFT Communications Officer and 0.8FTE Office Manager.

### **Anglo-Australian Observatory**

The Anglo-Australian Observatory (AAO) is the national optical/infrared observatory with facilities at Siding Spring, near Coonabarabran, NSW and Epping, NSW. It is currently owned and operated jointly by the Australian Government and the United Kingdom Government.

The AAT refurbishment is progressing according to plan, with the nature, urgency and extent of the required refurbishments determined, costs for specific tasks estimated, and the contracts for the work scheduled for 2008/09 signed.

Various options for a new AAT Instrument were presented at the community-wide *AAT Future Instrumentation Workshop* held 9 November 2007. The workshop drew 43 participants and, based on the input received, the HERMES high-resolution spectrograph was selected for further study and progression to a concept level. This selection was approved by the AAT Board at its March 2008 meeting.

### **Australian membership of the Gemini International Partnership**

Australia is currently a member of the International Gemini Partnership through an agreement between the US National Science Foundation (NSF) and the Australian Research Council (ARC). This project continues Australia's membership of this Partnership so as to provide access to 6.19% of the two Gemini 8m telescopes.

After a successful transfer from the Australian National University (ANU) in January 2008, the Australian Gemini Office (AusGO) now resides at the AAO. The Australian Gemini Scientist (AGS) and one Deputy Gemini Scientist (DGS) are in place at the AAO, and the second DGS, based at the ANU's Research School of Astronomy and Astrophysics (RSAA), has been recruited and will start in September 2008.

Another transfer that took place in September 2007 was the financial management of the Gemini LIEF grant from the University of Sydney to AAL. This has resulted in the reduction of the number of co-investigators and partner institutions listed on the LIEF grant (a change endorsed by the Australian Gemini Steering Committee).

The demand for the Gemini telescopes remains strong and widespread, with an over-subscription factor of 170% and 260% in 2006 and 2007 respectively. Almost all institutions that conduct astronomy research in Australia have received data from Gemini over the past two years, and the resultant papers, with on average 20 citations per published paper, have had a huge impact on the broader astronomical community.

Australia continues to play a key role in the instrumentation associated with the Gemini telescopes with its second Gemini instrument, the Gemini South Adaptive Optics Imager (GSAOI) to undergo commissioning on the Gemini South telescope later in 2008. Both GSAOI and the Near-Infrared Integral Field Spectrograph (NIFS; the first Gemini instrument) were designed and built by RSAA at ANU. The AAO is now leading one of the two Wide-Field Multi-Object Spectrograph (WF MOS) concept studies that are underway.

The Gemini Aspen instrument program encountered a number of difficulties in 2007/08 and progress has therefore been slower than anticipated. The two main challenges were the announcement by the UK of their intention to withdraw from the Gemini partnership due to an unexpected but significant cut to the Science and Technology Facilities Council budget, and a much worse than expected budget outcome for the US National Science Foundation in 2008. As a result of these developments, the Gemini Board decided not to proceed with the procurement of the Precision Radial Velocity Spectrograph (PRVS) instrument and there are now only two Aspen program instrument projects: the full construction of the Gemini Planet Imager, and two competitive design studies for the WF MOS instrument (one of which is led by the AAO). This involves a total financial commitment of US\$33,170,000.

## **MWA**

At the time of writing, the NCRIS-funded phase 2 project plan is still being developed.

## **Development of ASKAP**

The Australian Square Kilometre Array Pathfinder (ASKAP) is a new world-class radio telescope as well as a technology test-bed for the proposed Square Kilometre Array (SKA) that potentially will be built in Western Australia. ASKAP is to be located at the Murchison Radio Observatory (MRO), which is Australia's candidate site for the SKA. The development of the MRO is part of the ASKAP program within CSIRO. The ASKAP program also has carriage of Australia's technical input into the international SKA program.

The ASKAP project received a large injection of funds in 2007/08 and needed to be completely reworked to incorporate such large changes. The project is now progressing steadily with the ASKAP Project Office established and the Masterplan for the entire ASKAP project developed. The \$14.6M NCRIS portion of the total \$100M ASKAP funding has been allocated to the ASKAP digital subsystem – a section of the project with a cost of approximately this amount – and the Digital Systems Integrated Product Team defined.

The Parkes Testbed Facility (PTF), a new 12-meter antenna at Parkes, is being commissioned with tests of the Phased Array Feed (or PAF, a core new technology for ASKAP) to commence mid-2008. A key component of the functioning PAF is the beam-former (b/f), which is part of the Digital System. The PTF b/f is now being integrated for deployment at Parkes. The Boolardy Engineering Test Array (BETA) is the next system to be built, and will be deployed out at the site on the first six antennas of the array. This system is largely designed. The design of the full ASKAP digital system is underway.

## **Giant Magellan Telescope Design Development Phase**

The goal of ANU and AAL to jointly acquire a 10% share in the GMT Design and Development Phase (DDP) has been accepted by the GMT Board. While it was anticipated that the GMT Organisation would commence the DDP during 2007/08, the majority of work has yet to be defined by the GMT Project Office in Pasadena, which at the time of writing had only just begun to populate its staff requirements.

The Australian Giant Magellan Telescope Project office (AGMTPO) is currently staffed with an NCRIS-funded manager plus ANU-funded support resources. Although project progress was initially slow, the AGMTPO is now on schedule and is expected to meet all milestones. NCRIS funding of the AGMTPO was due to cease at the end of the 2007/08 period, however, the AAL board has decided to continue funding the project office until the ANSOC process is complete to help maintain momentum with Australian GMT activities.

A highly successful *Science with the Giant Magellan Telescope* meeting was held in Canberra at the end of March 2008. Representatives from Australian government and industry attended the 3-day meeting which included key representation from all GMT partner institutions and an impressive diversity of speakers in terms of scientific and technical expertise.

## **PILOT Design Study**

The proposed PILOT is a 2.4-metre optical/infrared telescope that would be built and operated at Concordia Station, Dome C, in the Australian Antarctic Territory. PILOT is the first stage of the development path for a possible large optical observing facility in Antarctica.

In 2007/08, the PILOT science office was established at UNSW, and the AAAAC advisory committee established as a subcommittee of AAL. Negotiations were also initiated with European partners on the formation of an International PILOT Board. A website for the PILOT project was launched and the "PILOT Roadshow" completed its tour of major astronomical centres within Australia as part of a process of in-depth consultation with the community.

Most importantly, the PILOT design study (including the technical design study by the AAO under contract to UNSW) will be completed on schedule. This study will present a costing for the design, construction, and whole-of-life operation of PILOT, identification of risks and a mitigation strategies, identification of potential contractors and a spend profile for the next phase of PILOT.

## **Expected Progress and Milestones**

### **Astronomy Australia Limited (AAL)**

In 2008/09, AAL will continue to provide strategic leadership for the Astronomy NCRIS by providing recommendations to the NCRIS secretariat for the Astronomy NCRIS Strategic Options. In addition, as the Astronomy NCRIS only contains seed funding for the next generation of Australian optical telescope facilities, AAL will also develop an Optical Facilities Roadmap that will provide a coherent future for optical astronomy in Australia. This Roadmap will be built around the outcome of the Strategic Options process and will identify the facilities and funding required to progress Australian optical astronomy beyond NCRIS.

Specific AAL activities for Q3 and Q4 of 2008/09 will depend on the outcomes of the Strategic Options process and the submission of the Optical Facilities Roadmap. Detailed milestones for Q3/Q4 will be developed once these decisions have been made.

During the period of this business plan, AAL will continue to maintain clear and open communications with the Australian astronomy community through a regularly updated website. Quarterly electronic newsletters, the individual NCRIS sub-contracts, AAL's annual

reports, reports to DIISR and other reports of import to the astronomical community (e.g. the report from the Australian NCRIS Strategic Options Committee and the AAL Board's recommendations to the NCRIS Secretariat) will be made available from this website.

Community input into individual projects is coordinated at the project level.

<b>Period</b>	<b>Activities and Milestones - AAL</b>
2008-09 Q1 (Jul08-Sep08)	<ul style="list-style-type: none"> <li>• Sixth board meeting held</li> <li>• Quarterly newsletter published</li> <li>• 2007/08 Astronomy NCRIS progress report submitted to DIISR and made available from the AAL website.</li> <li>• Nominations Committee to nominate new AAL board directors,</li> <li>• Hold 2008 AAL Annual General Meeting.</li> <li>• Australian Gemini membership paid for second half of 2008</li> <li>• AAL receives recommendation from ANSOC on the use the Strategic Options funding</li> <li>• AAL Board's recommendations and ANSOC report to be simultaneously submitted to the NCRIS Secretariat and made public</li> </ul>
2008-09 Q2 (Oct08-Dec08)	<ul style="list-style-type: none"> <li>• MWA contract with the University of Melbourne signed</li> <li>• Seventh board meeting held</li> <li>• Quarterly newsletter published</li> <li>• Submit Astronomy Roadmap to DIISR</li> </ul>
2008-09 Q3 (Jan09-Mar09)	<ul style="list-style-type: none"> <li>• Eighth board meeting held</li> <li>• Quarterly newsletter published</li> </ul>
2008-09 Q4 (Apr09-Jun09)	<ul style="list-style-type: none"> <li>• Ninth board meeting held</li> <li>• Quarterly newsletter published</li> <li>• 2009/10 Astronomy NCRIS business plan submitted to DIISR</li> </ul>

## **Anglo-Australian Observatory**

### **Refurbishment of facilities**

Strategic Facility Services (SFS) were commissioned in 2005 to develop a Long Term Maintenance Plan for the AAO. Their report highlighted that a significant number of items needed to be addressed within the next five years. These are items primarily related to specialist equipment associated with the telescope that are over 30 years old, and of aging technology that may not be effectively supported in the future. The NCRIS funding for the infrastructure upgrade is to cover only the items identified as having the highest risk (risk levels 1 and 2) within the AAT, as documented in the SFS report.

In 2007/08, the nature, urgency and extent of the required refurbishments were determined, the first work packages put out to tender, and appropriate contracts signed. In 2008/09 the major refurbishment works initiated at the end of the previous period will be progressed with upgrades to several systems, major maintenance of the aluminising plant and cryogenic systems as well as specified instruments and optics, and the purchase of new tools and equipment.

<b>Period</b>	<b>Activities and Milestones - Refurbishment</b>
2008-09 Q1 (Jul08-Sep08)	<ul style="list-style-type: none"> <li>• Inspect and overhaul the primary mirror elevator.</li> <li>• Upgrade the dome shutter and brake control system.</li> <li>• Upgrade the main air-conditioning and ventilation system.</li> <li>• Upgrade the telescope ancillary system.</li> </ul>
2008-09 Q2 (Oct08-Dec08)	<ul style="list-style-type: none"> <li>• Upgrade specified HVAC plant.</li> <li>• Upgrade telescope hydraulic system.</li> </ul>

	<ul style="list-style-type: none"> <li>• Carry out major maintenance of aluminising plant and cryogenic systems.</li> <li>• Carry out major maintenance on specified instruments and optics.</li> </ul>
2008-09 Q3 (Jan09-Mar09)	<ul style="list-style-type: none"> <li>• Replace standby generator and upgrade the main electrical switch gear.</li> <li>• Purchase various items of testing and inspection equipment.</li> </ul>
2008-09 Q4 (Apr09-Jun09)	<ul style="list-style-type: none"> <li>• Purchase various mechanical machine tools and equipment.</li> <li>• Upgrade various optical equipment.</li> <li>• Upgrade the control system for the dome windscreen and cranes.</li> </ul>

### Anglo-Australian Telescope Instrument

A new instrument for the Anglo-Australian Telescope, providing world-leading scientific capabilities, will be developed, built and installed. The work will be undertaken primarily within the AAO's instrumentation facility and ownership of the new instrument will reside with the owners of the AAT.

Various options for a new AAT instrument were presented at a Community Review meeting in November 2007 and, based on the input received, the HERMES high-resolution spectrograph was selected for further study and progression to a concept level. The AAT Board approved the selection of HERMES at its meeting on 31 March/1 April, subject to AAL Board approval and a successful outcome of the Conceptual Design Review scheduled for mid-May 2008. The design for this instrument will be progressed through the preliminary and final design stages during the period covered by this Annual Business Plan.

The preliminary design phase is scheduled for completion late in the second quarter of 2008/09, with a formal design review to follow. The final design phase is expected to be nearing completion by the end of the fourth quarter of 2008/09. Due to the long lead time experienced in obtaining custom optical elements it will be necessary to place orders for the largest and most expensive of these in the first two quarters of 2008/09. This schedule is consistent with the current NCRIS funding profile.

Period	Activities and Milestones – AAT Instrument
2008-09 Q1 (Jul08-Sep08)	<ul style="list-style-type: none"> <li>• Release System Requirements document.</li> <li>• Release draft Optical Component Specification document.</li> <li>• Place orders for critical long lead-time optical elements.</li> </ul>
2008-09 Q2 (Oct08-Dec08)	<ul style="list-style-type: none"> <li>• Complete preliminary design work.</li> <li>• Release preliminary design report.</li> <li>• Release System Specification document.</li> <li>• Release revised Optical Component Specification document.</li> </ul>
2008-09 Q3 (Jan09-Mar09)	<ul style="list-style-type: none"> <li>• Hold Preliminary Design review.</li> <li>• Complete preliminary design phase.</li> <li>• Start final design phase.</li> <li>• Release component requirements document.</li> <li>• Define construction work packages.</li> </ul>
2008-09 Q4 (Apr09-Jun09)	<ul style="list-style-type: none"> <li>• All long-lead time components ordered.</li> <li>• Release draft component specification documents.</li> <li>• Release construction phase plan</li> </ul>

### Australian membership of the Gemini International Partnership

During the period of this Annual Business Plan, AAL has responsibility for the financial management of Australia's share of Gemini. Support of Australia's use of 8m-class telescopes will be undertaken by the AusGO which will manage the Australian time allocation process for 8m telescopes, perform specified support duties, implement an online database of all Australian 8m proposals to facilitate reporting requirements, and maintain an up-to-date website. It will also coordinate the Australian Gemini Undergraduate Summer Student

scheme, host the National Gemini Office Staff and Operations working groups (with delegates from all Gemini member countries attending), conduct an Australian 8m telescope user survey to gauge level of satisfaction with AusGO performance and determine priorities for future staff effort, and promote Gemini capabilities at several meetings.

The main milestone for the Aspen program in 2008/09 will be the Gemini Board decision as to whether the WFMOS instrument will proceed to full construction. The two competitive design studies (one of which is led by the AAO) will be completed in February 2009, reviewed shortly thereafter, and a recommendation made as to which team should be awarded the build contract. At that stage, the cost of building WFMOS will be known, as will the status of negotiations with the Japanese to jointly fund WFMOS and put it on the Subaru 8m telescope, and the ability of the Gemini partner countries to make the necessary financial commitments to see WFMOS through to completion. With this information, the Gemini Board should be able to make its decision about WFMOS at its May 2009 meeting. This means it will not be known until almost the end of 2008/09 what, if any, additional financial commitments to the Aspen program will be required.

Period	Activities and Milestones – Gemini Partnership
2008-09 Q1 (Jul08-Sep08)	<ul style="list-style-type: none"> <li>• Support Australian involvement in 8m-class telescopes by:               <ul style="list-style-type: none"> <li>○ managing the Australian time allocation process for 8m telescopes</li> <li>○ the AGS and both DGS's performing specified Gemini support duties</li> <li>○ supporting Gemini instruments as required</li> <li>○ maintaining an up-to-date AusGO web site</li> </ul> </li> <li>• AusGO promotes new Gemini capabilities to community at July 2008 Astronomical Society of Australia Annual Scientific Meeting in Perth, and by visits to Gemini user institutions.</li> <li>• Recruit 3 Australian Gemini Undergraduate Summer Students (AGUSS) to spend Dec 2008 - Feb 2009 at Gemini South.</li> <li>• Second Deputy Gemini Scientist (based at ANU) to begin contract</li> <li>• AGSC (advisory committee) reports to AAL on increased access to 8m telescopes</li> </ul>
2008-09 Q2 (Oct08-Dec08)	<ul style="list-style-type: none"> <li>• AusGO supports Australian involvement in 8m-class telescopes.</li> <li>• Coordinate AGUSS travel and projects with Gemini South.</li> <li>• Implement on-line database of all Australian 8m telescope proposals, to streamline reporting requirements.</li> </ul>
2008-09 Q3 (Jan09-Mar09)	<ul style="list-style-type: none"> <li>• AusGO supports Australian involvement in 8m-class telescopes.</li> <li>• Host National Gemini Office staff and Operations Working Group meetings at AAO (Jan 2009).</li> <li>• Organise AGUSS final seminars via videoconference from Chile.</li> </ul>
2008-09 Q4 (Apr09-Jun09)	<ul style="list-style-type: none"> <li>• AusGO supports Australian involvement in 8m-class telescopes.</li> <li>• Promote awareness of WFMOS to Gemini and Japanese user communities at the 3rd Gemini Science Meeting, proposed for Japan in April 2009.</li> <li>• Conduct Australian 8m telescope user survey.</li> <li>• AGSC<sup>1</sup> reports to AAL on the Aspen program</li> </ul>

<sup>1</sup> This is dependent on the WFMOS (major Aspen instrument) concept design studies being complete and reports to the Gemini Board.

## MWA

At the time of writing, detailed plans for MWA have not been finalised between AAL and the University of Melbourne. Once the MWA contract is signed, the detailed milestones for 2008/09 will be available in the NCRIS subcontract for the MWA project.

## Development of ASKAP

2008/09 will see the Boolardy Engineering Test Array (BETA) phase of the ASKAP Masterplan undertaken, principally in the form of developing and building the BETA version of all systems. During this phase, 6 antennas operating on the Murchison Radio Observatory site will allow a limited amount of developmental feedback and provide a significant platform for feed prototyping and testing.

Site acquisition should be finalized within the 2008/09 period and the optical fibre installation to the Murchison Radio Observatory (MRO) underway. The first antennas (which themselves are full ASKAP antennas, but with BETA subsystems) are scheduled to be installed at the MRO in late 2009.

Period	Activities and Milestones - ASKAP	
	Digital System	ASKAP Overall
2008T1	<ul style="list-style-type: none"> <li>• Parkes Testbed Facility (PTF) uses recent ATNF digital developments (SKAMP and CABB processor systems) to validate algorithms.</li> <li>• Digital Integrated Product Team is set up</li> <li>• First draft of Project Book chapter and WBS.</li> </ul>	<ul style="list-style-type: none"> <li>• PTF operational</li> <li>• Antenna design tender</li> <li>• Antenna Preliminary Design Review</li> <li>• Site fibre link design</li> </ul>
2008T2	<ul style="list-style-type: none"> <li>• Parkes testbed system operational</li> <li>• BETA Digital System Preliminary Design Review</li> <li>• Revised digital project plan submitted to AAL</li> </ul>	<ul style="list-style-type: none"> <li>• Testing of prototype phased-array feed on PTF</li> </ul>
2008T3	<ul style="list-style-type: none"> <li>• BETA digital design complete</li> <li>• Full ASKAP Digital System conceptual design</li> <li>• BETA Digital System Critical Design Review</li> </ul>	<ul style="list-style-type: none"> <li>• Site fibre link tender</li> <li>• Antenna build tender</li> <li>• Design site infrastructure/buildings</li> </ul>
2009T1/T2	<ul style="list-style-type: none"> <li>• ASKAP Digital System Preliminary Design Review</li> <li>• ASKAP Digital Systems Critical Design Review</li> <li>• BETA Digital System manufacture commence</li> </ul>	<ul style="list-style-type: none"> <li>• First site infrastructure</li> </ul>

## Giant Magellan Telescope Design Development Phase

In 2008/09, the ANU and AAL will continue with forward planning on the assumption that the Founders Agreement will be signed by all major partners and the Work Package Descriptions (WPDs) released, while the continuation of Australian GMT involvement will be assessed as part of the Strategic Options process.

The overall objective of the Australian GMT Project Office (AGMTPO) is to maximise the national benefit of GMT membership (for example, by making industry aware of potential GMT contracts) by working closely with the international GMT Project Office in Pasadena, Australian academia, and Australian industry. Although only funded by NCRIS until 31 July 2008, it is clear that the AGMTPO should remain in place until at least mid-October (once the ANSOC process is concluded and a decision finalised) so as not to lose momentum in the event of continued Australian involvement in GMT. For this reason the AAL Board has agreed to fund the office during this period.

Activities to take place between 1 July and 30 November include the delivery of the final DDP Funding Justification to AAL, ongoing outreach activities to industry, other participating organizations and the Federal Government, discussion of the DDP Funding Justification document as required at the ANSOC review, assisting AAL with any GMT component of a National Optical Facilities Roadmap, and conducting a competitive technology assessment review for GMT that is intended to identify the technological areas in which Australian Industry would have a competitive stance or advantage. This last item is in preparation for the release of the DDP Work Packages.

One of the key post-November activities will be to second two specialist personnel into the GMT Project Office in Pasadena. The long lead time associated with the task means that candidate personnel will need to be identified during 2008/09 Q1.

Period	Activities and Milestones
2008-09 Q1 (Jul08-Sep08)	<ul style="list-style-type: none"> <li>• Final AAL DDP funding justification submitted</li> <li>• AGMTAC reports to AAL on year one of GMT DDP</li> <li>• ANSOC Review Discussions</li> <li>• Final status report submitted to AAL Board</li> <li>• Assist AAL with National Optical Facilities Roadmap draft.</li> <li>• Competitive Technology Assessment</li> <li>• Identification of candidate Pasadena Project Office secondees</li> <li>• Continuation of promotional activities such as maintaining the website and industry cluster database and disseminating information about the GMT at appropriate venues in both academic and industry circles</li> </ul>
2008-09 Q2 (Oct08-Dec08)	<ul style="list-style-type: none"> <li>• Review DDP Funding Justification Document once work packages are released</li> <li>• Assist AAL with National Optical Facilities Roadmap.</li> <li>• Reach an agreement with AAL, ANU, DIISR, GMTO on a path for the future</li> <li>• Selection of Project Office secondees</li> <li>• Continuation of promotional activities such as maintaining the website and industry cluster database and disseminating information about the GMT at appropriate venues in both academic and industry circles</li> </ul>
2008-09 Q3 (Jan09-Mar09)	<ul style="list-style-type: none"> <li>• Per DDP Funding Justification document</li> </ul>
2008-09 Q4 (Apr09-Jun09)	<ul style="list-style-type: none"> <li>• Per DDP Funding Justification document</li> </ul>

## PILOT Design Study

Although NCRIS funding ceases to flow to the PILOT project at the end of 2007/08, the PILOT science office will remain open through additional funding from UNSW. This funding will support the science office in some capacity through until at least 2010, regardless of the outcome of the Strategic Options process. During the first two quarters of 2008/09 the main activities of the PILOT science office will be to assist in the ANSOC process, assist AAL with any PILOT component of a National Optical Facilities Roadmap, and to continue promotional activities. Additional activities for Q2 - Q4 of 2008/09 may be added as a result of the ANSOC deliberations.

Period	Activities and Milestones - PILOT
2008-09 Q1 (Jul08-Sep08)	<ul style="list-style-type: none"> <li>• Final PILOT funding justification submitted to AAL</li> <li>• AAAAC (advisory committee) reports to AAL on PILOT design study</li> <li>• ANSOC Review Discussions</li> <li>• Final status report submitted to AAL Board</li> <li>• Assist AAL with the National Optical Facilities Roadmap draft.</li> <li>• Continuation of promotional activities such as maintaining the website and disseminating information about PILOT at appropriate venues               <ul style="list-style-type: none"> <li>○ Public Presentation for "Festival of the Stars", Sydney Observatory</li> <li>○ Scientific presentation at SCAR meeting, St Petersburg, Russia</li> <li>○ Scientific presentation at FOROT meeting, Sardinia, Italy</li> </ul> </li> </ul>
2008-09 Q2 (Oct08-Dec08)	<ul style="list-style-type: none"> <li>• Assist AAL with the National Optical Facilities Roadmap.</li> <li>• Continuation of promotional activities such as maintaining the website and disseminating information about PILOT at appropriate venues</li> </ul>
2008-09 Q3 (Jan09-Mar09)	<ul style="list-style-type: none"> <li>• Per Final PILOT funding justification document.</li> <li>• Continuation of promotional activities such as maintaining the website and disseminating information about PILOT at appropriate venues.</li> </ul>
2008-09 Q4 (Apr09-Jun09)	<ul style="list-style-type: none"> <li>• Per Final PILOT funding justification document.</li> <li>• Continuation of promotional activities such as maintaining the website and disseminating information about PILOT at appropriate venues.               <ul style="list-style-type: none"> <li>○ Scientific presentation at ARENA meeting, Frascati, Italy</li> </ul> </li> </ul>

## Proposed governance, management, access and pricing arrangements

The governance arrangements during the period of this Annual Business Plan will be the same as described in section 4, ‘Governance Arrangements’ of the Project Plan. Specific items during this period will be:

- Retirement of two members from AAL’s board of directors and election of two directors by the members of AAL. (Note: retiring directors are eligible to stand for re-election).
- Advice from the Australian Giant Magellan Telescope Advisory Committee (AGMTAC) on GMT matters.
- Advice from the Australian Antarctic Astronomy Advisory Committee (AAAAC) on PILOT matters.
- Advice from the Australian Gemini Steering Committee (AGSC) for Gemini and 8m issues.
- Recommendations from the Astronomy NCRIS Strategic Options Committee (ANSOC) for the distribution of the NCRIS Strategic Options funding as well as a long-term strategy for optical astronomy.
- Management and reporting for each project will be undertaken by the relevant party:
  - AAO - AAT refurbishment and AAT instrument
  - AAO - Australian Gemini Office (AusGO)
  - Australian Gemini Board Member - Australian Gemini Membership and Aspen Instrument Program
  - ANU – GMT DDP
  - CSIRO – ASKAP
  - University of Melbourne – MWA
  - UNSW – PILOT

The access and pricing arrangements during the period covered by this Annual Business Plan will be the same as described in section 3, ‘Access and Charging Arrangements’ of the Project Plan. Briefly, the following principles will apply in relation to access to the facilities and charging for their use:

- Time assignment for the facilities will be merit-based in accordance with established application and peer-review procedures;
- Effective data management systems will be embedded within the facilities, with services including comprehensive on-line archives, pipeline data-reduction tools and researcher access to reduced data products and catalogues to be provided; and
- Access to the facilities will be provide free of charge (although some of the costs entailed in using the facilities – such as travel and accommodation costs – may be borne by users).

## Proposed promotional activities

During the period of this Annual Business Plan, AAL will build upon its initial reputation and increase its profile with the Australian astronomical community. This will be achieved through:

- successful implementation of the Radio and Optical Astronomy NCRIS programme
- quarterly electronic newsletters which provide clear and open communications about AAL and the status of Australia's astronomy infrastructure
- a regularly updated website which highlights major AAL/infrastructure news items
- promote awareness of AAL and clarify the ANSOC process at the Astronomical Society of Australia Annual Scientific Meeting in Perth.
- presentations where appropriate at committee/staff/community meetings

In addition, some of the funded projects will also undertake their own promotional activities:

- AGMTPO
  - disseminate information on opportunities offered by the GMT at appropriate academic and industry meetings and through travel to Australian universities and other appropriate institutions
  - Maintain an up-to-date AGMTPO website
  - Maintain the industry cluster database
- PILOT
  - Maintain an up-to-date PILOT website
  - Public Presentation for "Festival of the Stars", Sydney Observatory
  - Scientific presentation at SCAR meeting, St Petersburg, Russia
  - Scientific presentation at FOROT meeting, Sardinia, Italy
  - Scientific presentation at ARENA meeting, Frascati, Italy
- AusGO
  - Maintain an up-to-date AusGO website
  - Promote new Gemini capabilities to community at July 2008 Astronomical Society of Australia Annual Scientific Meeting in Perth, and by visits to Gemini user institutions.
  - Promote awareness of WFMOS to Gemini and Japanese user communities at the 3rd Gemini Science Meeting, proposed for Japan in April 2009.
- MWA
  - Maintain an up-to-date MWA website
  - Organise two open meetings to present MWA progress and scientific developments
  - Present scientific talks on MWA science at local and international meetings
- ASKAP
  - Maintaining an up-to-date ASKAP website and contributing to the Team-Australia web presence
  - Producing the AuSKA newsletter
  - Presenting and/or having a presence at scientific and technical talks at national and international meetings/conferences
  - Production of ASKAP and SKA related fact sheets and educational material for both web and direct distribution.
  - Using PULSE@Parkes and other programs as testbed programs to show 'proof of concept' for outreach programs from ASKAP

## Financial projections (GST exclusive)

### ASKAP cash flow

Following the additional funding allocated to the ASKAP project in the May 2007 budget, CSIRO has requested a change to the NCRIS cash flow for ASKAP. The revised cash flow is:

2007/08:	\$1,000,000
2008/09:	\$3,000,000
2009/10:	\$4,500,000
2010/11:	\$6,100,000

### Gemini and the Strategic Options fund

Australia's commitment to the Aspen programme over the life of the Astronomy NCRIS (based on 6.19% share of Gemini) has now been clarified as:

	US\$	AU\$
2007/08:	\$297,889	\$315,193
2008/09:	\$424,165	\$499,018
2009/10:	\$566,226	\$666,148
2010/11:	\$408,819	\$480,964
<b>Total:</b>	<b>\$1,697,099</b>	<b>\$1,961,322</b>

Therefore, \$511,972 will be transferred from the current balance of the Aspen grant held by AAL to the Strategic Options fund, and future NCRIS receipts planned for Aspen will now be allocated to the Strategic Options fund.

The exchange rates associated with Gemini Operations payments (based on 6.19% share of Gemini) have been hedged for 2008, 2009 and 2010, and \$941,166 of future NCRIS receipts planned for Gemini Operations can now be transferred to the Strategic Options fund.

The funds now available for the strategic options fund are:

Base strategic options fund	\$1,356,375
Transfer from Aspen	\$2,987,972
Transfer from Gemini Operations	\$941,166
<b>Total strategic options fund</b>	<b>\$5,285,513</b>

### Change in cash balance

The Astronomy NCRIS transactions planned for 2008/09 will result in a reduction in the cash balance held by AAL across its Astronomy NCRIS accounts of \$3,292,218:

NCRIS grants to be allocated (30 <sup>th</sup> June 2008):	\$10,772,469
Change:	(\$3,292,218)
NCRIS grants to be allocated (30 <sup>th</sup> June 2009):	\$7,480,251 (estimate)

Note: This amount does not include the projected balance of the NCRIS reserve listed below.

### Interest projections

During 2008/09, AAL expects to earn approximately \$670,000 in interest from the NCRIS grant. This interest estimate will fluctuate depending upon:

- Timing of the receipt of the 2008/09 NCRIS Grant from DIISR;
- Timing of payments to projects yet to be finalised: MWA and strategic options;
- Interest rates available.

\$60,000 of this interest has been allocated to assist the PILOT and GMT projects to contribute to the Astronomy Roadmap. The remainder of this interest will be held in reserve to be allocated by the AAL Board to one or more of the current Astronomy NCRIS projects.

Balance of NCRIS reserve 30 <sup>th</sup> June 2008:	\$809,635
Balance of NCRIS reserve 30 <sup>th</sup> June 2009:	\$1,419,635 (estimate)

### **Notes to transactions**

The GMTDDP project has \$75,689 remaining as of 30<sup>th</sup> June 2008 as a result of favourable exchange rates. This amount is listed as being paid during 2008/09, however the final recipient of that money will be determined after the ANSOC process is completed.

The transactions listed for strategic options payments will be updated after the ANSOC process is completed.

## 2008/09 astronomy NCRIS transactions – GST exclusive

Date	Facility	Item	Transaction Type	From / To	Receipts	Payments
1/07/2008	Gemini	Gemini operations	Payments - International Access	NSF (USA)		\$1,095,717
1/08/2008	MIRA	ASKAP	Payment - Capital	CSIRO		\$1,000,000
1/08/2008	AAO	AA T instrument	Payment - Capital	AA TB		\$425,000
1/08/2008	AAO	AAO Operations AA T	Payments - Operating	AA TB		\$375,000
1/08/2008	AAO	refurbishment	Payments - Operating	AA TB		\$275,000
1/08/2008	AAL	AAL Operations	Payments - Operating	AAL		\$243,340
1/08/2008	Gemini	AusGO	Payments - Operating	AA TB AAL		\$75,000
1/11/2008	AAL	AAL Operations	Receipts	members	\$170,000	
1/11/2008	AAL	AAL Operations	Payments - Operating	AAL		\$170,000
1/11/2008	AAO	AA T instrument	Payment - Capital	AA TB		\$425,000
1/11/2008	AAO	AAO Operations AA T	Payments - Operating	AA TB		\$375,000
1/11/2008	AAO	refurbishment	Payments - Operating	AA TB		\$275,000
1/11/2008	GMT	GMT DDP - TBC	Payments - International Access	GMT PO (USA)		\$75,689
1/11/2008	Gemini Strategic Options	AusGO	Payments - Operating	AA TB		\$75,000
1/01/2009	MIRA	GMT/PILOT/8m	Payments - TBD	TBD		\$1,356,375
1/01/2009	MIRA	ASKAP	Payment - Capital	CSIRO		\$1,000,000
1/01/2009	MIRA	MWA	Payment - Capital	Melb Uni		\$400,000
1/01/2009	AAL	AAL Operations	Receipts	NCRIS	\$243,340	
1/01/2009	AAO	AA T instrument	Receipts	NCRIS	\$300,000	
1/01/2009	Gemini	AusGO	Receipts	NCRIS	\$312,000	

1/01/2009	MIRA Strategic Options	MWA	Cash	Receipts		NCRIS	\$400,000	
1/01/2009	Gemini	GMT/PILOT/8m	Cash	Receipts		NCRIS	\$616,171	
1/01/2009	AAO	ASKAP	Cash	Receipts		NCRIS	\$1,042,938	
1/01/2009	Strategic Options	GMT/PILOT/8m	Cash	Receipts		NCRIS	\$1,100,000	
<b>Date</b>	<b>Facility</b>	<b>Item</b>		<b>Transaction Type</b>		<b>From / To</b>	<b>Receipts</b>	<b>Payments</b>
1/01/2009	Strategic Options	GMT/PILOT/8m	Cash	Receipts		NCRIS	\$1,238,000	
1/01/2009	AAO	AAO Operations	Cash	Receipts		NCRIS	\$1,500,000	
1/01/2009	MIRA Strategic Options	ASKAP	Cash	Receipts		NCRIS	\$4,442,551	
1/02/2009	Gemini	Aspen	Cash	Payments - TBD		TBD		\$2,987,972
1/02/2009	AAO	AA T instrument	Cash	Payments - International Access		NSF (USA)		\$499,018
1/02/2009	AAO	AAO Operations	Cash	Payment - Capital		AA TB		\$425,000
1/02/2009	AAO	AAO Operations	Cash	Payments - Operating		AA TB		\$375,000
1/02/2009	Gemini	refurbishment	Cash	Payments - Operating		AA TB		\$275,000
1/02/2009	Gemini	AusGO	Cash	Payments - Operating		AA TB		\$78,000
1/02/2009	Gemini	Gemini operations	Cash	Receipts		ARC	\$900,000	
15/03/2009	Gemini	Gemini operations	Cash	Payments - International Access		NSF (USA)		\$900,000
15/03/2009	Gemini	Gemini operations	Cash	Payments - International Access		NSF (USA)		\$223,108
1/05/2009	MIRA	ASKAP	Cash	Payment - Capital		CSIRO	\$1,000,000	
1/05/2009	AAO	AA T instrument	Cash	Payment - Capital		AA TB	\$425,000	
1/05/2009	AAO	AAO Operations	Cash	Payments - Operating		AA TB	\$375,000	
1/05/2009	AAO	refurbishment	Cash	Payments - Operating		AA TB	\$275,000	

1/05/2009	Gemini	AusGO	Cash	Payments - Operating	AATB	\$78,000
1/06/2009	PILOT	Science Centre	Inkind	Receipts	UNSW	\$176,355
1/06/2009	PILOT	Science Centre	Inkind	Payments - Operating	UNSW	\$176,355
30/06/2009	NCRIS reserve	NCRIS reserve	Cash	Receipts	Interest	\$610,000
1/08/2008	Roadmap	AGMTPO	Cash	Receipts	Interest	\$30,000
1/08/2008	Roadmap	PILOT Office	Cash	Receipts	Interest	\$30,000
1/08/2008	Roadmap	AGMTPO	Cash	Payments - Operating	ANU	\$30,000
1/08/2008	Roadmap	PILOT Office	Cash	Payments - Operating	AAO	\$30,000