

The ATNF in brief

The ATNF supports Australia's research in radio astronomy, one of the major fields of modern astronomy, by operating the Australia Telescope, a set of eight individual radio telescopes.

Mission

- ♦ To operate and develop the Australia Telescope as a national research facility for use by Australian and international researchers.
- ♦ To exploit the telescope's unique southern location and technological advantages to maintain its position as a world-class radio astronomy observatory.
- ♦ To further the advancement of knowledge.

Size and funding

The ATNF employs approximately 135 staff. In 2001 – 2002 the organisation's total expenditure budget was A\$17.3M, of which A\$12.9M was direct appropriation from CSIRO.

Status within CSIRO

The ATNF is managed as a National Facility by Australia's largest national research institution, CSIRO. Formerly part of the CSIRO Division of Radiophysics, it became a separate division in January 1989. The Australia Telescope Steering Committee, appointed by the Minister for Science to advise the ATNF Director, also acts as the Advisory Committee for CSIRO's Radio Astronomy Sector.

Status as a National Facility

The ATNF became a National Facility in April 1990. As a National Facility, the Australia Telescope provides world-class observing facilities in radio astronomy for astronomers at Australian and overseas institutions. The Australia Telescope is

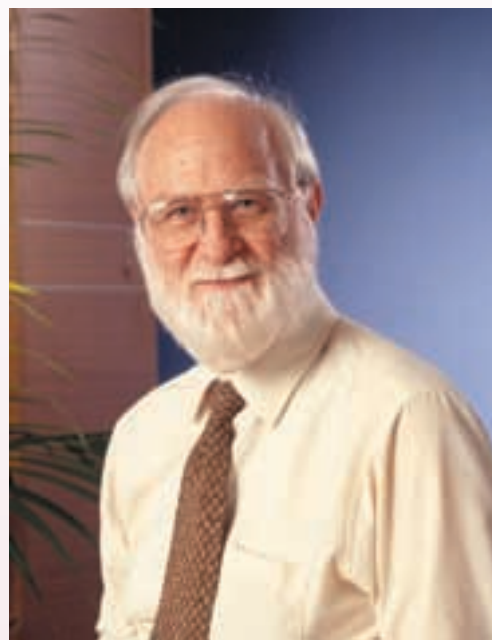


Photo: Kristen Clarke

Professor Ron Ekers, Director of the ATNF

operated as a National Facility under guidelines originally established by the Australian Science and Technology Council.

Users of ATNF telescopes

Observing time on the ATNF's telescopes is awarded to researchers on the basis of the merits of their proposed research programs by a Time Assignment Committee appointed by the Steering Committee. Approximately 90% of the telescopes' users come from outside the ATNF. In 2002 the proposals allocated time included scientists from 14 institutions in Australia and 126 institutions in 24 other countries.

The ATNF in the Australian context

The ATNF is the largest single astronomical institution in Australia. Approximately 90% of Australian radio astronomy is carried out through the ATNF. The organisation has strong links with

its primary user base, the university community. The interests of telescope users are represented by the Australia Telescope Users Committee.

The ATNF's Sydney headquarters are co-located with those of the Anglo-Australian Observatory, an independent bi-National Facility that provides world-class optical and infrared facilities. This close association is unique, in world terms, and promotes valuable collaboration between the two organisations.

The ATNF in the global context

Of the fields of modern astronomy—X-ray, ultra-violet, optical, infrared and radio—Australia makes one of the most significant contributions to world astronomy through radio astronomy. This is a result of Australia's early lead in the field, continuous technological advances, and southern hemisphere location. The Australia Telescope is the only major radio telescope of its kind in the southern hemisphere, and thus can view part of the sky which is out of reach of northern hemisphere telescopes. It provides one of the most powerful radio astronomy facilities in the world.

Australian and international observers use the telescope without access charges. This is in accordance with a general practice of the world-wide astronomical community, in which telescope users from different countries gain reciprocal access to facilities on the basis of scientific merit. This allows Australian scientists to use telescopes in other countries and international facilities such as particle accelerators and space-based instruments. Such access provides Australian scientists with a diversity of instruments and leads to a rich network of international collaborations.

The ATNF's observatories

The Australia Telescope consists of eight radio-receiving antennas, located at three sites in New South Wales.

Six of them make up the Australia Telescope



Photo: Kristen Clarke

John Brooks, Assistant Director of the ATNF

Compact Array, located at the Paul Wild Observatory near the town of Narrabri. Five of these antennas sit on a 3-km stretch of rail track running east–west; they can be moved to different points along the track to build up detailed images of the sky. A sixth antenna lies 3 km to the west of the main group. Each of these antennas has a reflecting surface 22 metres in diameter. After the radio signals from space are “collected” by the antennas’ surfaces they are transformed into electrical signals, brought together at a central location, and then processed. The end result is usually a picture or a spectrum of the object being studied—a picture equivalent to a photograph, but made from radio waves instead of light.

A further 22-m antenna, known as the Mopra telescope, is located near Mopra Rock, in the Warrumbungle Mountains near Coonabarabran, New South Wales.

The other key component of the Australia Telescope is the Parkes 64-m radio telescope, located near the town of Parkes. This telescope has been successfully operated since 1961 and is famous as a national symbol for Australian scientific achievement. Recent upgrades to accommodate a 13-beam focal-plane array have maintained its world-class position as a state-of-the-art instrument.

The eight ATNF telescopes can be used together as the Long Baseline Array (LBA) for a technique known as very long baseline interferometry (VLBI) which is used to obtain high resolution images of small areas of sky. The LBA is used as part of a larger Australian network of radio telescopes which includes the NASA satellite tracking antennas at Tidbinbilla, near Canberra, and radio antennas in Tasmania, South Australia and Western Australia. The LBA is also regularly used as part of the Asia-Pacific Telescope which links radio telescopes in Australia, Japan, China, Hawaii and India, and the VLBI Space Observatory Program (VSOP).

Engineering and technology development

The advance of radio astronomy depends crucially on exploiting the latest technological developments in a range of areas which include electronics, receiver technology, signal detection and processing, control systems, data processing and information technology. The ATNF provides a platform for the development of cutting-edge technology in Australia.

ATNF Steering Committee

ATNF policy is determined by the ATNF Steering Committee, an independent committee appointed by the Minister for Science. The Committee helps CSIRO to develop the ATNF’s long-term strategy. The inaugural meeting of the ATNF Steering Committee was held in May 1989. Since then it has met at least once a year, to define the broad directions of the ATNF’s scientific activities and the development of the Australia Telescope. It is also responsible for promoting the use of the Facility and, indirectly, for allocating observing time.

The Steering Committee appoints the Australia Telescope Users Committee (ATUC) to provide feedback and advice from the user community, and the Time Assignment Committee (TAC) to review proposals and allocate observing time. The committee members for the year 2002 are listed in Appendix C.

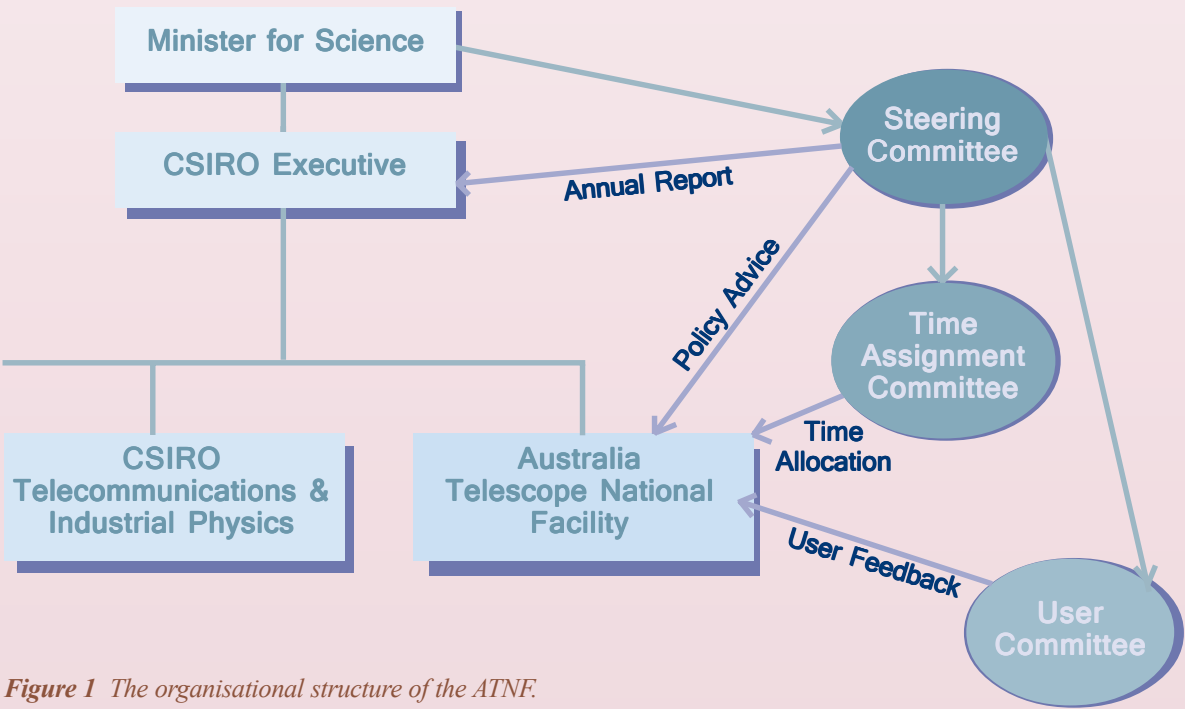


Figure 1 The organisational structure of the ATNF.

Australia Telescope Users Committee

ATUC represents the interests of the Australia Telescope's users. The committee provides feedback to the ATNF Director, discussing problems with, and suggesting changes to, ATNF operations; it also discusses and ranks by scientific merit various future development projects. ATUC meetings are also a forum for informing AT users of the current status and planned development of ATNF facilities, and recent scientific results. ATUC discussions can be found on the web at www.atnf.csiro.au/management/atuc.

Time Assignment Committee

The ATNF receives more applications for observing time than it can accommodate: proposals for time on both the Parkes and Narrabri telescopes exceed the time available by a factor of approximately two. The proposals are assessed, and time allocated to them, by the TAC. The TAC meets three times a year and reviews approximately one hundred telescope applications at each meeting.

Strategic objectives

The ATNF is one of the world's leading radio astronomy organisations. The strategic objectives for the ATNF are:

- ◆ **To continue to operate the Australia Telescope in such a way as to maintain a leading international position**

The ATNF will provide access to its facilities to satisfy the needs of Australian and overseas users. At least 70% of time on the Parkes and Narrabri telescopes will be used for astronomy. Time lost during scheduled observing periods will be kept to below 5%.

- ◆ **Develop and extend the performance of the Australia Telescope to maintain its competitiveness in the medium term (3 – 8 years)**

During the last five years the Narrabri and Mopra telescopes have been extensively upgraded, under the Major National Research Facilities (MNRF) program, funded in 1997, to work at shorter (millimetre) wavelengths. The upgraded telescopes use innovative devices for the detection of extremely weak millimetre-wave signals from space. These have been jointly designed by the ATNF and CSIRO Telecommunications and Industrial Physics (CTIP), a project funded by the CSIRO Executive Special Project. The MNRF upgrade also extends the Australian network of telescopes used for VLBI, which has both astronomical and geodetic applications. The MNRF upgrades will be fully completed in 2004.

- ◆ **To position the ATNF to participate in major international radio astronomy projects developing over the next decade**

The MNRF upgrade will allow the ATNF to maintain a leading position for the next eight to ten years. Beyond that, radio astronomy will be dominated by two major international developments: the Atacama Large Millimetre Array (ALMA) and the SKA. These instruments will allow astronomers to pursue key questions about the early evolution of the Universe. For Australia to maintain its position in radio astronomy, it needs to have a significant role in at least one of these projects. The SKA is a billion-dollar project, the "next-generation" radio telescope with a collecting area of one square kilometre. Its construction is expected to start around 2012. Australia is well positioned to play a key role in the development of the SKA. In some respects Australia offers an ideal location for the SKA as it has a number of regions of low population density which are relatively free from radio interference. The technology development required for the SKA will have wide industrial applications and the construction will involve significant industrial contracts.

In August 2001, the Government announced the allocation of A\$155M under the MNRF-

2001 program to 15 successful programs in Australia. Of these the ATNF-led proposal for SKA development, and improved access to the optical Gemini telescopes, received the largest single allocation of A\$23.5M. Initial funding under this award was received in 2002.

◆ To conduct an effective outreach program

The ATNF operates Visitors Centres at the sites of the Parkes and Narrabri Observatories and has an active public outreach program which has several goals: to raise the national profile of astronomy and related technology in Australia; to encourage the next generation of scientists by providing educational resources targetted at high school students and their teachers; and to maintain good community relationships.

ATNF management changes in 2002

The ATNF Director, Professor Ron Ekers, was on leave of absence from July 2001 until April 2002 to take up a Miller Professorship at the University of California Berkeley astronomy department. During his absence, and for much of the remainder of 2002, Professor Ray Norris took over as the Acting Director of the ATNF with John Brooks continuing as Assistant Director.

In July 2002 the Australian Research Council announced that Professor Ekers was awarded a Federation Fellowship, one of the most prestigious and richest publicly-funded research positions ever offered in Australia. One of the conditions of this fellowship is that Professor Ekers will cease to have a role in the management of the ATNF for the



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Professor Ray Norris, Deputy Director of the ATNF

five-year term of the fellowship from March 2003. Following this announcement, ATNF and CSIRO processes were put into motion to find and appoint a new Director.

In May 2002 Dr Lewis Ball was appointed as Deputy Officer-in-Charge of the Parkes Observatory and Human Resources Manager for the ATNF as a whole. In December 2001, Dr David McConnell completed his term as Officer-in-Charge of the Narrabri Observatory and returned to Marsfield to take up a management position as Head of Special Projects. Mr Ron Beresford, the Deputy Officer-in-Charge at

Narrabri, also moved to Marsfield. Dr Bob Sault took over as the Narrabri Officer-in-Charge on 1 January 2002 bringing to the observatory a broad range of expertise in engineering, astronomy and computing.

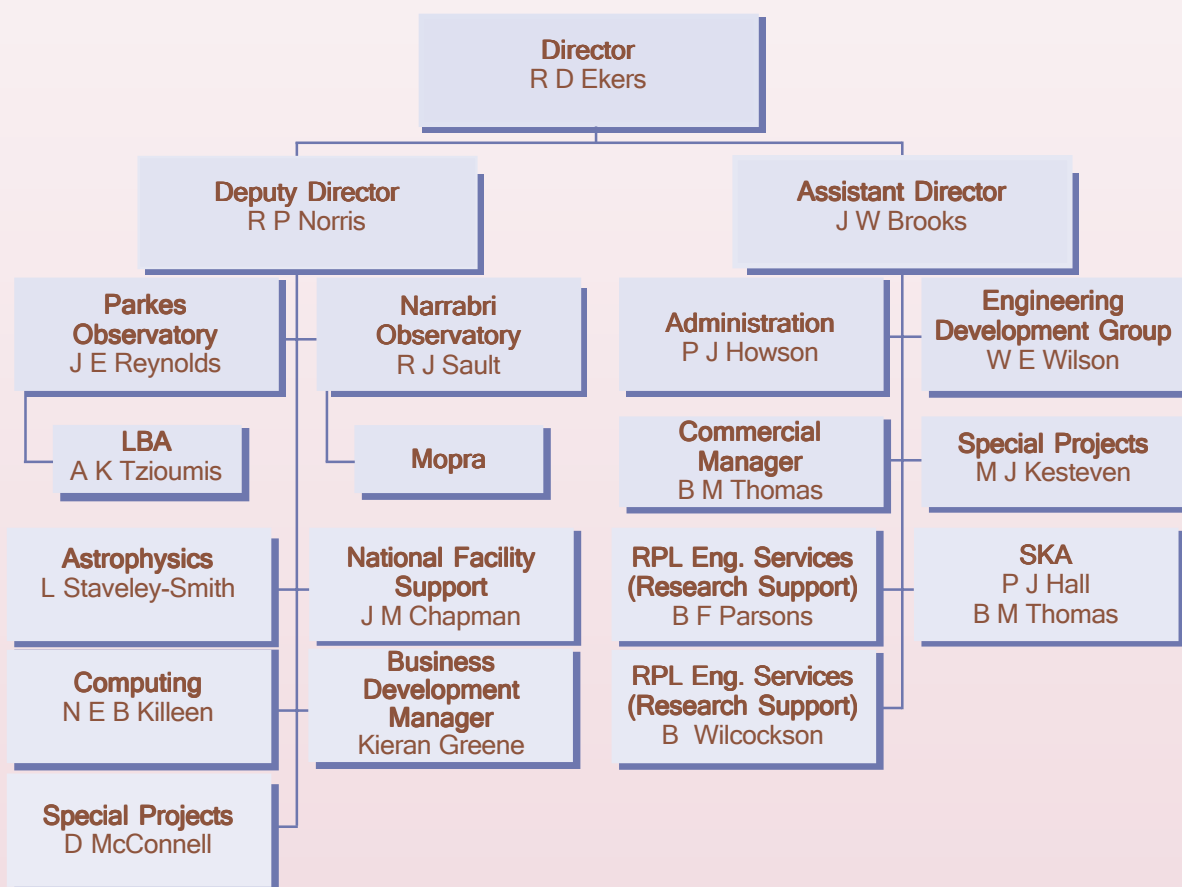


Figure 2 The management structure of the ATNF in July 2002.