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# SA, Australian radio astronomy software teams to pursue different paths

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South Africa and Australia have decided to terminate their collaborative radio astronomy software development programme, designated Convergent Radio Astronomy Demonstrator, or Conrad for short. Launched in July 2006, Conrad was intended to develop software for both South Africa's Karoo Array Telescope (Meer-KAT) and the Australian Square Kilometre Array Pathfinder.

Both these instruments are intended as precursors to the international Square Kilometre Array (SKA), a €1,5-billion pro- ject to create a radio telescope array that will be 50 times more sensitive than any existing instrument (see Engineering News May 9, 2008). South Africa and Australia are the two countries shortlisted to host the SKA.

Although Conrad has been a success, the requirements of the two sides have begun to diverge in terms of the technologies they seek to apply, which have different data processing requirements, and, so, different approaches to software development. The programme's successes include the development of the Conrad Telescope Operating System, which was written from scratch and is now operating South Africa's MeerKAT prototype XDM dish at the Hartebeesthoek Radio Astronomy Observatory, west of Pretoria.

Another achievement has been the configuration of a powerful design tool, known as Antconfig, which has been used for the design of both MeerKAT and Askap.

Further, coding has been developed in both C++ and Python software languages, with extensive use of third-party lib- raries and deployment to a number of different platforms. A powerful and robust Python package, called ACSM, has been developed to control antennas. Synthesis processing code is being run in parallel on a range of different machines, from clusters to the Cray XT3 supercomputer.

But now, although the South Africans and Australians are both pursuing innovative technologies for their SKA Pathfinders, they have begun to pursue different technologies. Askap will use innovative phased-array radio frequency feeds, which will produce a large field of view but need very high performance computing to pro- cess the data received. MeerKAT, on the other hand, will employ an innovative cooled, wide-band, single-pixel feed, with different data processing requirements.

Divergence between the two computing teams has also occurred in their approaches to

software development. The Askap team is developing almost exclusively in C++, whereas the MeerKAT team is using Python in nonperformance- critical parts of the code and C/C++ where required. Another factor encouraging divergence is that both projects are receiving greater funding than originally expected, allowing each to support larger software development teams than envisaged at the start of the project. Both sides will now pursue further software development independently, both using the Conrad code base. However, the two teams will maintain close contact and exchange news and information.

Meanwhile, a site has been selected for the support base for the MeerKAT Karoo operation – it is Klerefontein farm, some 11 km from Carnarvon. The base cannot be too close to the actual radio telescope because of the need to maintain maximum radio quietness around the MeerKAT. The support base will include electronic and mechanical workshops, offices, a conference room, an exhibition room, storage facilities and accommodation for staff.

Its proximity to Carnarvon means that staff can also be accommodated in the small town.

Engineers and technicians will be able to deploy to the MeerKAT core site withnin 90 minutes. The support base will act as access control to the core site. The Klerefontein farmhouse is of historical interest and the necessary permits for its renovation and upgrading – such as the provision of grid and back-up power, an optical fibre link, telecommunications and CCTV systems, modern water and sewerage systems, air conditioning, and conversion of rooms into offices and other specialist rooms – have been obtained from the National Heritage Resource Agency.

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