ASKAP Project

CSIRO Astronomy and Space Science
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ASKAP is the Australian SKA Pathfinder and the project has four principal goals:

- To establish the Murchison Radioastronomy Observatory (MRO) as an observatory to ultimately host the SKA;
- To develop new technology to advance radio astronomy and to demonstrate its viability for the SKA;
- To deliver high quality science, in particular to establish and explore science themes that will be fully exploited by the SKA.
- To foster the next generation of astronomers and engineers who, ultimately, will become the users and builders for the SKA.

Key objectives for ASKAP to achieve these goals are to deliver:

- 36 antennas with advanced receiver systems (PAFs) and signal processing,
- development of these Phased Array Feed (PAF) receivers and associated technology for radio astronomy
- the MRO control building and all support infrastructure,
- an on-site power plant with a significant renewable component,
- the MRO Support Facility (MSF) (in Geraldton), and
- the SKA-capable fibre optic network linking MRO to MSF and on to Perth.

During early 2011 ASKAP went through a significant process of project evaluation and internal review. This included a “bottom up” budget evaluation including schedule and risk reviews. As a result, a revised plan for the delivery of ASKAP has been developed. This plan has been presented to the ASKAP Steering Committee (16 June 2011) and CSIRO Board (29 June 2011) and approved by both at these meetings. The revised plan for ASKAP has 3 components:

1. Deliver the Boolardy Engineering Test Array (BETA):
    - Construction of 36 controllable antennas for ASKAP at the MRO
    - Establishment of the MRO as an operational observatory with support infrastructure and power station
    - Construction of the MSF in Geraldton
    - Construction of the SKA-capable fibre optic network linking the MRO to the MSF
    - Establishment of the radio-quiet zone and governance arrangements for CSIRO management of the MRO.
    - The electronic fit-out (PAF plus all subsystems) for 6 antennas using Mark I PAF technology (i.e. the current PAF design), forming the BETA array.
    - Commissioning of BETA and the implementation of some science capable observing modes.

2. ASKAP Design Enhancement (ADE) Mark II.

The ADE has commenced with an evaluation of the current overall ASKAP system to develop the next-generation improvements based on the lessons learnt from the rapid development of the first PAF systems. The exact scope of this is being determined, and it will include at least:

- Improved performance of the PAF (e.g. bandwidth)
- Improved PAF packaging
- implementation of evolving technologies such as RF over Fibre (RFoF) signal transmission and the newly announced V7 family of FPGAs by Xilinx, allowing significant reduction of real-estate required for the digital systems.

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The resulting Mark II design will be completed by Q2 2012. The Mark II PAFs and their signal transport system and digital systems are more closely aligned with SKA, and present a better path for the future development of PAFs for radio astronomy. (Additional funds are being sought to enable ASKAP to be built-out fully (36) with the new Mk II PAF design).

3. Deployment of the Mark II system

We currently have funds for the ADE project, and the delivery of 6 of the resultant new Mark II systems. This includes the new Mk II PAF, and its associated data transmission and new beamformer and correlator systems. The production will be implemented during FY2012-13, with all 6 Mk II PAF and related systems scheduled to be installed by March 2013. This will allow us to continue the commissioning of ASKAP with PAFs – limited "shared risk" science commissioning time will be available during this period, with the percentage of science versus commissioning time increasing steadily.

If funding to deploy the Mark II PAFs on all 36 antennas is not found, then Single Pixel Feeds (SPFs) will be deployed on the remaining 24 antennas. CSIRO will continue to seek additional funds to allow ASKAP to be fully fitted out with the PAF's required to achieve the full science goals, and CASS will use internal funds to deploy PAFs over time if we fail to secure external funding.

The Project Scientist and the ASKAP Team are in the process of creating a plan for science commissioning and early science usage of BETA. This is in a preliminary form and will be presented to the Survey Science Teams during the ASKAP Science Meeting in early November.