

The Square Kilometre Array

fact sheet for industry



Exploring the Universe with the world's largest radio telescope

What is the SKA?

The SKA will be a revolutionary radio telescope made of thousands of receivers linked together across an area the size of a continent. The total collecting area of all the SKA receivers combined will be approximately one square kilometre, making the SKA the largest and most sensitive radio telescope ever built.

What will the SKA do and how will it do it?

Radio telescopes detect radio-frequency signals from space. They provide alternative views of the Universe than those seen with optical telescopes and can reveal areas of space that may be obscured with cosmic dust. The SKA will cover the radio frequency range, 70 MHz – 10 GHz. It will give astronomers insight into the formation and evolution of the first stars and galaxies after the Big Bang, the role of cosmic magnetism, the nature of gravity, and possibly life beyond Earth. If history is any guide, the SKA will make many more discoveries than we can imagine today.

How much will it cost?

The target cost for the SKA is €1,500 million.

Where will it be built?

Two locations are under consideration: Southern Africa and Australia – New Zealand.

The final site decision will be made in 2012 and will be based on several factors including the operating and infrastructure costs, as well as levels of radio interference.

What will it look like?

The receivers will be arranged in five spiral arms extending from a central core to at least 3,000 km. In Australia the SKA would stretch all the way to New Zealand, and in Southern Africa it would stretch to the Indian Ocean islands. In the higher part of the frequency band, the SKA will use 3,000 dish antennas, each about 15 m wide. In the lower part of the frequency band, two other types of antenna, aperture arrays, will be used to observe very large areas of the sky simultaneously.

How will it work?

Astronomers, engineers and industry partners from more than 70 institutes in 20 countries are designing the SKA that will be 50 times more sensitive, and will survey the sky 10,000 times faster, than any other telescope. Signals will be transferred to a central high performance supercomputer by optical fibres carrying up to 420 Gb/sec per dish and 16 Tb/sec per aperture array. SKA data rates will far exceed the data rates of current internet traffic. A sophisticated data archive and distribution system will provide astronomers access to the data from anywhere in the world.



Where is industry involvement required?

Industry participation with the SKA offers the potential for involvement across a range of engineering and computing disciplines. The SKA expects to collaborate with a variety of industry partners, including niche R&D companies, followed by increasing engagement through commercial contracts with high-volume manufacturers, technology systems vendors, site services and installation firms, and power and data transmission specialists.

In particular, contracts may be sought for:

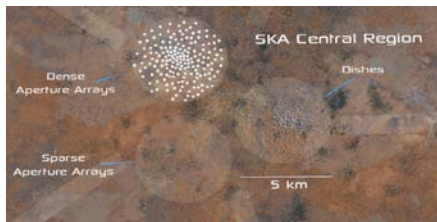
- Site studies and infrastructure engineering.
- Scheduling, operations and maintenance models.
- Low-cost, mass manufacturing of small to medium diameter dishes.
- Decade bandwidth feed antennas for dishes.
- Broadband, active, phased arrays for aperture and focal plane applications.
- Low-noise, highly integrated, receivers for both cryogenic and uncooled applications.
- High-speed (terabits/s) digital fibre optic links for distance regimes extending from 100 m to >3,000 km.
- Low-cost, high-speed (GS/s) analogue to digital converters.
- High-speed digital signal processing engines (petabyte/s) and ultra-fast supercomputing (at exaflop rates).
- Software engineering for robust, intelligent, array control and data processing, and radio-frequency interference mitigation.

Timeline

Five stages of development of the SKA are planned:

2008-2012	System design and costing.
2012	Site decision.
2013-2015	Detailed design and production engineering.
2016	Initial construction.
2019	First science.
2023	Completion of construction and commissioning.
2024	Full operation.

Artist's impression of the three arrays of receptors



Sparse aperture array



Dishes



Dense aperture array

How will industry be involved?

Industry will play a crucial role in the delivery and through-life support of the SKA technologies and infrastructure. The scale of the SKA, and the need to mass produce components, requires industry engagement on a scale unprecedented in radio astronomy. The involvement of organisations with experience and expertise in delivering demanding technological specifications within a production cost envelope will be essential. The SKA welcomes industry partners that are keen to adopt a spirit of partnership that reflects the inspirational nature of the SKA whilst achieving a return on investments commensurate with the risk and funding capacity of a non-defence program.

What's in it for industry?

Technologies developed with industry for astronomy have seen application in ICT, medicine, ecology, and complex system management amongst others. Non-astronomy solutions for SKA challenges (power supply, remote access, and remote operations of high tech infrastructure) will also have important applications around the world. The SKA project offers industry partners the opportunity of early involvement and profitable contracts in a funded, multi-billion Euro project.

Benefits include:

- The opportunity to undertake joint R&D, as a shared-risk endeavour, in an open environment.
- The potential for exploitation of intellectual property.
- Increased visibility associated with involvement in a high profile, international mega-science project.
- The opportunity to work with engineering and computing professionals on a highly imaginative and creative project that ultimately aims to chart the entire history of the Universe.

Where can I get more information?

The SKA Program Development Office (SPDO) based at the University of Manchester (UK), is the central organisation and is preparing a costed design that will be completed by 2012.

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