



SPDO/Swinburne Astronomy Productions

SKA pre-construction

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ATUC

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CSIRO ASTRONOMY AND SPACE SCIENCE

www.csiro.au



SKA1 Schedule

2013	Cost ceiling established Design consortia start
2014	Preliminary Design Review
2015	Re-baselining
2016	End of pre-construction – CDR
2017	Tender and procure SKA1 construction
2018-23	Phase 1 construction
2020→	Early science operations with Phase 1

SKA pre-construction phase

- 3 year design phase – started Nov 2013. €120 million.
- Most of work will be delivered by international consortia
- CSIRO's role:
 - **Dish** – lead, funding from Dept Industry
 - **Australian infrastructure** - lead, funding through Aurecon who have technical lead
 - **AIV** - led by SKA SA, funding from Dept
 - **Science Data Processor** - led by Uni Cambridge
 - **Signal and Data Transport** - led by Uni Manchester, funding through AARNet
 - **Telescope Manager** - led by NRC Canada
 - **Central Signal Processing** - led by NCRA India

CSIRO activities

- Established 'CSIRO SKA Centre' to co-ordinate our activities
- Extensive work to sign seven Memoranda of Understanding and Consortium Agreements
- Close collaboration with Dept of Industry and WA Office of Science
- Working with Dept of Industry on Hosting Agreement
- Discussions about Australian SKA Operator and SKA Site Entity
- Site establishment work
 - Configurations
 - Radio quiet
 - Environmental and heritage surveys

Dish consortium

17 institutions, 8 countries

1. Chalmers (Sweden)
2. Commonwealth Scientific and Industrial Research Organization (Australia)
3. Electromagnetic Software and Systems (South Africa)
4. European Industrial Engineering (Italy)
5. IAF Fraunhofer (Germany)
6. National Institute for Astrophysics (Italy)
7. Instituto Geografico Nacional (Spain)
8. Joint Laboratory for Radio Astronomy Technology (China)
9. Max Planck Institute for Radio Astronomy (Germany)
10. National Research Council of Canada (Canada)
11. Omnisys Instruments AB (Sweden)
12. RPC Technologies (Australia)
13. SKA South Africa (South Africa)
14. Societa' Aerospaziale Mediterranea S.c.r.l. (Italy)
15. Universidad de Cantabria (Spain)
16. Universidad Publica de Navarra (Spain)
17. Vertex Antennentechnik GmbH (Germany)

Dish consortium - highlights

- Review of SKA Level 1 Requirements complete
- Initial drafts of interface control documents (ICDs) complete
- Prototype antennas
 - MKT-1 assembled
 - DVA-1 assembly underway
 - DVA-C subreflector complete; reflector mould in fabrication
- “Feed down” antenna geometry recommended from optics configuration workshop.
- Single pixel feed (SPFs) analysis complete
- Receiver design well advanced
- Testing of different phased array feed (PAF) elements underway at Parkes
- Antenna verification and test framework complete
- Estimates of antenna power consumption complete

Dish prototypes



MKT-1



DVA-C subreflector

DVA-1



Parkes testing



L to R: Tom Burgess (NRC) Bruce Veidt (NRC) Roel Witvers (ASTRON) Robert Shaw (CSIRO) and Douglas Hayman (CSIRO)

Dish schedule

- June 2-4, 2014: DISH optics review and selection (CoDR)
- Aug 15, 2014: DVA-C prototype testing complete
- Aug 15, 2014: MKT-1 prototype testing complete
- Nov 7, 2014: DISH PDR
- May 27, 2015: DISH Detail Design Review (DDR)
- Jul 23, 2015: Receiver prototype subassemblies complete
- Sep 18, 2015: PAF DDR complete
- Apr 27, 2016: SKA1 pre-production dish build complete
- Oct 12, 2016: SKA1 pre-production dish verification testing complete
- Nov 16, 2016: DISH CDR

Infrastructure Australia consortium

- Led by CSIRO (as sub-consultant to Aurecon)
 - Consortium Lead is Ant Schinckel in CASS
- Project management and technical management by Aurecon
 - Project Manager Rebecca Wheadon
 - Funded by Australian Government to complete Stage 1 of pre-construction work
- Industry partners (sub-consultants to Aurecon) include:
 - Horizon Power (WA power solutions)
 - RLB (Quantity Surveying)
 - RQZ Solutions (SME working in Radio-quiet compliance technologies)

Deliverables in Stage 1

- Preliminary design and base costing for infrastructure required for SKA1 deployment in Australia, including:
 - Power consumption study and modelling
 - Review existing infrastructure with the AIV work package to determine space availability and potential expansion
 - Dish foundations
 - Buildings
 - Water and sanitation
 - Roads
 - Recommendations for construction scheduling
 - Approach definition and options identified for site monitoring
 - Approach definition and scope definition of construction camp requirements.



Progress to date

- Review of SKA Level 1 Requirements is complete
- Initial drafts of interface control documents (ICDs) are complete
- Exchange of site visits complete
- Initial Power Analysis report complete
- Participation in SKAO EMC Task team complete
- Participation in SKA1 Survey and Low array configuration complete
- Initial layout of roads and basic infrastructure to suit initial array configurations complete
- Design of RFI monitoring system complete and construction underway



Assembly, Integration and Verification

- Led by SKA South Africa. Partners CSIRO and ASTRON
 - CSIRO lead Adam McLeod
- Key role in integrating pre-cursors (ASKAP, MeerKAT) into SKA1
- Deliverables so far: draft ICDs, review of Level 1 requirements, site visits
- Next months – roll out plan, verification plan



Re-baselining

- Cost cap is 650m Euro
 - Current design cost is more than 800m Euro
 - Process for determining design to fit within the cost cap
- Preliminary design reviews for consortia in late 2014
- Re-baselining decision by SKA Board in early 2015
 - input from pre-construction consortia, SEAC, SKA Office, science priorities

We acknowledge the Wajarri Yamatji people as
the traditional owners of the Observatory site

Thank you

CSIRO Astronomy and Space Science