



SKA Organisation Bulletin

24th Issue, July – August 2017

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From the Desk of the Director-General

On 14th July I visited CERN in Geneva to meet with the Director-General, Fabiola Gianotti and senior members of her team to sign a [Collaboration Agreement](#) between SKAO and CERN. The purpose of the agreement is for CERN and SKAO to work together to tackle the many challenges that will arise as the era of Exascale computing and storage approaches. We also wish to learn from CERN's experience as we plan the distributed SKA Regional Centre model for data processing.

In early August I participated in the [3rd planning meeting](#) preparing the US radio astronomy community for the forthcoming 2020 Astronomy Decadal Survey. It was an interesting meeting with a significant fraction of the three days focusing on plans for the design of ngVLA, a major expansion of the JVLA. Current plans estimate an ngVLA construction cost of ~\$1.5B and a completion date of 2034. Other talks discussed plans for the future of low-frequency astronomy, for pulsar research, CMB work, a large mm/submm single dish, the Event Horizon Telescope and more. I gave a presentation on SKA in order to inform the US community present of the work progressing in the rest of the world.

The articles below provide information on the July SKA Board meeting and the welcome outcome of the Cost Control Project. This work is now folded in to all SKAO and consortia activities; the focus on cost efficiency will remain high.

I look forward to the focus on CDRs that are also discussed below; this will be the culmination of many years of design and development work and I wish all consortia and other teams the best for this challenging process.

I also look forward to the culmination of the work on the drafting of the SKA Observatory Convention and associated documents; this work has continued at pace over the northern summer and I am grateful to Daan du Toit and other colleagues for all the effort they have put into this.

Project

By *Alistair McPherson, Head of Project*

Due to the northern hemisphere summer holiday it has been a relatively quiet period. That said, when you reflect on the time, quite a lot has happened.

The Board Meeting in July accepted the report from the Cost Control Project and agreed the outcome. This has meant that we now have the utility of controlling the cost of SKA by adjusting the baseline from the current Design Baseline, which would deliver an observatory which answers all of the Level 1 Requirements, to a Deployment Baseline which is an acceptable, affordable Baseline. Based on our current estimates of costs the Deployment Baseline would be:

	Design Baseline	Deployment Baseline	Re-instatement '+' means add to system
SKA1-Mid			
No. dishes	133	130	+3 dishes at 150 km
Max. Baseline	150 km	120 km	+ infra to 150 km
Band 1 Feeds	133	130	+3 Band 1 Feeds for 3 dishes
Band 2 Feeds	133	130	+3 Band 2 Feeds for 3 dishes
Band 5 Feeds	133	67	+66 Band 5 feeds
Pulsar Search (PSS)	500 nodes	375 nodes	+125 nodes
SKA1-Low			
No. stations	512	476	+36 stations (18 stns at 49 & 65 km)
Max. Baseline	65 km	50 km	+infra to 65km
Pulsar Search	167 nodes	125 nodes	+42 nodes
Common			
Compute Power	260 PFLOPs	50 PFLOPs	+210 PFLOPs

It can be seen that the Deployment Baseline is designed to be recovered to the Design Baseline should additional funding be made available. We therefore have a clear way towards CDR based on the Design Baseline, whilst understanding that we may only be able to initially afford a Deployment Baseline.

The conclusion of the CCP has meant that the Office has been able to re-focus on the preparations for CDR and the support to the Consortia. The Office is planning a Pre-CDR Review where the aim is to review the preparations for CDR. This will include a review of the compliance of consortia, the status of systems budgets and ICDs and the readiness of the Baseline Design description. This effort is intended to give everyone a clear baseline against which we can assess CDR of the consortia before approaching the Systems CDR in 2018.



Now that the northern summer draws to a close, we are all looking forward to the effort to complete the CDR process and move towards Construction.

Project Management

by Andrea Casson, Head of Project Management

Following the successful conclusion of the Cost Control Project at the July Board of Directors meeting, the project management team across the Office and Consortia has been clarifying the outcome and re-working plans accordingly. All Element CDRs will be against the Design Baseline approved by the Board: several are planned for the first half of 2018 with System CDR expected to be held in Q4 2018.

A revised SKA1 Construction cost estimate is due from all consortia on 2nd October. These costs will be against the Design Baseline including Rev 11 of the L1 requirements (see Project Engineering below) and will also contain an update on the savings to the Deployment Baseline. Cost estimates will also take into account the new construction schedule milestones including T0 (Construction Proposal approved and funding available) in September 2019 and C0 (kick off of major contracts) 6 months later, and the new SAFe® methodology to be used for software delivery in the Construction phase (see Computing and Software below).

Work on the Construction Plan suite of documents has also re-commenced with changes to the Work Breakdown Structure in particular. This document is required for the second round of the (non-binding) Expression of Interest process planned for Q4/2017 to Q1/2018. The first review of the entire set of Construction Plan documents is being planned for Q1 2018 with a follow-up in Q2. In short, 2018 will be the year of the review!

Mission Assurance

by Tim Stevenson, Head of Mission Assurance

As intimated in previous Bulletin articles, Mission Assurance covers a wide scope of topics where, for various reasons, there is a lack of attention being paid. One of these areas is the matter of Custom Experiments.

There have been a number of proposals for modifications to both Telescope designs to accommodate investigations which lie outside the scope of the High Priority Science Objectives. In the spirit of creating the 'Well Found Observatory', the Office has drafted a Custom Experiments (CE) Policy which attempts to provide for a wide range of such experiments rather than limiting design features to just those proposed. It is acknowledged in the Policy that modifications to the baseline design to accommodate generic CEs will cost money, both in development, in construction and in operations. The Policy limits these costs whilst attempting to provide for as wide a range as possible.

Owing to this potential for increased costs, the work to specify CE interfaces was suspended during the Cost Control Project (CCP). This was regrettable, as time has been lost as we march towards Element CDRs. With the work of the CCP now concluded, Gary Davis has asked that CE interfaces be revisited in order to identify affordable opportunities to provide them. Once these opportunities have been identified, the Office will initiate a series of Engineering Change Proposals to allow Consortia to consider the feasibility of providing them, and most importantly, calculate development cost, schedule impact, capital cost and operating costs for each interface. Watch this space for news of the Custom Experiment interfaces.



Project Engineering

by Luca Stringhetti, SKA Project Engineer

The SKA telescope engineering office is getting more and more focused on the preparation for the CDRs. An important milestone for the correct execution of the critical design review was the release, end of July, of the System Requirement Document in its version REV11. This is the version that the Element CDRs will use as reference. The REV11 is not so different from the REV10 but it integrates the approved Engineering Changes that just due to time were not possible to include in REV10, and a few more changes approved from the end of 2016 until now. About 15 requirements have been modified in this new version, which, in the light of a total of 500 requirements, gives an idea of how much the System Requirement Document has stabilised.

The office is working on two work streams in parallel, the element CDRs or sub-element CDRs, which are about to start next month, and the System Pre-CDR. This review is organised internally in the office with the following objectives: to refocus the attention to a system level; to inform whenever possible the element CDRs with system findings; and to check the current status of the system view of the project for its System CDR that will happen at the end of 2018. The current schedule for pre-CDR shows the final review meeting at the end of November (21st-23rd November). The system analysis work is continuing with the support of the consortia in order to present the most accurate picture of the current design of the SKA1 system during the review. This includes the system compliance matrix, system budgets and signal chain analysis of the both telescopes. The detailed procedure and the list of expected deliverables for the System pre-CDR is under construction and it will be available in the next few weeks.

The work on the L2 review and product to product ICDs consolidation is still on-going, but significant progress is visible compared to just a few months ago when the project was focused to the Cost Control Project.

During the last months, a specific effort organised as a self-standing project within the SKA was carried on. This project had the goal to explore the solution space for the LOW antenna and provide the best Low Antenna achievable within the SKA constraints. A team of around 15 people spread between Europe and Australia worked together, and the very intense engineering work provided in time for the July milestone a few options that look extremely interesting from a performance point of view. These options will be weighed with a set of criteria that includes the non-functional characteristics and cost. This solution is currently under review by an external panel that will eventually provide to the LFAA consortium and to SKAO a recommendation, so the office can make a substantiated programmatic decision on the antenna. The conclusion of the work is expected in a few weeks.

Computing and Software

by Nick Rees, Head of Computing and Software

The northern hemisphere summer season has brought the normal set of holidays in the office, but there have still been developments on the software front. On the staffing side, at the beginning of August we welcomed the arrival of Marco Bartolini, our new software quality engineer. Marco will be working on all the processes and tooling that are essential to ensure that we can manage the quality of the enormous amount of SKA software that will have to be delivered. In addition, in September we look forward to the arrival of our new software project manager, and sadly farewell our interim project manager, Pete Shephard, who has done a great job in the short time he has been with us.

The major technical development during the period has been the adoption of the Scaled Agile Framework (SAFe® - <http://www.scaledagileframework.com/>) as the process for software development during construction.



While I believe this is widely welcomed because it provides a defined set of processes and terminology based on modern best practice, it has also created some degree of upheaval because it now makes concrete things which may have only been assumed before, and this takes some level of adjustment. However, the office is trying to support this, with a number of consortia-specific meetings, including a very useful 2-day SDP workshop, new construction planning guidelines, a one-day workshop for all consortia planned on the 2nd October and the selection of a consulting firm to help guide us in the process. Whilst the details are still evolving, this has also helped form a structure for the software engineering management plan that will form the cornerstone of the SKA software construction proposal.

Another technical area where there has been significant development is the progress we have made in developing the Software Architecture Decision Log. If you are involved in SKA software you should familiarise yourself with this in the software engineering area of Confluence. The core architecture team in the office meets regularly with key consortia members to progress this log, and the decisions are intended to provide system level guidance for software developers. Consequently, if you have a question that needs system level guidance, please don't hesitate to ask the question to prompt a new decision by creating a new decision page on Confluence.

Finally, I had a very productive trip to Chile with the Operations Team where we had many discussions with members of the ALMA operations and software staff. They have developed some very similar systems to the ones we have envisaged for the SKA for their array control and telescope scheduling software. As a result, we have arranged another trip to Chile with members of the TM team to attend the [ADASS conference](#) and we will use the visit to have some follow up meetings with the ALMA software staff to further understand their software and how they use it. ALMA is probably the closest telescope to the SKA in its scope and ambition, and it is good to see that we are thinking along similar lines.

Architecture

by Peter Dewdney, SKA Architect

No contribution as of this time.

Operations Planning

by Gary Davis, Director of Operations Planning

The headline for the project since the previous Bulletin was undoubtedly the SKA Board meeting held in The Hague on 18–19 July. At that meeting the Cost Control Project reached a successful conclusion. The estimated operational budget for SKA1 was a key element of this project and, accordingly, the Operations Planning Group had participated fully in this critical work. I am grateful to all the consortia for the cost information they provided for all of the cost-saving options under consideration.

The work of the Group is now evolving from the high-level definition of concepts to the specification of details. The Group held an internal workshop in July to set the groundwork. This was followed by two week-long visits during August: one to the ALMA Observatory, and one to South Africa to develop closer engagement with MeerKAT. Both were enormously useful in clarifying our ideas and defining areas of ongoing work.

We plan to hold two SKA Operations Workshops in early 2018, one each for SKA1-low and -mid. This will be our first opportunity to engage in detail with the relevant consortia and with precursor telescopes on the two sites. Details will be forthcoming as plans for these workshops develop.



Prof. Gary Davis giving a public presentation about the SKA, “Building a Better Lighttrap”, on 10th July at The Vale pub in Bollington.



John Carpenter (ALMA), Corrie Taljaard, Gary Davis, Nick Rees and Antonio Chrysostomou outside the ALMA Headquarters in August.

Science

by Robert Braun, SKA Science Director

Over the past two months the SKA Science Team have organised sessions at two different locations. The first of these was a symposium held in conjunction with the European Week of Astronomy and Space Science 2017 entitled, “Scientific Synergies enabled by the SKA, CTA and Athena”, on the 26th and 27th of June in Prague, the Czech Republic. The six sessions of this Symposium were filled with a wide-ranging set of talks highlighting the many areas of research where observations from multiple facilities were anticipated to provide even greater scientific insights than those enabled by the individual observatories acting alone. The second event was a series of sessions held in conjunction with the URSI General Assembly 2017, entitled, “The Square Kilometre Array” on the 25th and 26th of August in Montreal, Canada. The three SKA sessions spread over two days provided updates on the designs of SKA1-low and SKA1-mid as well as an opportunity to highlight exciting recent results from many of the SKA precursors and pathfinders. Both of these SKA events were well-attended and the talks generated a great deal of useful discussion. It was notable that while the SKA project is quite familiar to the European community, there were many within the more North American audience of the URSI event for whom this exposure to the SKA capabilities and timeline were of particular benefit.



Members of the SKA Science Team also gave presentations at the “Galaxy Clusters” conference in Santander, Spain, the “Irish LOFAR Station Opening” at Birr Castle, Ireland and the “Fast Radio Burst” session at URSI2017.

Policy Development

By Simon Berry, Director of Corporate Strategy

As I wrote the last update, the policy team was returning from the StratCom and IGO working group meetings in Singapore. After a brief sprint to prepare for the Board meeting in July, where there was a useful discussion on our planning for transition to the IGO and how we align the policy and engineering schedules, the focus has returned to the final steps towards completing the negotiation of the IGO Convention and supporting documents.

Work has continued through August through the auspices of the ‘Convention Task Force’, the group representing the various countries negotiating the Convention text. The next milestone will be closing the negotiation process, through ‘initialling’ the text; a significant step for all involved. After that, the governments will prepare to ‘sign’ the Convention. That represents an even more significant step, and the point at which ratification of the Convention can begin for each country. We still hope that this will be possible around the turn of the year, but will depend on many more discussions, papers and documentation being prepared and agreed. Watch this space!

SKA Board Matters and Administration

by Colin Greenwood, SKA Head of Administration

SKA Governance

On 12 April 2017, Dr Marco de Vos stepped down as the Netherlands’ Board Science Representative and was replaced in this role by Prof. Carole Jackson.

On 21 April 2017, Ms Patricia Kelly stepped down as Australia’s Voting Board Representative and was replaced in this role by Ms Jane Urquhart. She also stepped down from the SKA Executive Committee.

On 1 May 2017, Prof. Steven Tingay as Italy’s Board Science Representative and was replaced in this role by Dr Filippo Zerbi.

On 4 May 2017, Dr Adam Baker stepped down as the UK’s Voting Board Representative and was replaced in this position by Dr Brian Bowsher.

SKA Board of Directors Meeting

The 24th meeting of the SKA Board of Directors (SKA-BD-24) was held at Netherlands Organisation for Scientific Research, Den Haag, the Netherlands on 18-19 July 2017.

In addition to the standing items on the agenda, the SKA Board reviewed the SKA Organisation’s Report and Financial Statement for the period ended 31 December 2015; the SKA Organisation Financial Policies and Regulations and the Schedule of Delegations and Authorities. The Board received updates on policies issues such as the progress of the negotiations to establish the SKA Observatory Intergovernmental Organisation



(IGO), and the progress towards IGO transition.

The Board welcomed a revised construction cost estimate of €806M and the revised estimate of operations costs of €88.7M per year. The Board acknowledged the excellent work undertaken as part of the Cost Control Project (CCP), initiated at the November 2016 meeting (SKA-BD-22), in bringing the cost of the SKA1 Design Baseline down. The Design Baseline, set in March 2015, remains the long-term ambition of the SKA1 project and the focus of the design consortia as they progress their work towards the Critical Design Reviews.

The CCP has identified a route for delivering two transformational telescopes within the set cost cap of €674M (2016 euros). The Board approved the definition of a 'Deployment Baseline', which will include as much of the Design Baseline that can be afforded at the time of the approval of the SKA-1 Construction Proposal. The Deployment Baseline corresponds to the telescopes currently deliverable at that funding level. The Deployment Baseline takes advantage of the scalable nature of interferometers.

The current deployment baseline is presented in the [Notes from the Chair](#) for this meeting. It has been defined following an analysis from the SKA Office in collaboration with the engineering design consortia and in consultation with the science community. The science community, and particularly to the SKA Science and Engineering Advisory Committee, will be asked to regularly review the deployment baseline to confirm its ability to deliver transformational science.

The Board agreed to end the Cost Control Project as a separate project and challenged the SKA Office and consortia to continue reducing project construction and operations costs as a high priority, while maintaining the project's intent to deliver the world's best radio telescopes. The Board is confident that the project is now in a position to transition the SKA Organisation to formal intergovernmental status.

The Board discussed and approved the Engineering Plan to Construction as an acceptable plan for obtaining construction approval for SKA-1. The Engineering Plan to Construction was developed from the outline construction plan, previously presented to the SKA Board in July 2016.

Staff

Welcome to the following new staff:

- Cristina Garcia-Miro, SKA VLBI Scientist (from 1 August 2017)
- Marco Bartolini, SKA Software Quality Engineer (from 1 August 2017)
- Job Obiebi, Verification Systems Engineer (from 4 August 2017)
- Fiona Davenport, Head of Human Resources (from 4 August 2017)
- Gerhard Swart, Mid Telescope Engineer (from 4 August 2017)
- Maurizio Miccolis, EPM of SDP and TM (from 18 August 2017)

On 31 August Kesseven (J) Mooneyan is leaving SKA Organisation to return to university following his IT Intern placement. J is thanked for his contributions to the SKA Organisation over the past year.

SKA HQ

A report on the construction of the SKA HQ will be provided in the next Bulletin.

Communications and Outreach

by *William Garnier, SKA Director of Communications, Outreach and Education*

Northern hemisphere summer was not only synonymous of vacation for the SKAO Comms team; I've got several very interesting and exciting initiatives to report on in this new issue of the SKAO bi-monthly bulletin.

Early July, for the 2nd year running, the famous and extremely successful music & science festival, Bluedot, returned to Jodrell Bank. Bluedot is an award-winning festival of discovery at the grounds of a deep space observatory. Set against the backdrop of the iconic Lovell Telescope at Jodrell Bank, Bluedot combined a truly stellar line-up of music with a ground-breaking programme of live science experiments, expert talks and immersive artworks. The SKA was invited again this year to give talks, which Dr Rosie Bolton and Dr Anna Bonaldi both delivered, along with an SKA stand, with the famous SKA inflatable telescope also being present. Over the three days of the festival there were a range of SKA-focused outreach activities for the public to try-out including the set of engineering activities for children developed with the Jodrell Bank Discovery Centre team, and with an army of some 15 SKA volunteers from SKA Organisation as well as the universities of Manchester, Oxford and Cambridge, it was a highly successful, educational and incredibly fun three days of public engagement, with unusually fantastic weather throughout! Big thanks to all our volunteers at the SKA stand and massive kudos to the Jodrell Bank Team for organising another very successful event.





Some photos taken at the SKA stand at the Blue Dot festival. Credit: SKA Organisation

The last couple of months have been quite intense with respect to media activities. With the help from our Spectrum Manager Harry Smith we provided support to an interview conducted by the International



Telecommunications Union (ITU) with in-house Legal Counsel Theunis Kotze on the SKA project and its participation in ITU work. [The article was published in July](#) in the ITU newsletter and distributed to some 65,000 stakeholders of ITU. Following the July Board meeting, we arranged for Phil Diamond to be interviewed by [Nature](#) and [Physics World](#), both interested in following up the latest developments of the Cost Control Project. Infrastructure Project Manager Martin Austin was interviewed by [Professional Engineering](#); SKAO High-Performance Computing Specialist Miles Deegan was interviewed by Hewlett Packard Enterprise. This followed the signature of the [SKA-CERN cooperation agreement on exascale computing](#) that was signed on July 13 at CERN by the SKA and CERN DGs. Project Scientist Dr Anna Bonaldi was interviewed by [Sky at Night on the sidelines of Bluedot](#); and Alistair McPherson, SKAO Head of Project, was interviewed by IEEE Spectrum. We also provided supporting digital materials for the [popular Japanese TV programme “Cosmic Front”](#) of the national broadcast NHK, currently developing a piece on the SKA to be aired on September 14.

On a related note, in August we received a visit from RAW, a London-based award-winning production company. RAW are preparing a brief for a drama series on the SKA for Discovery Channel. If selected by Discovery, this could lead to the production of a multi-episode, multi-season science series based on the challenges of delivering the SKA. They talked with Infrastructure Consortia leads Ant Schinckel and Tracy Cheetham to get a feel for what’s happening on the ground at the sites as well as to SKAO Project Scientist Dr Evan Keane to cover the exciting science we will do. We’ll keep you posted on future developments of this initiative, which could end up with a thrilling piece on the project to be aired on a multi-million viewer platform.

A couple of weeks ago, in collaboration with the SC17 organising committee, we jointly announced that [Prof Phil Diamond alongside our SKA Regional Centre Project Scientist Dr Rosie Bolton will deliver the keynote speech at the upcoming SC17 conference](#), to be held in Denver, CO, in November. This was widely promoted internationally. SC is an International Conference for High Performance Computing, Networking, Storage and Analysis annually bringing together thousands of HPC experts from around the world. Having the SKA featured as the keynote talk of the conference is clearly a big thing and a great opportunity for the project to further raise awareness within a community of high-relevance for the project and to strengthen or develop new partnerships in the US but also well beyond. For the occasion, we are developing new material that will be premiered at the conference, including new animations.



Dr Rosie Bolton being interviewed for the new video material we are developing for SC17 in collaboration with Polar Media, the production company that produced our award-winning trailer. Credit SKA Organisation

In August, we also visited the venue for EWASS 2018 in Liverpool – due to take place on 3-6 April – where we are hoping to have a strong presence. EWASS is the European Week of Astronomy and Space Science and next year's edition is a joint event with the UK National Astronomy meeting, promising to attract a large number of scientists from across Europe and beyond.



Venue for the 2018 edition of the EWASS conference. Credit SKA Organisation

Early August, we published the 35th issue of the SKA Newsletter, our quarterly publication providing an update on activities from across the partnership. For the occasion, we produced a brand new eNews mailing template with a much more professional look and feel, matching our other publications. Contribution from the partners (consortia, SWGs, Observing countries, Communications & Outreach teams, others) to the eNews remains very high, providing a very comprehensive overview of the level of activities around the world, and this latest issue is the largest ever edition of the eNews yet; 137 pages and 28,711 words. We strongly encourage you to have a look at it [here](#).

On another note, our indigenous art-astronomy exhibition Shared Sky has just arrived in Australia, to be displayed at the South Australian Museum in Adelaide, coinciding with the International Astronautical Congress taking place there in late September. More in the next issue of this bulletin.

Last but not least, our social media savvy followers will be pleased to know that we have opened an [Instagram account](#), providing a behind-the-scenes and lighter look at the SKA.

Selection of SKA in the News

We've read the news for you and are happy to provide this selection of media articles relevant for the SKA directly on the SKA website. On the right hand-side of the [homepage](#), you'll see a "In the Press" tab, which is updated at least weekly. Note that the appearance of articles in the selection is not synonymous of endorsement by SKA Organisation. Enjoy!

Connect with us

For any enquiries, requests or feedback please write to ska-outreach@skatelescope.org

You can also find the SKA Organisation on [Facebook](#), [Twitter](#), [Google+](#) and [YouTube](#).