



REPORT ON REBASELINING FROM THE SCIENCE AND ENGINEERING ADVISORY COMMITTEE

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ORGANISATION DETAILS

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1 Report details

SEAC held two tele-conferences with senior SKAO staff on 2nd and 19th December 2014 which were focused on the options for rebaselining and the reports from the SRP.

A face-to-face meeting was held at Jodrell Bank on 22nd and 23rd January. Committee members attending were Jack Dongarra, Sean Dougherty, Andrea Ferrara, Bryan Gaensler, Brian Glendenning, Jackie Hewitt, Richard Hills (Chair), Justin Jonas, Andreas Kaufer, Adrian Russell, Gary Sanders, Marco de Vos and Suijian Xue. Matthias Steinmetz sent his apologies for absence due to other commitments, but was able to join by phone for the afternoon of the 22nd.

The Committee welcomed Jack Dongarra to his first face to face meeting of the SEAC.

The committee heard a detailed account of the re-baselining process from the Head of Project and had a thorough discussion of it. We were joined by Chris Carilli, the chair of the Science Review Panel, who gave a summary of the Panel's discussions and conclusions. (The final report of the SRP was not available at that point, but we did have their second report and a draft of the recommendations from their 16th Jan meeting.) Further discussion of the rebaselining packages followed.

The SEAC was given the following charges by the Director General:

1. Has the re-baselining process to date been effective?
2. Has the SKA Office overlooked any options?
3. SEAC should provide advice on the direction of re-baselining.

The Committee's response is as follows:

1. The process has indeed been effective. A large number of possibilities for making savings were considered and these were analysed, from both technical and scientific perspectives, in a well-organized and thorough manner. The SEAC commends the Office, the SRP and other people involved for all their efforts, which resulted in a set of packages of options which appear feasible and affordable. The Science Review Panel (SRP), which was constituted in such a way that it represents all parts of the SKA scientific community, has played a vital role: it has studied the options in depth and arrived at clear set of recommendations.

2. Given the large cost savings required, it appears very unlikely that there are any reasonable options that lie outside the range of possibilities put forward by the SKAO.

3. The SEAC supports the conclusion of the SRP that package 2 is the best choice amongst the seven proposed re-baselining options for SKA1. We offer the following comments:

a) SEAC endorses the SRP's ranking that the High Priority Science Objectives (HPSOs) on Physics of the Epoch of Re-ionization and on Pulsars should have the highest priority, and agrees that packages which cannot do transformational science on both these topics (i.e. packages 3, 4, 5, 6, 7) are therefore undesirable.

b) SEAC also agrees with the SRP that package 2 is strongly preferred over package 1, because of the greatly superior angular resolution of the former. Package 2 retains the potential to perform transformational science across most of the HPSOs. It is nevertheless clear that SKA1's performance will be substantially lower than that foreseen for the baseline design and therefore that the HPSOs will need to be reduced in scope, as discussed by the SRP, and/or carried out over a longer timescale than originally assumed. It may even be necessary to drop some of the current HPSOs from the initial SKA1 program. SEAC nevertheless believes that package 2 will provide transformational science for an acceptable fraction of the HPSOs within the first five years of operation.

c) As defined, package 2 contains no further development work on Phased Array Feeds (PAFs). SEAC believes that PAF technology, which is of course already a key element in the ASKAP telescope, will play an important role in SKA in the future. We therefore support the SRP's suggestion that package 2 should be modified to include a well-focused R & D program on PAFs. Accommodating this within the cost cap will add to the pressure on resources: if further reductions in the capabilities of MID and LOW are required then these should respect the scientific priorities above and the more detailed assessment provided by the SRP.

d) The discussion of packages 1, 2, 3 and 7, in which SUR is set to 0%, is on the basis that there will be no survey facility. In fact ASKAP is a powerful facility which is equivalent to something like 20% of the baseline-design SUR. SEAC notes that an SKA science program including ASKAP would relieve some of the oversubscription pressure on MID, as discussed by the SRP in Appendix 2 of their second report, and would mitigate against some of the implications raised in point b) above. The science ranking provided by the SRP in their second report and the upcoming SKA Key Science Program workshop will both be invaluable in identifying a subset of transformational science programs at mid-frequencies that could be pursued with the combination of 70% MID and ASKAP.

e) SEAC looked carefully at package 4, which might appear superficially attractive in that it offers "something of everything". We concluded that this would be a very undesirable choice because: a) it fails to meet the key criterion of making possible transformational science in the very highest priority areas on both EOR and Pulsars, and b) it entails a high level of complexity and risk.