

**REVIEW OF THE  
NATIONAL ASTROPHYSICS AND SPACE SCIENCE PROGRAMME (NASSP)  
AND  
THE MULTI-WAVELENGTH ASTRONOMY (MWLA) PROGRAMME**

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**THE NATIONAL RESEARCH FOUNDATION (NRF)  
MANAGEMENT RESPONSE**

## **Introduction and background**

Astronomy as one of South Africa's geographic advantage fields continues to receive a high priority status in the country. A number of initiatives and projects aimed at supporting the development and exploitation of the field have been put in place and/or in the process of being established. Principal among these are: (i) the Southern African Large Telescope (SKA) project; (ii) the High Energy Stereoscopic System (HESS)- the collaborative initiative with Namibia; and (iii) the efforts relating to the Karoo Array Telescope (KAT) and Square Kilometer Array (SKA). South Africa recognises that it runs the risk of not being able to fully utilise or maximise the benefits from these facilities if the current lack of adequate human capital is not addressed adequately and swiftly. The lack of adequate numbers of highly trained and skilled scientists will result in a situation where the country may own the hardware, but will be subject to a form of "knowledge/skills colonisation" from international quarters, many of whom already possess a critical mass of requisite skills, would take advantage of and fully utilize this infrastructure and equipment.

The two funding programmes, Multiwavelength Astronomy (MWLA), and the National Astrophysics and Space Science programme (NASSP) that were jointly under review are aimed at addressing these concerns in the areas of Multiwavelength astronomy, astrophysics and space science.

The MWLA programme was established as an interim programme of human capacity development in astronomy. This is implemented in parallel to the development of a comprehensive strategy for astronomy in South Africa.

NASSP is also a human capacity development programme, seeking to raise the research and postgraduate profile of South African institutions by producing scientists (primarily from designated groups) with broad-based skills useful in industry as well as for research in astronomy, astrophysics and space science.

These two programmes are closely related, and the majority of the stakeholders related to NASSP and the MWLA Programme are the same. It was therefore considered prudent and cost-effective for the programmes to be simultaneously reviewed by the same reviewer. This not only saved time and costs, but also enabled the reviewer to provide a comprehensive overview of how these programmes relate to each other, and could function optimally going forward.

## **The review process**

The Terms of Reference (as presented in Appendix 1 of the Report) for the review of the NASSP and the MWLA Programme stated in part that the scope of the review was:

- the retrospective review of the NASSP programme from 1 February 2003 – 31 March 2011; and
- the retrospective review of the MWLA programme from 2006/7 to 31 March 2011;

focusing on the performance of these programmes in terms of their stated aims and strategic principles under which they were founded. In consultation with the Department of Science and Technology (DST) - the department that funds the programmes through the NRF and managed specifically by the Knowledge Fields Development (KFD) directorate, a specialist reviewer, Professor FJW Hahne (Stellenbosch Institute for Advanced Study), was appointed as the most appropriate person to review the programmes by the Monitoring and Evaluation (M&E) unit of the NRF, who managed the review process. Professor Hahne prepared and submitted the report: *Review of the*

*National Astrophysics and Space Science Programme (NASSP) and the Multi-wavelength Astronomy (MWLA) Programme* which is the focus of this management response.

The NRF, which as indicated through the KFD directorate, has managed the two programmes on behalf of the DST, prepared this management response to address, pertinent issues and recommendations that flowed from the review report in order to facilitate follow-up by relevant parties. Issues that are the direct responsibility, and or within the control, of the NRF are emphasised. Reviewer comments and recommendations that are of a strategic and/or policy nature, and that are within the direct control of the DST have been flagged with comments and possible ways forward suggested where appropriate. It is of course the prerogative of the DST to accept and/or not accept the recommendation(s) of the review and “advice” of the NRF as reflected in this management response

### **Comment on the review process**

The NRF would like to sincerely thank Professor Hahne and all the review participants for their contributions and assistance in support of this exercise. Conducting on-site interviews involve complex and intricate arrangements including the identification of appropriate stakeholders, reorganisation of reviewer and stakeholder diaries, travel, and are inevitably time-consuming. Selected stakeholders included members of the management of NASSP and the MWLA programme, government, the higher education sector (that implement the programme), as well as student beneficiaries of the programmes. The review process can be said to have been fair, reasonably adequate and objective. It is the view of the NRF that the review process and the resulting report were of adequate quality, essentially objective, and provide information that will facilitate decision making about the future of the NASSP and MWLA Programmes. Better editing would however, have improved the quality of the report.

### **The scope of the review as detailed in the terms of reference**

The reviewer was requested to determine and report on identified strengths, weaknesses and impact of the NASSP and the MWLA programme, and to make recommendations based on the following aspects:

- Programme inputs;
- Programme processes;
- Programme outputs and outcomes;
- Performance of NASSP and the MWLA programme in relation to others; and
- Management of NASSP and the MWLA programme.

### **NRF comment on the extent to which the review addressed the detailed requirements as outlined in the terms of reference document**

It is the view of the NRF that some of the aspects of the review as numerated in the scope of the terms of reference were not adequately addressed. In a few cases, specific requirements were completely omitted. It is the view of the NRF that this may in part be due to the manner in which the funding programmes were initially set up, the subsequent and current management structure,

and implementation arrangements of these programmes, as is highlighted in the review report itself. For instance the MWLA was set up as “interim programme” close to six years ago, with limited detail and agreement about the key indicators for reporting on progress. A consequence of this has been inadequate reporting structures, vague selection processes and limited number and inconsistent performance indicators. This makes it difficult to fully address the review terms of reference as required. The lack of clarity of responsibility among the implementers of one of the programmes delayed the process of submission of the self-evaluation report which the reviewer needed to prepare for the full review of the programmes. Some of the aspects of the review and report that are limited include those related to:

- Programme inputs
  - The level of support for researchers and visiting academics with regards to stipends was not detailed;
  - Information on the composition of the lecturing staff and management of the programmes in terms of disciplines, race and gender was not detailed enough;
  - The profile of the students (applicants and those accepted and supported by the programmes) in terms of disciplines, race, nationality and gender was inadequately addressed; and
  - The availability and suitability of infrastructure was touched on but not inadequately addressed;
- Programme processes
  - Assessments of applications and the criteria for the selection of students was not detailed;
  - The effectiveness of the curriculum of NASSP and the MWLA programme in meeting the joint training needs of astronomy and space science could not be addressed in detail as this (outcome) requires longer period of data collection and engagement with past students; and
  - Little discussion appears to have been had on the appropriateness of the performance indicators (output, outcome and impact) used by NASSP and the MWLA. In effect this is the issue raised above and will require careful consideration by all involved in the future;
- Programme outputs and outcomes
  - The sectors that attracted graduate students (including the proportion of graduates that emigrate) were not addressed in detail. This again requires establishing in place tracking systems;
  - The level and number of publications produced by students was not detailed; and
  - Conferences, symposia and seminars where students participated, if at all, were not presented in detail.
- Management of the NASSP and MWLA programme
  - The report did not address in adequate detail the appropriateness or lack thereof of the programmes’ management structures and processes to achieve the objectives of NASSP.

Nonetheless, the report brings these issues and differing levels of “frustrations” of the programme management team at the NRF; the implementing team at the institutions of learning, and the DST (with high expectations) as a funding department. **In essence some of the limitations of the report that have been highlighted above as having been inadequately addressed should form the basis of the discussions about the future of the programme(s) among the relevant parties. The report points to the need to revise the programme(s) and for the different parties to clearly agree on how the goals of the programme will be achieved.**

### **NRF responses and comments on review comments and recommendations**

The NRF gratefully acknowledges the reviewer comments and recommendations. Presented below are the Review comments and recommendations followed in each case by the NRF response and/or comments. The first part of this section presents comments and recommendations that are of a general, crosscutting nature. The second section deals with comments and recommendations relating specifically to either the NASSP (including its Extended Honours Programme) or the MWLA Programme. It is envisaged that an action list and responsibilities will be generated after consideration of these comments, recommendations and responses by the NRF, DST and indeed the implementing higher education institutions.

### **General comments and recommendations**

- The different bursary levels for students who are all within the scarce skills category causes conflict in closely related endeavours such as physics, astrophysics, and radio-astronomy. It appears that these closely related disciplines compete with each other for prospective students not only on the basis of academic excellence but rather on levels of bursaries all originating from DST grants. It is believed that the SKA-type funding appears to be the realistic level, and that other scarce skills groups need to aspire to reach the same levels.
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***NRF response:* There are on-going discussions between the DST and NRF concerning the standardization and improvement of bursary levels and values, respectively. However, given the urgency of the matter with respect to the needs in this field, the DST and the NRF (or future body responsible for astronomy) should look at investing more funds to either bridge the gaps and/or standardize the value across the sector.**

- The system of topping up state-funded bursaries by bits from other state-funded grants appears not to be the best way of addressing this matter. MWLA researchers achieve these levels using “top-up” schemes. Others refrain from doing this because they want to treat all students equally.

***NRF response:* The NRF concurs with this sentiment and strongly recommends that going forward, the programmes should be structured such that conditions of award and top-up regulations should adhere to the established NRF scholarship and bursary regulations governing top-up. The programmes should move away from their “special” and apparent inconsistent rules for topping up student bursaries.**

- Funding for research degrees should not be (and generally are not) channelled through NASSP. They should be handled by the grant holders directly or, if required, through the MWLA or SKA funds, as the case may be.

***NRF response:*** The NRF concurs with this statement and would like to consider an alternative mode of funding additional student requirements. Similar conditions of grant-holder linked bursaries of the NRF should generally be used

- Once all the newly granted SARChI positions are occupied, many students will be attracted by them, and fewer candidates are expected to be available for the smaller projects which are currently supported by MWLA.

***NRF response:*** The NRF does not concur with this statement. It is envisaged that additional instruments (as rolled out by DST and/or the NRF) create **ADDITIONAL** opportunities for human capacity development, rather than competing ones. This is all the more reason why student bursaries (as in bullet point 1 above) must be standardised and/or follow the conditions agreed upon by the NRF and DST.

#### **Programme-specific comments and recommendations**

- ***Support for NASSP for 2013 and beyond should be granted subject to the following conditions:***
  - A clear well-documented governance structure is developed.
  - Mission and vision statements are formulated and agreed to by the participating community.
  - A new zero base-line budget be drafted for 2013, with detailed, itemised motivation.
  - A business plan be developed based on the vision, mission and goals. This should include fund-raising strategies for bursaries to support foreign African students.

***NRF response:*** The NRF concurs with the continued support of the NASSP programme subject to the detailed conditions. In addition, the DST should consider possible alternative management and structural arrangements (for NASSP, EHP and MWLA). This **MUST** be discussed and agreed upon with the key parties, i.e., the DST; the NRF (or relevant agent) and key persons in institutions of higher learning/national facilities responsible for student training.

- ***The idea of a Northern Node of NASSP should be accepted and should be developed gradually with full participation of the Southern Hub***
  - More students need to be encouraged to register for their NASSP MSc at other participating institutions, and hence a revised method of funding their bursaries is required.

***NRF response:*** The NRF concurs with this sentiment. This will require additional resources. However, the lack of adequate resources should not inhibit some discussion and agreement on development of the node within the available funds, even if this means a limited number of students.

- ***It is recommended that the EHP be continued in a more cost-effective manner by concentrating on the teaching of the course***

- The Winter School and other projects should be handled separately under another heading, and these would include functions and activities at other universities including HBU's. These should involve these universities and note of their needs should be taken into account.

**NRF response:** The NRF suggests that this be carefully considered, as the success of the EHP rides heavily on this initiative.

- Ways and means need to be found how the ADP idea for graduate students can be handled on a wider basis across the mathematical and physical sciences in order to be more cost effective and to improve quality.

**NRF response:** The NRF agrees with this sentiment

- ***The MWLA research fund should be retained to cover bursaries and mobility and other approved funds for MSc, PhD and Postdoc research for which other provision is not available.***

- As NASSP is a teaching programme, the follow-up research of its students is proposed to reside under the MWLA together with other qualifying research by students who have proceeded along other routes.

**NRF response:** While the NRF agrees that a follow-up programme for NASSP students be maintained, the NRF does not agree that the MWLA programme in its current form be the best possible mechanism. The DST is advised to consider an alternative funding mechanism that incorporates both programmes, and ensuring that ALL aspects of astronomy are catered for and is managed *via* the established mechanisms of the NRF or future astronomy agency.

- ***A lean efficient one-stop office should be charged to handle applications, funding and payments for human capacity development (including NASSP and MWLA).***

- It could eventually be placed at SANAA (or its equivalent) when it is established. In the interim it could be placed at the NRF.

**NRF response:** The NRF will await the decision of the DST on how to take the management of these programmes forward.

- ***The MWLA is generally considered by the researchers as an interim measure which needs to be replaced by a more permanent funding structure***

- This is seen to be aligned with the funding for research and human capacity development at MeerKAT and the SKA-SA when all these become part of the South African National Astronomy Agency (SANAA). When this is done, it is believed that the unequal treatment of students in optical astronomy on the one hand and radio-astronomy on the other, will be resolved.

**NRF response:** The NRF concurs with this sentiment

### **Final comments**

All in all however, the report provides a point of departure for the revision and consolidation of a programme and or programmes that support the development of a cadre of highly skilled astronomers. It is the view of the NRF that the “interim programme” and or “interim solution” must be replaced by a carefully planned and articulated human capital development programme that involves all capable and potential higher institutions of learning, and academics in the country. This requires engagement between the DST, HEIs and the NRF and or interim structures of the astronomy agency. It must be noted that in the interim, the planning and implementation of the programme and any new initiatives can only be accommodated with the funding budget to be transferred to the NRF by the DST, and limited for two years. It is the NRF’s assumption that once decisions have been finalised regarding the astronomy agency, the funding for human capital development will also be revised accordingly.

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