

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

**Reviewer:**

**Professor FJW Hahne**

**Stellenbosch Institute for Advanced Study**

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## Contents

Executive Summary.....	3
1 Background.....	5
2 Relation between MWLA Programme, NASSP and its Extended Honours Programme.....	6
3 Management and Funding of MWLA.....	6
4 Management and Funding of NASSP.....	7
5 Management and Funding the EHP of NASSP.....	7
6 The review process itself.....	8
7 Performance and outputs of MWLA.....	8
8 Performance and outputs of NASSP.....	9
8.1 Governance and Management.....	9
8.2 The host institution.....	10
8.3 Need for annual reports.....	11
8.4 Financial reporting.....	11
8.5 The BSc Honours and the MSc course work.....	12
9 Performance and outputs of EHP.....	14
10 Other related Programmes.....	15
11 Profile of students and researchers.....	16
12 Outcomes of the programme.....	17
13 Recommendations.....	17
13.1 Recommendation 1.....	17
13.2 Recommendation 2.....	18
13.3 Recommendation 3.....	18
13.4 Recommendation 4.....	18
13.5 Recommendation 5.....	18
14 Acknowledgements.....	18
15 List of Acronyms.....	19
16 List of Annexures.....	20
17 List of Appendices (Available through hyperlinks in text).....	20
18 Annexure A1: List of documents considered.....	21
19 Annexure B1: Terms of Reference for the review.....	23
20 Annexure C1: List of NASSP and the MWLA review participants per slot.....	31

**List of tables**

Table 1: NASSP breakdown of costs, bursaries and DST contribution over time	12
Table 2: The relevant numbers of EHP cohorts since inception	14
Table 3: Summary of number of students who passed BSc Honours over time	16

## **Executive Summary**

South Africa occupies a favourable geographical position for being internationally a foremost location for astronomy. Substantial equipment has been and is being provided to make use of this. The training of local Astronomers which started some 40 years ago in Cape Town obtained a boost by the far-sighted nation-wide collaboration between institutions to form a joint teaching initiative called the National Astrophysics and Space Science Programme (NASSP).

Even though NASSP was initially intended to rotate, it has now for the past nine years been located at University of Cape Town (UCT). This contributed to the increasing growth in this field within the Western Cape. In order to achieve a more even geographical distribution of activity in the field, the establishment of a Northern Node is recommended. It is furthermore recommended that the NASSP governance be formalized and that in its constitution clear provision for the interests of all the role players is made. The current plan to extend the enrolment of students at other partner institutions is supported.

Besides South African students, NASSP trains a good proportion of other African students, and in this way meaningful collaboration across the continent is advanced. However funding for foreign students needs renewed attention, as those reserved for scarce skills development are generally not available for them. NASSP needs to develop a proper business plan which spells out directions for further growth. It also needs to issue annual reports which contain detailed financial reports. All of this needs to be approved within its governance structures once it is fully established.

The quality control of its academic programme is handled through the normal UCT channels through the Astronomy department and the faculty of Science under which it resides. Here the broad NASSP management can also introduce some input. Given the nature of the programme which makes use of a variety of lecturers from various institutions, it is recommended that much more use be made of tutors with at least one of them being quite senior. Effort is required to ensure cohesion of the courses.

Four years ago a project was initiated to increase the number of students who passed their first degrees at Historically Black Universities. A pre-Honours course, which resides with the Academic Development Programme of UCT, was introduced for them. A Winter School which is held at SAO was also attached to it. This served among other things the purpose of selecting applicants for the pre-Honours course. Much effort was invested. Even though the success is limited and the cost is high, it is recommended that innovative methods of outreach be continued, albeit in a more cost-effective manner. It is essential to ensure very broad participation in the exciting developments in astronomy in South Africa.

Also about four years ago a research support project for Multi-Wavelength Astronomy (MWLA) was started in order to retain the newly trained young scientists in South Africa. The hope was to place it under a separate structure for all Humans Capacity Development for Astronomy as soon as this was established. This remains the intention. It is recommended that all MSc research, via NASSP or independent of it, and PhD research for which no funding is available through other channels, like South African Research Chairs Initiative funds, be handled through this mechanism. Mobility and other funds for young researches should also be provided.

In order to streamline the various projects alluded to above, it is recommended that a lean efficient one-stop office be established that will receive and approve funding applications, will transfer the payments and will receive the annual reports including reports on expenditure. This process should be overseen by a senior scientist who would decide when and whether additional expert opinion is required. Eventually this office would merge in the structure of SANAA, but for now, it could be placed at the NRF.

## 1 Background

Observational Astronomy by means of increasingly more sophisticated instrumentation has been practiced in South Africa for almost two centuries by Astronomers mostly from abroad. It is only during the last third of the previous century that formal training of local students was developed. This very small local astronomy community started to link up more closely with the larger physics community around 1990 when they became an active part of the South African Institute of Physics (SAIP). These links grew. Astronomers were elected to the Council of the SAIP and two recent past Presidents of the SAIP emerged from the Astronomy community. The SAIP strongly supported proposals for telescopes, like the one which later became Southern African Large Telescope (SALT).

The Physicists had already developed a tradition of novel collaborations across institutional borders of which Southern Universities Nuclear Institute (SUNI), established in the sixties, was an early example of a joint initiative between Stellenbosch University (SU) and University of Cape Town (UCT). It was very successful and developed through various stages to a nation-wide collaboration to become the iThemba Laboratory for Accelerator-Based Sciences (iThembaLABS) of today. The theoretical Physicists started a little later with joint nation-wide training workshops. These were at first held among them, and then they were extended to become advanced schools to which leading international scientists were invited in order to teach courses on novel topics in physics. From this spirit and the basic ideas of this project, which today is called the Chris Engelbrecht Summer School in Theoretical Physics, emerged the much larger and better funded initiatives like African Institute for Mathematical Sciences (AIMS) and National Institute for Theoretical Physics (NITheP).

In these and other examples, the basic idea is that, isolated small groupings of scientists have little chance to each significantly contribute to research which is done on a much larger scale internationally. However, rather than competing against each other, these small local groups can collaborate closely and thereby jointly produce work of real significance. Also rather than teaching advanced topics to very small groups of students, one can bring the various students together for an all-round better teaching experience. Of course, there is always a lot of give and take in such joint projects, and people who only see their immediate own interests in such arrangements are not good partners.

For Astronomy the main centre was Cape Town with activities at South African Astronomical Observatory (SAAO) and UCT. Generally good relations existed between them. In addition there were other smaller groups around the country. Notably, there was the radio telescope at Hartebeeshoek which, as a remnant of the first satellite-launching era, was developed to a scientific instrument in its own right. Also the cosmic ray work at Potchefstroom became increasingly more relevant for astronomy. Other activities in Durban, Bloemfontein, Pretoria and Johannesburg need to be mentioned as well.

Recently several reviews and position papers were written on the state of Astro-sciences in South Africa, namely:

- Review of the NRF Astro-geosciences cluster as part of the NRF Institutional Review (2010)
- Position Paper on A Decadal Strategy for Human Capacity Development In Astronomy and Astrophysics in South Africa by Krish Baruth-Ram (August 2010 updated February 2011)

- Report on Strategies and Policy for the Development of Astronomy of Astronomy in South Africa from the Astronomy Desk by Manfred Hellberg (March 2011)

These were of a fairly broad nature addressing many matters. The present review accepts these as constituting a general framework from which more detailed policies will be developed. This review is then focussing very specifically on education in astrophysics and space science and the development of research capacity in these areas. The review is in retrospective and covers the period from 01 February 2003 to 31 March 2011 for NASSP and 2006/07 to 31 March 2011 for the MWLA programme. It focuses on the performance of the NASSP and the MWLA Programme. The reviewer was requested to conduct the review, determine and report on identified strengths, weaknesses and impact of the NASSP and the MWLA Programme in terms of programme inputs, processes, outputs and outcomes, management, performance in relation to others, and provide recommendations for future strategic direction.

## **2 Relation between MWLA Programme, NASSP and its Extended Honours Programme**

The Review was commissioned for two different programmes, namely NASSP and the MWLA, which are supported by and large by the same scientists. Quite early during the Review it became clear that the part of the NASSP called the Extended Honours Programme (EHP) which trains underprepared students for future study within NASSP is actually run by a different section of UCT under a different leadership and with a separate budget. It also reported separately. Hence it was decided to handle it separately within the Review as well.

We therefore handle three parts: 1) the pre-Honours within EHP, 2) the Honours and MSc teaching part within NASSP and 3) the general MSc, PhD and post-doc research within the MWLA funding. This clear distinction into three groups then avoids confusion of the kind: what is an NASSP PhD student? All PhD students in the astro-sciences would thus in principle qualify for MWLA support irrespective whether they came through NASSP or not, depending only on the quality of the student and the proposed project and on the extent to which other support is available or not.

## **3 Management and Funding of MWLA**

MWLA was started during 2006/7 as an interim programme which was at first envisaged to last for only a short period, after which it was to be replaced by a long-term new structure which was still to be conceptualised and instituted. However, this process is still not completed and hence MWLA has been extended in this interim state.

It is thus understandable that the procedures, while as transparent as possible, were of an ad-hoc nature.

The main purpose of MWLA was to provide funding for many young scientists in the field to conduct research, and thereby to develop and retain the emerging expertise as the future users of the new equipment in the region.

Patricia Whitelock was finding herself in the unenviable position of having to deal with the NRF/DST as the source of the funding on the one hand and on the other hand with the scientists from various institutions who are spending the money. In this position she had to explain discrepancies which were mostly of a passing nature, and were caused by delays in the system of reporting.

The overview 2006-2011 in which these matters are described is attached as [Appendix A](#).

#### **4 Management and Funding of NASSP**

The idea of NASSP was already discussed in 2001, but in 2003 it started as a joint teaching programme for Honours which is followed by an MSc. The initial Steering Committee agreed that the programme would be hosted at UCT for the first five years, and Prof Peter Dunsby, being available at UCT, was tasked to take the lead. The idea was that the teaching expertise would be pooled nationwide among the members of the consortium. Funding for bursaries was secured, initially from the Ford Foundation. This was a fine start with lots of enthusiasm and the results are discussed below.

Unfortunately the management structure was not developed beyond the initial Steering Committee. While such informal arrangements may seem fine to some of the participants, it is not acceptable for some others who consider themselves not to be part of the insiders. Also for a reviewer, the task to sort out accountability, financial and general reporting is by no means made easy.

Following the initial two-year funding from the Ford Foundation, the Mellon Foundation and others also provided sponsorship for 2005 and 2006. Eventually in 2007 the DST became the main funder and currently still is at a much increased level.

A document entitled "Some thoughts on the National Astrophysics and Space Science Programme. A report for the NASSP review, January 2012." is attached as [Appendix B](#) and serves as a self-evaluation. It contains a list of all students from 2003 onwards giving their names and their origins.

#### **5 Management and Funding the EHP of NASSP**

Even though NASSP was drawing a diverse student body, it was less successful in enrolling South African Black students. Potential candidates from several universities were considered to be underprepared for the NASSP Honours course due to their general background and more specifically, due to a lack of exposure to Astronomy as a subject. It was therefore deemed necessary in 2008 to commence with an additional intervention in the form of an EHP which DST agreed to fund from 2008 onwards. The EHP resorts under the Academic Development Programme (ADP) of UCT with the financial management being handled through them. Prof Saalih Allie leads the EHP and reports on it. His very clear and fine self-evaluation of the EHP is attached as [Appendix C](#).

The academic curriculum and approach has been changed each year. Being a rather small programme, it is considered necessary to make use of existing undergraduate courses of the Science faculty. This sensitive matter is discussed below.

Also, in order to recruit students from Historically Black Universities (HBUs), a Winter School is run each year to which final year BSc students from these universities are invited. The two-week school



serves to acquaint the students with astronomy as a career option, and it also serves as a vehicle to test and recruit potentially successful future students for NASSP. This exercise is also funded from the DST grant.

## **6 The review process itself**

A set of documents, Annexure A1, was put together by the Monitoring and Evaluation unit of the NRF, and this was studied thoroughly before the visit. Further clarifying documents were requested before, during, and after the period of interviews. As set out in the Terms of Reference, Annexure B1, interview/interact with a selection of members of the management of NASSP and the MWLA programme, government, the Higher Education Sector, and other stakeholders, as well as student beneficiaries were undertaken during 20 to 24 March 2012 in Pretoria and Cape Town. A list of the participating groups and their members is attached in Annexure C1.

Discussions took place around key topics for the three programmes in a united manner. It turned out that the main NASSP received most of the attention. Main review questions were around the following topics: programme management, reporting, governance (review documents, roles and responsibilities), programme and course structures, relations to other programmes, quality assurance, target groups, support staff, student experiences and future prospective. A tour of the NASSP facility was also undertaken.

In the reporting below most of the comments are handled under the NASSP heading, while only those which specifically pertain to the other two programmes appear under their respective headings.

## **7 Performance and outputs of MWLA**

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 Square Kilometre Array – South Africa (SKA-SA) when all these become part of the South African National Astronomy Agency (SANAA) as envisaged by previous reviews listed above. 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 hand, will be resolved.

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. In discussions on such topics it was stated by some of those who were interviewed that the SKA-type funding was the realistic one, and the other scarce skills groups need to aspire to reach the same levels. The MWLA researchers see an opportunity for their students to achieve this now by using “top-up” schemes. Some refrained from this action because they prefer to handle students in physics departments equally.

An alternative opinion is that differential treatment in such closely related groups is reasonable on the grounds of the nature of the projects. It may be considered reasonable to financially compensate students, who are prepared to work under circumstances in which their project is narrowed down to achieve very specific goals giving them less freedom to follow their own interest. This happens anyway in many cases where industrial goals determine the future routes of projects, and academic achievements become secondary. Implementation criteria for such decisions by a national grants system are by no means straightforward. The danger is that scientific excellence may be on the losing end. However, these matters are outside the scope of this Review.

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.

The community of astronomy researchers at universities is still quite small and, even though there are researchers with high NRF rating among them, generally the NRF rating of the others is not sufficient to access enough funds for a field that is in a growing phase. MWLA funds are needed for mobility of researchers and their students to do observations. Student support is also required for MSc and PhD and certainly for South African post-docs in order to retain them in the field. The excessive use of top-up grants is however not convincing.

The often seen reference to “NASSP PhD students” creates the wrong impression that the only route to a PhD in these fields is through NASSP. In fact some of the PhDs who were interviewed did not follow the NASSP Honours. As a rule 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.

The information which was gathered on student theses and publications shows that good use has been made of the MWLA funds. [These funds are relatively small on the scale of the equipment funding and even on the scale of the South African Research Chairs Initiative (SARChI) funds]. See [Appendix D](#) for research outputs.

Once all the newly granted SARChI positions are occupied, the situation will change. Many students will be attracted by them, and fewer candidates are expected to be available for some of the smaller projects which are currently supported by MWLA. They should nevertheless be encouraged to continue within research collaborations.

## **8 Performance and outputs of NASSP**

As stated above NASSP was a wonderful far-sighted idea at its inception and it is to the credit of the community that supports it that it is still intact. It has been instrumental in educating a steady stream of astrophysicists and space scientists over the past 9 years. Even so, there is room for improvement, and there is also criticism about the programme which needs to be addressed.

### **8.1 Governance and Management**

The lack of a properly developed governance system has already been addressed above. It appeared that even the members on the Steering Committee were not sure about their role.

There seems to be no Constitution document, and no standard vision and mission documents. The appointment and the term of the director are not determined. Participants are not sure whether the Steering Committee has a management function or whether it has a purely advisory role. In some documents there is reference to a management team in another to a NASSP executive committee. These comprise different sets of names.

This leads to the situation in which participants, who are not part of the inner circle; do not know how decisions are taken and what routes they can take to propose changes in the operation or in the content of the course. It was also reported that members of committees are sometimes just arbitrarily dropped.

Some lectures, thesis supervisors and other members of the community from outside the Western Cape expressed the view that NASSP was essentially a UCT project even if its name implied that it was a national programme. It was also felt that those who participate in lecturing there were at a disadvantage because they had to squeeze their course into a three-week period while the lecturers living in and around Cape Town were spreading theirs over a semester.

## **8.2 The host institution**

UCT was and still is the strongest contender to host NASSP. Recently additional investments have been made to strengthen the Astronomy department which has no equal in South Africa. The research publications are impressive and they seem to be growing.

The Mathematics Department which itself has an impressive record, houses NASSP even though it is less involved in its operation. The Director and the administrative officer are part of the staff of the Mathematics department but the courses are accredited through Astronomy. NASSP's computer lab is located in the Mathematics building and the computer officer has a room there as well. Most of the lectures are presented in the Physics/Astronomy departments. This is where most of the students and lecturers can be found and it looks like the more natural home. In passing it is surprising though that the Physics department is not closely involved. Some say this is a matter of personalities, which should never be an acceptable reason.

(Erratum: After submission of the first report it was pointed out to the reviewer that there were two further rooms used by NASSP for lecturing in the Mathematics Department. These were not shown to him when he inspected the physical facilities, and hence no comment can be made about their suitability.)

Even though UCT has the academic strength to be the best host for NASSP, its current provision of infrastructure could be challenged by others, that is to say, if others wanted to.

In comparison with AIMS the infrastructure at NASSP is a very fragmented set-up. To an outsider NASSP appears to be no more than a well-funded cross-disciplinary teaching programme of a single university in which lecturers from other universities participate on invitation. Also in comparison with AIMS the computer operation is very small and it is hard to

see why NASSP needs two IT officers, while in comparison AIMS has for a long time got along fine with a single IT officer. AIMS now has two of them in its very much larger operation.

It needs to be added that the current Dean of Science took a very positive view about assisting NASSP further, for instance in terms of IT support. He had taken the trouble to extract the figures for the subsidy received by UCT which was generated by NASSP students over the past few years. While all universities need to slice off money at the top, and furthermore also need to cross-subsidize less cost-effective programmes, the Dean expressed his willingness to consider further support for the NASSP if well-motivated proposals were laid before him.

The Dean of Science has also indicated that UCT is in discussion with other partners with the aim of sharing the benefits of NASSP more equitably, a draft document in this respect was made available to the reviewer. Such partners would naturally also need to invest in the parts of the programme which they will handle.

### **8.3 Need for annual reports**

A programme the size and complexity of NASSP needs to have a proper annual report which contains its mission and vision and its achievements during the past year. It also should contain a full financial statement of its income and expenditure. This report should be discussed and approved by the management of NASSP, once properly constituted, and be made available to the partner universities and to DST and NRF.

During the current review it was for instance difficult to obtain financial statements which are necessary to consider whether available resources are spent well. With good annual reports this becomes easy. Similarly, the trends in academic achievements are easily understood if subsequent annual reports are compared.

It is advisable for NASSP to once again seek sponsorship from other donors as well, in particular for the funding of foreign African students, see below. For this purpose proper annual reports are essential.

### **8.4 Financial reporting**

The most difficult part of the Review was to understand how the finances of NASSP are handled and reported. A single cost centre, from which Income and Expenditure statements are drawn, would have been the simple way to do this. After requests more and more details were received. In [Appendix E](#), the details of the bursary component of the expenditure from DST funds over the past three years are shown for both South African and foreign students. In both cases this is at a higher level than the NRF scarce skills amounts.

In the table below the trend of increase of expenditure since inception is shown for the total cost of NASSP and for the combined bursary component of BSc Honours and MSc. The DST contribution is also given in both cases and amounts are in thousands of Rand, rounded.

**Table 1: NASSP breakdown of costs, bursaries and DST contribution over time**

	2003	2004	2005	2006	2007	2008	2009	2010	2011
<b>Total costs</b>	1189	2100	1842	1916	2046	3567	3767	5361	6086
<b>Total bursaries</b>	622	1149	890	941	729	1738	1572	3101	4112
<b>Total DST part</b>				133	1780	3209	2870	3998	4263
<b>Total DST bursary</b>					729	1738	1201	2274	2828

The increases in recent years have been steep. Expenditure on IT and increases in bursary levels are responsible for part of this. The contribution from UCT is modest, but the Dean of Science indicated that he is prepared to revisit this item. The Dean has kindly provided a summary of the Department of Higher Education (DHET) subsidy which UCT receives for NASSP students, but this is not given here, as one would need to go into university funding in general to make a fair assessment of expected support.

### 8.5 The BSc Honours and the MSc course work

The NASSP honours course is its core. It consists of 10 course units of 30 contact sessions each, as well as a seminar component counting two units. Currently 7.5 of the course units are taught by lecturers who reside in the Western Cape while one is at Hartebeesthoek Radio Astronomy Observatory (HartRAO), one at University of the Witwatersrand (Wits) and one half of a course in Electrodynamics is given by a lecturer from University of KwaZulu-Natal (UKZN) (information taken from [www.star.ac.za/programmes](http://www.star.ac.za/programmes)). The major contribution is from UCT and SAAO. This may very well be different in different years.

As indicated, some of the lecturers from outside the Cape who have taught in the Honours (and in the MSc) course considered themselves at a disadvantage because they had to complete their course in three weeks for practical reasons, while lectures from the Western Cape could spread their course over a full semester. Students' response to these two types of delivery apparently differs significantly. One solution would be to divide all the Honours and the MSc course work into three-week blocks as is done at AIMS. Several lecturers from outside the Western Cape found it rather difficult to teach a NASSP course because they received hardly any tutor support. They were given no introduction and received little in terms of academic and logistic guidelines regarding the course.

Researchers from outside the Western Cape were of the opinion that it was much more difficult for them to attract good research students from NASSP as the best of them were snatched up by supervisors in Cape Town.

The MSc course consists of 14 units of lectures of which each student needs to pass five units. There is thus considerable choice which is generally linked to the direction of research to be

undertaken. The number of students in these classes is hence lower. Compared to the Honours course, there are more lecturers from the North who volunteer for these courses. Last year, 5 out of the total group of 18 who lecture a full or partial course came from outside the Western Cape. For course content and structure, see: [www.star.ac.za/programmes](http://www.star.ac.za/programmes).

It was also pointed out that the NASSP collaboration had over the years in effect strengthened the already active South much more than the North, while it had been hoped that activities and interest in astrophysics would spread more evenly across the nation.

Several lecturers and supervisors supported a proposal for a new Node of NASSP in the North to be set up in a carefully planned manner. For instance initially a certain set of MSc courses could be taught at one of the northern universities, and if all courses are divided into three-week blocks, this should be logistically quite feasible. Discussions on the feasibility of a northern Node which remains in the NASSP framework are under way. Understandably, there was less enthusiasm for the Node in the North among the participants of NASSP who reside in the Western Cape. Those who were asked whether they would be prepared to teach at the new Node were generally reluctant. Some of the students pointed out that they would have liked to be taught by a few well-known international lecturers as is the case at AIMS. For this to be realized, it would also be preferable to work within a system of three-week block courses.

In discussion with the lecturers and specifically also with past and present students, several matters came to the fore, which are listed for the attention of the academic management.

- The courses are very full and students tend to learn as much as possible without real understanding.
- There is an excessive emphasis on examinations with papers having similar questions in successive years leading students to work on examination questions rather than on understanding the topics.
- Some of the apparently bright students reckoned they had to do more challenging problems for their undergraduate degree than they were required during the NASSP Honours courses.
- Several students felt that proper Quantum Mechanics should have remained in the set of courses, and some thought it should be brought back. Some even thought that it would be more appropriate for them than General Relativity was, the latter being considered difficult to comprehend by some.
- Students were not exposed to Space Science during the Honours course. They hence tended not to follow this direction for the MSc.
- There is a lack of good tutoring. Some lecturers said they have had no tutor at all for their classes.
- Some students who were particularly interested in the practical side said that they had neither worked with a telescope nor with other equipment throughout their entire NASSP training. They were only given data to analyse.
- While students were asked to give feed-back most of them were not convinced that it was incorporated in future planning in a serious manner.
- Students were not receiving feedback on their Honours projects, but they wanted it.

To balance the picture it needs to be recorded that several students expressed their pride in being part of a national programme. They enjoyed some of the courses very much, citing as an example one given by the lecturer from Wits as being particularly good and enjoyable.

## 9 Performance and outputs of EHP

The EHP serves as an outreach programme mostly for HBUs. It is said that experience has shown that due to the fact that they had no exposure to astronomy and they lacked certain other academic skills, students from some of the universities are not ready to join the Honours programme. For some internal reasons consideration cannot be given to simply spreading the Honours course over two years with some additional models in say computing, problem solving and introductory astronomy. So the EHP was introduced as a pre-Honours course which earns no subsidy and counts no normal credits. Initially these students were considered undergraduates, but since they have degrees, they were not happy about that, and they are now considered as postgraduates, and the EHP is treated as an ADP, at a graduate level. Students who pass this yearlong study are then admitted to the BSc Honours. Details of the various options which were tried in successive years are described very clearly in the self-evaluation report.

The first step in recruiting students for the EHP is taken by Prof Medupe, now at the University of North West (UNW), Mafikeng campus and Dr Sefako (SAAO) when they visit various HBUs to talk about NASSP and astronomy in general. They extend also invitations to a Winter School which is held at SAAO in Cape Town over a period of two weeks. This School has two purposes. It exposes 20 to 30 students to activities at SAAO and in Astronomy more generally. Lectures are presented and various sites including Sutherland are visited. Students conduct a project and from this and from general interaction with them, up to 10 are recruited for the EHP for the following year. Those who pass the EHP, after an additional year, are then able to join the main NASSP Honours course.

**Table 2: The relevant numbers of EHP cohorts since inception**

Year	2008	2009	2010	2011	2012
Joined EHP	4	7	9	7	6
Passed EHP	4	6	6	5	
Joined NASSP Honours		3	3	5	4
Joined NASSP MSc			3	3	3

Also given in [Appendix F](#), is neat and well-prepared Income/Expenditure Statement with the appropriate comments, of EHP as provided by Prof Allie upon request. A quick glance already shows that in view of the number of successful students, the full programme funded as EHP is too expensive. One can argue that the Winter School serves a more general outreach purpose as well,

and hence it should not be included as a cost in the EHP. Similarly Research and Evaluation hopefully serves a greater purpose than only the EHP which presents a rather small sample for this kind of work. It should also be removed from this budget and be handled elsewhere. Even after these steps, EHP looks expensive and other avenues of handling this clear need should continue to be explored.

Prof Medupe is very active in this operation and he is highly regarded by many. According to him the disappointing figures are those “that the nation gives” at present. They are not due to a lack of trying. Two of the Afro-American academics, Dr Hakeem Oluseyi and Prof Charles McGruder, who have been engaged in NASSP, and in particular with the EHP, have been contacted by the reviewer, and according to them, the student response here from Black students is better than that in the USA. Both academics were surprisingly positive about what had been achieved so far and they expressed encouragement for continuation. Prof McGruder’s report is found in [Appendix G](#).

Nevertheless a rethink is called for. Astronomy and Science in general cannot prosper if it does not reach all the sectors of the nation in a more convincing way, and if it does not enjoy the support of all. For instance one could consider spreading some of the activities like some parts of the Winter School more evenly across the country.

## **10 Other related Programmes**

It would be useful for NASSP and EHP to observe what is done in other projects. A few examples are discussed:

The African Institute for Mathematical Sciences started its teaching in the same year as NASSP, but is now very much bigger. All along it had well-documented appropriate governance, it prepared annual reports and it secured funding from a variety of sources. Bursaries for its foreign African students were funded by foreign grants. AIMS divided the academic course into three-week units, made use of very many international lecturers to encourage continued renewal, concentrated on real problem solving and de-emphasized the focus of merely learning for examinations. Many South African academics are involved particularly in the essay phase.

AIMS struggled all along to attract sufficient numbers of South African students. It tried schemes like the EHP for several years and also attracted too few students, even though some of those enrolled were quite successful. However, it turned out that the numbers remained low and that the programme was not sustainable. The previous and the current director visited most HBUs personally to discuss student recruitment with the students and with the faculty. It was clear from the beginning that one should not just drain the best students away, but one should aid the development of these universities which play an important role in very large rural communities and which train many teachers. These future teachers are crucial in increasing the pool of young people from which scientists will emerge.

NITheP, is to a large extent involved in research, but it also spends considerable effort in the development of Human Capacity Development including outreach actions. Its director has also himself visited most of the HBUs where he has discussed with the faculty on how best faculty support should be structured. From its inception NITheP was designed as a structure of a hub in



Stellenbosch and two nodes at Wits and at UKZN. This turned out to be a very favourable constellation in many ways and in particular for the outreach action.

Several universities have bilateral agreements in which student registration is shared. An example in Physics is an agreement between University of Western Cape (UWC) and University of Zululand (UZ). Also the recent appointment of joint research chairs indicates that this kind of collaboration is part of a future trend.

For NASSP a more decentralized operation with a hub in Cape Town and a node in the North would fit into this trend of cooperation. It would also be useful for NASSP to collaborate with some of the other projects in the outreach action. Some of the training can be done jointly as all these projects need to teach computational methods, problem-solving skills in mathematical sciences and general abilities to tackle research projects.

## 11 Profile of students and researchers

Astronomy in South Africa is seen as a benefit for Africa as a whole. The same is true for science and technology in general. Africa has many common problems with similar solutions. It has a common destiny and common hopes. It is therefore refreshing to see how many African students come to study here. Many of them are very talented and they contribute enormously to our scientific endeavour. The problem is that they don't have funds to cover the teaching and the living costs and that there is the expectation that South Africa should provide these funds. However, at present we have so many pressing needs in the education of science which require priority attention. Also other African states need to accept the responsibility to train their own young scientists to their own benefit. NASSP has a large portion of such students and it provides them with generous bursaries. The number of students who passed the BSc Honours since inception is summarised in the table below. The totals and those from South Africa are shown in the table below.

**Table 3: Summary of number of students who passed BSc Honours over time**

	2003	2004	2005	2006	2007	2008	2009	2010	2011
<b>HONS SA</b>	10	6	6	8	7	3	9	9	10
<b>HONS TOTAL</b>	12	10	10	16	13	11	16	16	15

The position does not look acceptable, but could change if sufficient other sponsorships can be secured for most of the foreign students. We then have a win-win situation. NASSP initially started with a sponsorship from the Ford Foundation and later from the Mellon Foundation. NASSP should take on the challenge to fund foreign students with such sponsorships. This goal needs to be part of its business plan.

## 12 Outcomes of the programme

- Astronomy in South Africa is seen as a benefit for the nation and for Africa as a whole with examples of some graduates from African countries returning to their home country and establishing astronomy departments in their universities.
- Outreach to some universities where NASSP students are recruited does take place during visits by some of the participants of NASSP.
- As it is, several students participating in NASSP expressed their pride in being part of a national programme, and in future the programme has a potential of reducing the brain drain.
- NASSP, through EHP is increasing the pool of local scientists by attracting students who would otherwise not have furthered their studies in astronomy.
- Through the Winter School, NASSP is able to engage in scientific public relations (science awareness).
- Several of the former students of NASSP have found employment within the South African universities while some went abroad, some of these students who are abroad want to collaborate with the programme. For example a former NASSP student who is currently studying nuclear astrophysics in the United States requested to come and offer talks to Winter School participants.
- An unintended outcome is that Astronomy in the Western Cape has grown stronger relative to other parts of the country.
- During the past 9 years a continuous stream of students were trained through NASSP at Honours and Masters Level as is shown in [Appendix B](#).

## 13 Recommendations

Continued support for both NASSP and MWLA is recommended subject to conditions indicated below.

### 13.1 Recommendation 1

In view of the intrinsic value of a joint programme, 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 is drafted for 2013. In it, the different items need to be motivated fully.
- A business plan is developed based on the vision, mission and goals. For instance, it needs to include fund-raising strategies for bursaries to support foreign African students.

### **13.2 Recommendation 2**

- The idea of a Northern Node of NASSP should be accepted and should be developed gradually with full participation of the Southern Hub.
- Plans be encouraged, which are currently developed in which BSc Honours students could register at some of the participating universities, and that provision is made in revised funding arrangements for bursaries to enable this to happen smoothly.
- 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 should be streamlined for this to happen.

### **13.3 Recommendation 3**

- 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 outreach projects should be handled separately under another heading and these would include functions and activities at other universities including HBUs. These should involve these universities and note of their needs should be taken.
- 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 the quality.

### **13.4 Recommendation 4**

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.

### **13.5 Recommendation 5**

A lean efficient one-stop office should be charged to handle applications, funding and payments for human capacity development (including NASSP and MWLA). It is to be eventually placed at SANAA (or its equivalent) when that is established. In the interim it could be placed at the NRF.

## **14 Acknowledgements**

Prof F Hahne wishes to express his gratitude to all the participants who enabled him to perform the review smoothly and in particular wishes to acknowledge the hospitality extended by SAAO through Prof Patricia Whitelock and Dr Bonita de Swardt. He also acknowledges the support of the M&E unit of the NRF, particularly Ms Millicent Motheogane and the wonderful professional assistance provided by Ms Makhupu Selepe.

## 15 List of Acronyms

ADP	Academic Development Programme
AIMS	African Institute for Mathematical Sciences
DHET	Department of Higher Education
HartRAO	Hartebeesthoek Radio Astronomy Observatory
HBUs	Historically Black Universities
NITheP	National Institute for Theoretical Physics
SAAO	South African Astronomical Observation
SAIP	South African Institute of Physics
SALT	Southern African Large Telescope
SANAA	South African National Astronomy Agency
SARChI	South African Research Chairs Initiative
SUNI	Southern Universities Nuclear Institute
SU	Stellenbosch University
UCT	University of Cape Town
UWC	University of Western Cape
UZ	University of Zululand
UKZN	University of KwaZulu-Natal
Wits	University of the Witwatersrand

## **16 List of Annexures**

Annexure A1: List of documents considered

Annexure B1: Terms of reference for the review

Annexure C1: List of NASSP and the MWLA review participants per slot in alphabetical order

## **17 List of Appendices (Available through hyperlinks in text)**

Appendix A: Human Capital for Multi-wavelength Astronomy: Overview 2006-2011

Appendix B: Some thoughts on the National Astrophysics and Space Science Programme. A report submitted to the NASSP review, January 2012

Appendix C: NASSP Extended Honours Programme (EHP) Self-Assessment

Appendix D: List of Publications and Outputs as reported by people supported by MWLA

Appendix E: Expenditure for NASSP Bursaries for Honours and Masters Students for 2009, 2010 and 2011

Appendix F: Financial Summary for EHP for the period 2008 – 2011

Appendix G: Assessment of the Success of the EHP as compiled by Prof McGruder

## 18 Annexure A1: List of documents considered

Document	
NASSP report on activities 2003-2008	2003-2008
NASSP self-assessment report (Some thoughts on the National Astrophysics and Space Science Programme. A report submitted to the NASSP review, January 2012)	January 2012
NASSP Annual progress reports	2009 & 2010
NASSP Steering and Executive Committee	
NASSP Financials 2003 - 2011	2003 - 2011
NASSP Extended Honours Programme (EHP) self-assessment	
Attachment to EHP self-assessment document	
NASSP Extended Honours Programme (Annual reports)	2008, 2009 & 2010
NASSP EHP financials 2008-2011 with narrative	2008-2011
Cost to EHP (Addendum to the financial reporting regarding the cost of the EHP)	
Human Capital for Multi-wavelength Astronomy: Overview 2006-2011	2006-2011
MWLA project plans from 2006/7 to 2009/10	Business plan for 2009-11 2009 contract Unsigned 2006 contract with Annexure A
MWLA programme annual reports from 2006/7 to 2009/10:	3 NRF annual reports: 2008/9, 2009/10, 2010/11 <b>Grant-holders reports:</b>

Document	
	Prof Whitelock , 2006/07 and 2008 Prof Kraan-Korteweg, 2007-2010 Prof Cress 2007, 2008, 2009 & 2010 Prof Moodley 2007, 2008, 2009 & 2010 Prof Meintjes 2007, 2009 & 2010 Prof De Jager 2008 & 2009 Prof Charles 2009 & 2010 Prof Dunsby 2009 & 2010 Prof Van der Walt 2010 and 2010 Prof Smits 2007
MWL accounting of end of 2011	end of 2011
NWU financials 2009, 2010 & 2011	2009, 2010 & 2011
NWU MWL expenses reggestel 2012	2012
Position Paper on a Decadal Strategy for Human Capacity Development in Astronomy and Astrophysics in South Africa	2011
Review of the NRF Astro-geosciences cluster as part of the NRF Institutional Review	2010
Report on Strategies and Policy for the Development of Astronomy of Astronomy in South Africa from the Astronomy Desk by Manfred Hellberg	March 2011

**19 Annexure B1: Terms of Reference for the review**

**TERMS OF REFERENCE**

**For**

**The Review of the National Astrophysics and Space Science Programme (NASSP) and  
the Multi-Wavelength Astronomy (MWLA) Programme**

**FEBRUARY 2012**



## **1. ASSIGNMENT TITLE**

Review of the National Astrophysics and Space Science Programme (NASSP) and the Multi-Wavelength Astronomy (MWLA) Programme.

## **2. BACKGROUND**

### **2.1. National Astrophysics and Space Science Programme (NASSP)**

In February 2003, members of the astronomy, astrophysics and space science community started the South African Astrophysics and Space Science Programme. The main objective of the programme was to attract bright students, particularly from designated groups, into postgraduate study, to ensure that they receive adequate financial support during their studies, and that their career prospects are improved. The lecturing staff of the programme is drawn from the entire South African astronomy and space physics community. Courses are presented either over a semester or in three- to four-week blocks. From 2005, additional lecturing staff was drawn from the African American scientists. This was mainly to provide role models as there had been and continues to be few black South African astronomers qualified up to doctorate level. It was vitally important that African American astronomers be engaged to act as role models and mentors for the next generation of African astronomers.

NASSP is posed to address a number of national strategic drivers, most particularly those associated with raising the research and postgraduate profile of South African institutions, and transformation in the physical sciences, with an emphasis on astrophysics and space science.

#### **2.1.1. The aim of NASSP**

The aim of NASSP is to produce scientists with broad-based skills useful in industry as well as for research in astronomy, astrophysics and space science. It is envisaged that the NASSP graduates should be highly competitive for rewarding employment opportunities in industry, as well as for research in other areas. The emphasis of the NASSP programme is to train talented students of various backgrounds in the following:

- Research at the cutting edge of Astrophysics and Space Science;
- General problem solving based on scientific methods;
- Numerical calculations and processing of large data sets;
- Using computational techniques;
- Operating, maintaining, perhaps also designing and manufacturing new research equipment at the South African Astronomical Observatory (SAAO) and the Hartebeesthoek Radio Astronomy Observatory (HartRAO);
- Writing up the research results in scientific papers and publishing them in international refereed journals and
- Presenting the research results in seminars and colloquia at research institutions, as well as national and international conferences.

### **2.1.2. The expected outcomes of NASSP**

The primary expected output of NASSP is the facilitation of the through-put of MSc graduates who have the appropriate skills to continue with doctoral studies in astrophysics or the space sciences, or to take up employment in industry or commerce. This also includes setting up close linkages with scientists working at universities and research institutions around the world. The ultimate outcomes are far-reaching and include the following:

- Increased research capacity and an enhancement of university teaching capacity;
- Reduction of the brain drain, as real opportunities emerge to participate in international science;
- Creation of a pool of local scientific and technical talent for industry and commerce;
- Development of capacity to engage in scientific public relations and to impact on school level education.

## **2.2. Multi-wavelength Astronomy (MWLA) programme**

The Multi-wavelength Astronomy (MWLA) programme was established in 2006/07 as an interim project during the development of the Astronomy Geographical Advantage Programme (AGAP) strategy. This programme was developed to ensure that there were no opportunities lost during the development of the strategy.

**2.2.1.** The allocation of funds to the MWLA programme was targeted towards student bursaries at Honours, Masters and PhD levels, and postdoctoral fellowships. Allocations were also intended for Mobility Fund for students and for information technology hardware/software and personnel. It was anticipated that the AGAP strategy would ultimately provide for the human resource development required to effectively operate and use the South African Large Telescope (SALT) and the High Energy Stereoscopic System (HESS) and prepare the research community for Karoo Array Telescope (KAT) and Square Kilometre Array (SKA). As the process of strategy development was still unfolding, MWLA funding was continued over the years to maintain and improve the number of students trained.

**2.2.2.** The MWLA programme was founded under the following five strategic principles:

- Cutting-edge multi-wavelength science;
- Redress and equity, through ensuring adequate support for black and female students, researchers and academic staff;
- Adherence to quality through an approach that focuses on international best practice;
- Focus on Africa, through networking and training; and
- Internationalization through new and existing partnerships.

From the background above, it must be noted that the majority of stakeholders related to NASSP and the MWLA programme are the same. It has therefore been agreed that NASSP

and the MWLA programme should be simultaneously reviewed by the same reviewer(s) in order to save the time and costs of executing the reviews of the two programmes.

### **3. ASSIGNMENT PRINCIPAL**

The assignment principal is the Department of Science and Technology (DST) represented by the Chief Director: Human Capital and Science Platforms, Dr Phethiwe Matutu. The role of the DST will be to:

- Commission the review;
- Approve the terms of reference;
- Receive the final report by the reviewer through the NRF;
- Receive through the NRF, management response(s) to the NASSP and the MWLA programme review report by the implementers of the programmes;
- Accept the final report within two months of receipt from the NRF.

### **4. SERVICE PROVIDER**

The Monitoring and Evaluation (M&E) unit of the NRF will act as the service provider of the review process. The responsibilities of the service provider are to:

- Appoint the reviewer selected in consultation with the Assignment Principal;
- Develop a programme for the review, including a budget;
- Manage, coordinate and administer the entire review process, including logistics for the reviewer;
- Provide on-site support to the reviewer in liaison with host(s) of the programmes;
- Source the documents stipulated in the Annexure 1 of the terms of reference from NASSP and the MWLA programme and other stakeholders;
- Receive and refer the review report encompassing both programmes and its management response to the Knowledge Fields Development directorate for consideration and comment, before submission to the Assignment Principal;
- Placement of the final review report and the response from the management of NASSP and the MWLA programme on the NRF website within ten weeks of acceptance of the report by the Assignment Principal.

### **5. THE SCOPE OF THE REVIEW**

5.1. The retrospective review will cover the period from 1 February 2003 to 31 March 2011 for NASSP and 2006/07 to 31 March 2011 for the MWLA programme. It will focus on the performance of the NASSP and the MWLA programme in terms of their stated aims and the strategic principles under which the MWLA programme was founded as listed in section 2.1 and 2.2.

5.2. The reviewer is requested to conduct the review, determine and report on identified strengths, weaknesses and impact of the NASSP and the MWLA programme in terms of the aspects outlined below:

### **5.2.1. Programme inputs**

with reference to but not limited to:

- How the NASSP model was conceived and implemented;
- The level of financial support for students bursaries;
- The level of support for researchers and visiting academics with regards to stipends;
- The composition of the lecturing staff and management of the programmes in terms of disciplines, race and gender;
- The profiles of students (applicants and those accepted and supported by the programmes) in terms of disciplines, race, nationality and gender;
- Availability and suitability of infrastructure.

### **5.2.2. Programme processes**

with reference to but not limited to:

- Assessment of applications and the criteria for the selection of students;
- Effectiveness of the curriculum of NASSP and the MWLA programme in meeting the joint training needs of astronomy and space science;
- Where possible and applicable, comment also on the appropriateness of the performance indicators (output, outcome and impact) used by NASSP and the MWLA programme.

### **5.2.3. Programme outputs and outcomes**

with reference to but not limited to:

- The demographic profile of students graduated and the sectors that attract them, including the proportion of graduates that emigrate;
- The numbers of students in terms of the throughput over time;
- The extent to which NASSP and the MWLA programme have contributed to transformation within the wider community of the National System of Innovation, in terms of race and gender;
- Level and number of publications produced by students;
- Conferences, symposia and seminars where students participated;
- Patents produced.

### **5.2.4. Performance of NASSP and the MWLA programme in relation to others**

Comment on:

- For comparative purposes, relate the performance of NASSP and the MWLA programme, where appropriate to similar systems in South Africa and other countries;

### **5.2.5. Management of NASSP and the MWLA programme**

Comment on:

- The appropriateness of the management arrangement;
- Whether the management structures and processes were well designed and appropriate to achieve the objectives of NASSP and principles under which MWLA programme was founded;
- The participation of the respective role players in the management of NASSP and the MWLA programme;
- The effectiveness and efficiency in obtaining funding from other sources;
- The appropriateness and effectiveness of using financial and human resources.

### **5.3. Recommendations**

The reviewer is requested to make recommendations:

- 5.3.1 based on the aspects outlined above.
- 5.3.2 on the future strategic direction in support of human capacity development in astronomy with reference to:
  - an appropriate model of growing the human capacity development in South Africa taking into account support provided by NASSP, MWLA Programme and the other NRF programmes;
  - how both NASSP and the MWLA Programme relate to each other;
  - whether the NASSP and MWLA Programme models can be used to strengthen and grow astronomy in South Africa.
- 5.3.3 In the context of 5.3.2 above, suggest ways of improving both NASSP and the MWLA Programme.

## **6. THE REVIEW PROCESS**

### **6.1. The appointment of the reviewer, preparations and programme**

- The M&E or NRF as the service provider will appoint the reviewer;
- The reviewer should possess the appropriate level of experience and skills set required to conduct the review and make informed and appropriate comments;
- The resource documents for the review listed in the Annexure 1 will be made available to the reviewer four weeks before the commencement of the review;
- The service provider will draw up a programme for the review in consultation with the Assignment Principal. The reviewer will have the opportunity to interrogate the proposed programme and to recommend amendments and additions should the need arise;
- The reviewer will have the opportunity to interview/interact with members of the management of NASSP and the MWLA programme, government, the Higher Education Sector, and other stakeholders, as well as student beneficiaries, etc.;
- The reviewer will decide on and pursue his/her own line of questioning during interviews.

## **6.2. Deliverables of the reviewer**

- Verbal feedback on conclusion of the on-site review programme by the reviewer to the Assignment Principal, representatives of the NRF as well as the management of NASSP and the MWLA programme;
- A preliminary report by the reviewer on the final day of the review programme;
- A final report within two weeks of completion of the review programme. The report should include:
  - an executive summary;
  - background to the review;
  - evaluation questions that were addressed;
  - key findings;
  - recommendations;
  - appendices containing, e.g., terms of reference, self-evaluation report, persons interviewed.

## **6.3. Deliverables of the NASSP and the MWLA programme for the review**

- A self-evaluation report to be submitted to the M&E unit for transmission to the reviewer at least five weeks prior to the commencement of the on-site review. The self-evaluation report should address the scope of the review (see item 5 above) both in terms of NASSP as well as the MWLA programme and should clearly distinguish between the two. The report should cover the period 1 February 2003 until 31 March 2011. If preferable, two separate reports for NASSP and the MWLA programme could be provided. The report should not exceed 40 pages with annexures;
- A list of stakeholders. Appointments/discussions with stakeholders will be arranged by NASSP and the MWLA programmes in conjunction with the M&E unit to facilitate the task of the reviewer. NASSP and the MWLA programme are therefore requested to supply the names of stakeholders with whom they have interacted with since inception, those that they would be interacting with in the future and should be interacting with;
- In liaison with M&E unit deal with logistical arrangements including transport, accommodation for the stakeholders invited to interact with the reviewer and meals for the on-site programme;
- A list of documents considered to be essential reading for the reviewer and other documentation which should be accessible to the reviewer during the review;
- Documents listed on the Annexure 1 to the terms of reference for the review which are not in the public domain are to be supplied to the M&E unit for onward transmission to the reviewer five weeks in advance of the commencement of the on-site review;
- A written response by the management /implementers of both NASSP and the MWLA programme to the review report within two weeks after receipt of the Review Report to be submitted to the M&E unit;
- Consideration and possible implementation of relevant recommendations contained in the final Review Report by the management of NASSP and the MWLA programme.

## **7. TIME FRAME**

The review will take place during 2011 depending on the availability of a suitable reviewer.

## **8. BUDGET**

- The Monitoring and Evaluation unit of the NRF will submit a budget to the DST.
- The costs incurred for the review will be covered by the DST.

## **ANNEXURE 1**

### **Essential reading**

- NASPP report on activities 2003-2008
- NASSP and MWLA self-assessment report
- NASSP Annual progress reports 2009 & 2010
- NASSP- Extended Honours Programme
- MWLA project plans from 2006/7 to 2009/10
- MWLA programme annual reports from 2006/7 to 2009/10

### **Additional/recommended reading**

- Position Paper on A Decadal Strategy for Human Capacity Development in Astronomy and Astrophysics in South Africa

## **9. ENQUIRIES**

### **Makhupu Selepe**

Programme Officer

Monitoring & Evaluation

National Research Foundation

Tel: +27 (0) 12 481 4239

Fax: +27 (0) 86 607 6869

Email: [makhupu.selepe@nrf.ac.za](mailto:makhupu.selepe@nrf.ac.za)

## **20 Annexure C1: List of NASSP and the MWLA review participants per slot (Names arranged in alphabetical order)**

**Reviewer: Prof Fritz Hahne**

### **Welcome and briefing of reviewer**

Dr Daisy Selematsela, Executive Director: Knowledge Management and Evaluation, NRF  
Ms Joyce Olivier, Manager: Monitoring and Evaluation, NRF  
Ms Makhupu Selepe, Professional Officer: Monitoring and Evaluation, NRF  
Ms Millicent Motheogane, Liaison Officer: Monitoring and Evaluation, NRF

### **Sponsors**

Dr John Butler-Adam, Program Officer - Higher Education, The Ford Foundation Southern Africa Office  
Dr Phethiwe Matutu, Chief Director: Human Capital and Science Platforms, DST  
Dr Gilbert Siko, Director: Human Capital and Science Platforms, DST  
Dr Mathoto Thaoge-Lefyedi, Deputy Director: Human Capital and Science Platforms, DST

### **NRF Management**

Prof Nithaya Chetty, NRF Group Executive: Astronomy

### **NRF Representatives**

Ms Lynn Erasmus, Grants Officer: Grants Management and Systems Administration (GMSA)  
Ms Candice Steele, Programme Director: Knowledge Fields Development

### **Members of the Steering Committee**

Dr Chris Engelbrecht, University of Johannesburg (UJ)  
Dr Mike Gaylard, Hartebeesthoek Radio Astronomy Observatory (HartRAO)  
Prof Thebe Medupe, North-West University (NWU), Mmabatho Campus  
Prof Pieter Meintjies, University of the Free State (UFS)

### **Members of the MWLA Programme**

Dr Chris Engelbrecht, UJ  
Prof Thebe Medupe, NWU, Mmabatho Campus  
Prof Pieter Meintjies, UFS  
Prof Kavilan Moodley, Lecturer, University of KwaZulu-Natal (UKZN)

### **Lecturers, Student Supervisors**

Prof Fabio Frescura, University of the Witwatersrand  
Prof Kavilan Moodley, Lecturer, UKZN  
Prof Derck Smits, Lecturer, University of South Africa

### **Management of NASSP and MWLA programme**

Prof Saalih Allie, Manager: NASSP Extended Honours Programme  
Prof Peter Dunsby, Director NASSP



Prof Patricia Whitelock, Acting Director for both SAAO and NASSP

**Hosting Institution: University of Cape Town**

Prof Renée Kraan-Korteweg, Head of Dept.: Astronomy, University of Cape Town (UCT), (also member of the NASSP Steering Committee)

Prof Anton le Roex, Dean of the Science Faculty, UCT

Prof Patrick Woudt, Acting Head of Dept.: Astronomy, UCT, (also lecturer)

Prof Danie Visser, Deputy-Vice Chancellor: Research, UCT

**Members of the MWLA Programme**

Prof Catherine Cress, University of the Western Cape (UWC)

Prof Peter Dunsby, Director NASSP

Prof Renée Kraan-Korteweg, UCT

Prof Patricia Whitelock, Acting Director for both SAAO and NASSP

**Members of the NASSP Steering Committee**

Prof Catherine Cress, UWC

Prof Manfred Hellberg, UKZN

Prof Roy Maartens, UWC

Dr Lee-Anne McKinnell, South African National Space Agency (SANSA)

**Lecturer/Student Supervisors**

Prof Bruce Bassett, Lecturer, SAAO/ African Institute for Mathematical Sciences (AIMS)

Dr David Buckley, Lecturer, SAAO/ Southern African Large Telescope (SALT)

Prof Roy Booth, Square Kilometre Array (SKA)

Dr Andrew Collier, Lecturer, UKZN

Dr Shimul Maharaj, Lecturer, SANSA

Dr Enrico Olivier, Lecturer, UWC

**Winter school/Extended Honours Programme Participants**

Ms Victoria Nemanashi, UCT

Mr Siyambonga Matshawule, UCT

Mr Phillip Mokoena, UCT

Mr Max Richter, UCT

Mr Muzi Sikhonde, UCT

**External Stakeholders**

Prof Adri Burger, NWU, Potchefstroom Campus (via Skype)

Prof Robbie Lindsay, UWC

**Coordinators/Organizers**

Prof Saalih Allie, Manager: NASSP, Extended Honours Programme

Prof Thebe Medupe, NWU, Mmabatho Campus (via Skype)

Dr Ramotholo Sefako, Winter School Organizer, SAAO

Dr Bob Osano, Lecturer, UCT

Ms Nicky Walker, NASSP Administrator

**Post-graduate Fellows and Former Students**

Dr Roger Deane, MeerKAT  
Dr Zama Katamzi, HMO  
Dr Mellony Spark, Post doc, SAAO  
Dr Caroline Zunckel, Lecturer, UKZN

**Honours Students**

Ms Sulona Kandhai, UCT  
Ms Mokhine Motsoaledi, UCT  
Mr Khaled Saeed, UCT

**Masters and Doctoral Students**

Mr Daniel Cunnama, PhD, UWC  
Mr Moses Mogotsi, PhD, UCT  
Mr Francios Nsengiyumva, PhD, UKZN  
Mr Temwani Phiri, Masters, UCT  
Ms Yahya Sohba, Masters, UCT

**Verbal feedback**

Prof Nithaya Chetty, Group Executive: Astronomy, NRF  
Ms Lynn Erasmus, Grants Officer: GMSA, NRF  
Mr Jacob Mahlangu, Manager: Corporate Legal Services & IR, NRF  
Ms Millicent Motheogane, Liaison Officer: Monitoring and Evaluation, NRF  
Ms Joyce Olivier, Manager: Monitoring and Evaluation, NRF  
Ms Makhupu Selepe, Professional Officer: Monitoring and Evaluation, NRF  
Dr Gilbert Siko, Director: Human Capital and Science Platforms, DST  
Ms Candice Steele, Programme Director: Knowledge Fields Development, NRF  
Dr Albert van Jaarsveld, Chief Executive Officer, NRF