



National
Research
Foundation



REVIEW OF
THE INTERNATIONAL ASTRONOMICAL UNION
OFFICE OF ASTRONOMY FOR DEVELOPMENT
PANEL REPORT MARCH 2021

Table of Contents

1.0 Executive Summary	3
2.0 Background	5
2.1 IAU Strategic Plan 2010-2020	5
2.2 2015 OAD Review – Conclusions and Recommendations	5
2.3 IAU Strategic Plan 2020-2030	5
3.0 Purpose and Objectives of this Review	6
4.0 Key Findings	7
4.1 Achievements.....	7
4.1.1 Organisation and Management	7
4.1.2 ROADs and LOADs	8
4.1.3 Projects and Proposals.....	9
4.1.4 Partnerships	9
4.1.5 Steering Committee	10
4.1.6 Impact	10
4.2 Liaison with Stakeholders	11
4.3 Staffing	11
4.4 Funding	12
4.5 Problems	12
4.6 Benefits to IAU and DSI/NRF	13
4.7 Governance	14
4.8 IAU-NRF Agreement.....	14
4.9 The Future.....	14
5.0 Recommendations	16
Acknowledgements	17

Annex A - Panel Membership and Terms of Reference

Annex B – Interviews conducted with key Stakeholders

Annex C – Written input from Stakeholders

Annex D – Sources of Information

Annex E – List of Regional Offices

Annex F – Standard acronyms used by NRF

1.0 Executive Summary

In the decade since its establishment in March 2011 the IAU Office of Astronomy for Development (OAD) has turned the somewhat abstract concept of “astronomy for development” into a reality, with over 160 projects world-wide, 11 Regional Offices spread throughout the world, 17 partnerships with other organisations, and many international meetings and workshops. This is down to the visionary and highly motivated staff of the small team based at the South African Astronomical Observatory (SAAO) in Cape Town, assisted by the support offered by the NRF through the SAAO, the commitment and support of the IAU and the Department of Science and Innovation (DSI), the valued strategic input of its Steering Committee, and a global network of volunteers.

Our interviews with major stakeholders and the written input we have received endorse our conclusion that the performance of the OAD has been outstanding by any standards, and exceptional given the small size of the core team, its global remit and its relatively modest resources. We were impressed by the enthusiasm and commitment of everyone we spoke to, and by the range of activities being carried out world-wide under the auspices of the OAD. We therefore believe that the OAD should continue at the SAAO with the support of the IAU and NRF.

The Steering Committee is a major asset and is fully engaged and committed to the success of the OAD. The Committee has provided invaluable strategic advice and guidance, over and above exercising its governance roles.

The IAU was somewhat “ahead of the curve” in setting out to exploit science for development – something the United Nations has now assimilated in its Sustainable Development Goals (SDG). These have been adopted by the IAU in its Strategic Plan 2020-2030, and are reflected in the Actions for the OAD in the next decade under Goal 3 of that Strategic Plan. We are confident that the OAD is well prepared to support the ambition of the IAU Strategic Plan 2020-2030 and we stress that the OAD should not be allowed to stand still and risk losing the momentum built up over the past 10 years. Fundraising is, inevitably, essential if the OAD potential is to be fully realised.

The IAU General Assembly in South Africa in 2024 is a major opportunity to showcase the OAD, the SAAO, the IAU, and African astronomy to the world. This is an opportunity not to be missed, which again implies additional resources. A progressive increase in funding will allow steady enlargement, and impact, of the programme, and possibly enable a modest increase in size of core team. There are other issues which will have to be addressed in the future, largely to do with resourcing, priorities and the balance of expertise in the core team. These are dealt with in more detail below.

Our recommendations are:

1. The OAD should continue at the SAAO with funding from IAU and DSI via NRF.
2. The IAU-NRF Agreement, modified to make explicit reference to the Actions in the 2020-2030 Strategic Plan, should be extended to the 2027 IAU General Assembly.
3. The IAU and NRF should consult each other on appointments to the Steering Committee to ensure it has the appropriate spread of expertise required by the 'development' mission of the OAD. This should be incorporated in the modified IAU-NRF Agreement.
4. A major effort, through fundraising and/or otherwise, should be made to increase resources, particularly for the proposed 'Flagship' programme, and to put more resources into the Regional Offices.
5. The Regional Offices are an important adjunct to the OAD and would benefit from increased funding and carefully monitored autonomy.
6. The OAD, working with the Steering Committee, should develop a prioritised strategy for addressing the actions for the OAD set out under Goal 3 of the IAU Strategic Plan 2020-2030.
7. In this context, consideration should be given to prioritising projects with demonstrably longer term development benefit.
8. A 'development' specialist would be a valuable addition to the core team; the optimal way in which this expertise could be provided should be studied urgently by the OAD working with the NRF and IAU. In addition, the OAD should explore and leverage closer relationships with development specialists at the regional universities.
9. The members of the Steering Committee should be encouraged to take a more direct interest in the progress of the Regional Offices.
10. The OAD should not be expected to take responsibility for fundraising, which would divert it from its core mission: that is an IAU responsibility and the OAD should provide appropriate assistance.

2.0 Background

2.1 IAU Strategic Plan 2010-2020

The IAU decadal Strategic Plan “Astronomy for the Developing World: 2010 – 2020”, a follow-up to the International Year of Astronomy 2009, identified “astronomy as a unique and cost-effective tool for furthering sustainable global development”. This led to the establishment of the Office of Astronomy for Development (OAD) as an equal joint partnership by the IAU and NRF with offices at the SAAO in Cape Town. Although it is based in South Africa, it has a global remit which is strongly supported by the South African Department of Science and Innovation (DSI).

As foreseen in the IAU-NRF Agreement establishing the OAD, an independent review took place in 2015, and the Agreement was continued until 2021.

2.2 2015 OAD Review – Conclusions and Recommendations

This review reported in February 2015. It concluded that the OAD’s “performance has been outstanding, particularly given the very limited resources that have been made available to an organisation with such ambitious terms of reference”.

The review made the following recommendations (in summary):

- (i) The OAD should continue for 6 further years at SAAO.
- (ii) IAU should declare its intention to continue beyond the period of the 2010-2020 Strategic Plan.
- (iii) There should be a modest increase in funding.
- (iv) The structures should be simplified and reporting lines clarified.
- (v) The OAD should focus on initiatives in progress, and clarify its mission as “astronomy for development”.
- (vi) There should be an annual high level meeting between IAU and NRF to ensure clear communication.

All these recommendations have been successfully implemented. One final recommendation (vii) on seeking to expedite the issuance of visas for incoming OAD staff is outside the capabilities of the OAD and has been attempted by DSI/NRF with little success. This remains an issue of concern.

2.3 IAU Strategic Plan 2020-2030

This sets out the IAU vision for 2020-2030, building on the success of the 2010–2020 Plan and the lessons learned in its implementation. The 2020-2030 Plan continues the

evolution of the IAU and its many activities into a set of five goals and their related actions for the next decade.

Goal 3 is to “stimulate global development through the use of astronomy”: and the OAD is the mechanism whereby this is to be achieved. The Plan states that “The OAD uses the UN Sustainable Development Goals (SDGs) as the global definition of development in calling annually for proposals.....A goal for the 2020–2030 strategic plan is that — depending on the region — about half of the 17 UN Strategic Development Goals (SDG) should have been positively affected by OAD projects on all of the populated continents.”

The actions explicitly assigned to the OAD are:

- Contribute significantly to at least half of all SDG indicators; develop a number of global OAD “signature” projects.
- Establish enough regional offices to cover all populated regions of the world.
- Refine the OAD project evaluation and feedback loop.
- Use astronomy and its technology to position young people for career opportunities throughout society.
- Establish interdisciplinary partnerships around science for development.
- Source the necessary funding to realise the above and assist other related initiatives in fundraising.

We endorse these actions but have significant reservations about the final action (fundraising) which we will address further in this report.

3.0 Purpose and Objectives of this Review

The membership of the Review Panel and our Terms of Reference are attached at Annex A. The Purpose of this review is given in Section 3 of the ToR:

“A retrospective evaluation of the performance of the OAD in terms of the following specifics:

- i. Evaluate the performance of the OAD against its objectives within its resource constraints;
- ii. Examine the IAU/NRF agreement with a view to its possible enhancement;
- iii. Assess benefits that the OAD has brought to the IAU and DSI/NRF along the way to assist in determining whether the continuation of the OAD in South Africa would be desirable or not;
- iv. Evaluate the implementation of the IAU decadal Strategic Plan, Astronomy for Development 2010-2020; and
- v. Assess the extent of implementation of recommendations emanating from the previous (2015) evaluation.
- vi. Make recommendations/suggestions to optimise the future development of the OAD in the context of the IAU Strategic Plan 2020-2030.”

In the course of this review we interpreted the “Evaluation Dimensions” listed in Section 6 of our Terms of Reference in the context of the Purpose as defined above, rather than treating them as a ‘check-list’. We nevertheless believe we have successfully addressed them all.

The coronavirus pandemic meant that visits and face-to-face interviews were impossible. We based our review on the wealth of documentation submitted by the OAD, our own perusals of the IAU and OAD websites, remote interviews with 23 key stakeholders and written input from around 25 other stakeholders. Detailed lists are given in Annexes B and C. We are confident that this has allowed us to make a balanced assessment of the overall performance of the OAD and make some comments on the future.

4.0 Key Findings

4.1 Achievements

4.1.1 Organisation and Management

The unanimous view of those we interviewed was that the organisation, management and administration of the OAD are exceptional overall. This is credited to a combination of outstanding leadership and a tightly knit, highly motivated team with a good understanding of the goals of the OAD.

The team is small, but deploys its extensive expertise to achieve maximum effectiveness. The innovative use of interns and fellows allows for greater efficiency and even greater cost-effectiveness. Further effectiveness in realising objectives is achieved through an extensive set of networks.

Financial controls, reporting and general management of the budget are all fully compliant.

The treatment in the self-evaluation report is comprehensive, as are the series of annual reports and business plan, with a clear indication of KPIs.

Implementation of strategic plans requires a good, nuanced understanding of the notion of ‘astronomy for development’. This is well understood and put into practice by the team. At the same time the place of concepts such as ‘development of astronomy’ and ‘astronomy for education’ and their relationship to ‘astronomy for development’ are equally well understood.

The organisation and administration of communications are of a high standard, with a well maintained and comprehensive website, frequent newsletters, and regular social media posts. In addition, formal and informal communication within the OAD community, that is, with the host organization and sites around the world, is regular, with the Director and the other members of the team being highly accessible. We note the rapid response to the Covid-19 pandemic situation and the extensive use of remote technologies. This will be an ongoing feature of the OAD's working practices in future.

4.1.2 ROADS and LOADs

A successful delivery of the OAD mission relies on effective ROADS distributed around the globe. It is a very significant achievement to have set up, thus far, 11 ROADS, among which 3 serve as joint or dedicated language centres (LOADs). We therefore made a serious effort to understand the structure, function and effectiveness of ROADS through zoom interviews and written reports.

ROADs have considerable autonomy. Their activities are subject to oversight by a Steering Committee on which the OAD is represented by its Director. The OAD director has been fully committed to the success of ROADS and heavily involved in their strategic development. This is a delicate task that has been carried out with diplomatic sensitivity to local and regional issues.

Most of the ROADS are now well established, and are increasingly involved in project preparation, selection, shaping, and execution. They are poised to play significant roles in flagship projects in the future.

Some ROADS are ready for next phase of growth, if additional resources are provided to them.

A small number of ROADS, however, are undergoing transitions and are still trying to identify future directions to meet the "astronomy for development" goal. They need further internal and external assistance. The OAD Director and Steering Committee members can monitor them more closely and provide advice. As a result some agreements have still to be finalised.

The IAU Strategic Plan 2020-2030 envisions establishing ROADS to cover all populated regions of the world. Collaborations among ROADS provide efficient channels for well-developed regions to share resources and lend experience to the less-developed regions.

One potential region to establish a ROAD, mentioned by several interviewees, is Australia/New Zealand, which can serve the Oceania countries. The SKA in Australia can promote VLBI collaborations in Oceania and transfer technological skills to young people for career opportunities in developing countries.

4.1.3 Projects and Proposals

The OAD carries out its mission primarily through the projects it funds. It is to its credit that 160 projects have been funded worldwide at a cost of some 850k€ and a further 43 projects have just been funded through a special rapid response ‘Covid-19’ call. The funding for the majority of these projects is quite modest, relying on volunteers, and therefore cost-effective.

We were impressed by the processes adopted by the OAD in selecting projects for funding, with the initial call for proposals given publicity on the website and via the Regional Offices, followed by a robust two-stage review and evaluation process, leading ultimately to approval by the Steering Committee. Throughout this process the OAD is on hand to assist and advise proposers, and all projects are managed and coordinated from the OAD with assistance of the ROADS. Whereas many early projects focussed on educational aspects of development there has recently been an increasing emphasis on socio-economic development, in line with the UN SDG. Although one could argue that Africa is the continent to benefit most from development we were reassured by the wide geographical spread of the funded projects. The relatively large number of (small) projects of high quality ensure geographical spread and also allows innovative ideas to develop, possibly into something more substantial.

Each call for proposals is heavily oversubscribed and, unfortunately, good projects go unfunded. The project leaders we were able to interview showed impressive enthusiasm for their projects and for what the OAD is doing. Both project leaders and reviewers spoke very highly of the assistance and guidance provided by the OAD. Such assistance is inevitable because the often inexperienced but passionate volunteers behind projects lack the necessary knowledge to extract maximum value and impact.

A largely qualitative impact assessment has been carried out, with gratifying results. This will be improved in future if the necessary resources are available.

In future the OAD will prioritise two of the five ‘Flagship’ projects: “Stimulating Economies” and “Science Diplomacy”. If additional funding permits, other ‘Flagships’ will follow. We agree with this approach: the OAD should concentrate on a limited number of attainable, high value added, projects to maximise the use of its resources.

4.1.4 Partnerships

The self-evaluation report provides a lengthy list of partners. These were however not explored in detail during the review process. The self-evaluation report presents a picture of significant leverage of funds through partnerships with organisations of

high credibility. The total leveraged through partnerships, grants and the regions amount to around 30% more than that provided through the IAU and DSI/NRF.

Liaison with the relevant division within the host organization, that is, SAAO Science Engagement is smooth and effective.

There are strong ties to and active collaboration with the other IAU Office for Astronomy Outreach (OAO) and the Office for Young Astronomers. The OAD has also worked with the Office of Astronomy for Education (OAE) since its inception in 2019 to assist in planning and to explore synergies.

The ties with the SKA take various forms. There are strong links between the OAD and DARA (Development in Africa through Radio Astronomy), with DARA providing substantial funding for Astronomy for Development in AVN countries. The OAD is represented at SKA Africa meetings, and works closely with the SKA communications team. In the same way, the OAD has developed close ties with SAAO and SARAQ, the two South African national facilities devoted to astronomy.

4.1.5 Steering Committee

The Steering Committee is a major asset and is so perceived by the OAD, the IAU and the NRF. Steering Committee members are fully engaged and committed to the success of the OAD, and have confidence in the OAD leadership. The Committee has provided invaluable strategic advice and guidance, over and above exercising its governance roles such as approval of the OAD budget.

The IAU executive has direct representation on the Steering Committee, by choice, while NRF nominees are academics or researchers in astronomy. The NRF is comfortable with this 'arms-length' relationship between its leadership and the Steering Committee. The inclusion ex officio of the SAAO Director ensures the direct engagement of the host organisation.

Given the importance of the Steering Committee we believe the appointment of its members should ensure the necessary spread of expertise and that the IAU and NRF should consult each other in future, prior to making appointments.

4.1.6 Impact

The OAD has conducted a qualitative assessment of the impact of OAD projects in terms of impact on development and success of implementation. There has been a ~96% success rate. Out of 110 projects assessed, only 1% was ranked as "low impact", 1% as "low" in implementation, and 2% failed to complete (cancelled). By any standards this is a good record.

While budget, number of participants, frequency of meetings, etc. can be analysed quantitatively for impact indicators, the assessment of the real impact of many activities is very hard to quantify. The OAD is a long-term project in itself, and some OAD projects are intrinsically long term as well. Their impact cannot be assessed in the short term characterised by this review.

We have noted very positive feedback from SAAO/SALT and DSI, with both benefitting from the OAD's helping them to justify to the general public the investments in big sciences.

4.2 Liaison with Stakeholders

Based on interviews and written input from over 50 stakeholders, we find the OAD's liaison with stakeholders has been exemplary. The stakeholders unanimously praise the OAD for being always available to give advice and guidance, responding quickly to any request, and communicating well.

4.3 Staffing

There was essentially unanimous agreement amongst everyone we interviewed or who gave a written submission that the OAD team were “outstanding”. We agree with this assessment and we confirm from our own interviews that the staff are enthusiastic, competent, determined, and fully committed to the mission of the OAD. Many people remarked on the leadership skills of the Director and how he had fashioned a team with overlapping complementary skills and in which everyone had confidence in their colleagues.

We were pleased that the addition of a professional astronomer (Vanessa McBride), as recommended in the 2015 review, has been of benefit in raising the profile of OAD in astronomy communities and has played a major part in ensuring the excellent relations with the SAAO. We were relieved that she has a tenured appointment at SAAO, because all positions on this relatively small team are essential and longer term stability and security are needed to meet the ambitious goals the OAD and IAU have set for the future. In this context we were concerned to hear that visa issues have not yet been resolved and that the Operations Manager may have to leave South Africa to apply for a new visa.

With a small team of only four people ‘succession planning’ has little meaning although the departure of any one team member would have significant consequences. This is an important topic that IAU and NRF should keep in mind.

There is very effective use of interns, post-docs and fellowships in various positions. These have added invaluable expertise to the OAD as well as providing additional experience to the individuals concerned.

We are concerned that the staff are at risk of overload, especially with the adoption of the flagship programmes. This is perhaps inevitable given the staff's commitment to the programme set out for 2020-2030.

The Director has made a strong case for a Development specialist, currently a fellow. We believe that such a person would be an asset in a permanent position, although possibly not full-time. Close contacts with nearby universities should continue to be explored, because this is an area of potential mutual benefit and we believe there is a real possibility of a secondment.

While not explicitly part of staffing, the management and organisation of volunteers, either within or without the ROADS, is an area which needs continued attention and is a potential drain on resources. Volunteers (over 700 have been registered) make significant contributions to the mission of the OAD, so we agree with the OAD that an online volunteer management system is needed, with appropriate resources to back it up.

4.4 Funding

Despite the OAD having leveraged some 2 M€ over the review period, an amount that exceeds the support by the IAU and DSI/NRF, the overall funding is barely adequate for the current programme.

The ambitious future set out in the actions under Goal 3 of the IAU Strategic Plan 2020-2030 will require significant additional funding. Some of this would go to enhanced projects and some to make the ROADS more effective.

The immediate injection of a large sum, for example of a few million Euros, would not have the desired impact. On the other hand, an amount of the order of 1M€ p.a, brought in over time, would allow time for effective expansion of activities in line with the strategic plan, and corresponding growth in impact.

Fundraising has to be the responsibility of the IAU rather than the OAD, which possesses neither the expertise nor the time. Nevertheless, it is important that the OAD have an involvement in fundraising exercises as it is best placed to 'sell' the vision of astronomy for development.

4.5 Problems

As has been stressed already, adequate funding is the biggest problem facing the OAD and ROADS!

The IAU Strategic Plan 2020-2030 requires the OAD to develop "flagship" or "signature" projects. Such projects are expected to stimulate economies, use

astronomy for science diplomacy, spread knowledge and skills from astronomy to education and data science, and apply technology from astronomy to industry or socio-economies. The current OAD urgently needs additional development expertise to fulfil these project needs.

The OAD team is very small, consisting of only 4 staff members. While they have done an amazing job contributing to the success of the OAD thus far, they are reaching a breaking point and risk becoming over-committed and over-loaded. In addition, only the Astronomer has a tenured position. Staff stability and job security present a risk of single-point failure.

ROADs are the field workers of the OAD. To efficiently carry out their functions, further investment of time and money are needed to help consolidate their activities and enhance coordination across global projects.

South African visas with work permit remain a problem. This could affect the critical team member Ramasamy Venugopal when his current visa expires, and any future recruits from outside South Africa.

4.6 Benefits to IAU and DSI/NRF

We believe this was well covered in the OAD's self-evaluation report and the details need not be repeated here. In our interviews the mission and performance of the OAD was strongly endorsed by all. One interviewee even suggested that "if the OAD didn't exist we would have had to create it". Amongst other things, the OAD was credited with a major contribution to South Africa's successful bid to host the 2024 IAU General Assembly, which will be, in part, a showcase for South African astronomy.

The success of the OAD is, of itself, a major benefit to the IAU, enhancing its international credibility and serving as an example of what can be achieved to other unions. The wide diversity of the OAD projects, reaching over 100 countries, has raised the visibility of astronomy and astronomers in areas of importance to governments and agencies charged with development. This is enhanced by the adoption of the UN SDG as the basis for its future strategy. Because of the OAD the astronomy community has an effective focus and conduit for its engagement in socio-economic development.

South Africa is making a very large investment in astronomy and the NRF is committed to science engagement and enhancing the societal impact of this investment. Some of this is carried out through the SALT and SKA Engagement activities, in collaboration with the OAD, whose African networks have expanded the SAAO's reach across the continent. In addition, the OAD's AstroVarsity programme and its support for Historically Black Universities is materially helping to develop capacity throughout Africa.

Although much of the OAD's benefit to South Africa is through its association with SAAO and NRF, there are benefits at a Departmental and Governmental level through OAD's extensive international activities and contacts. One example is the OAD's facilitation in creating the African Astronomical Society, another is the OAD's part in the DSI's Africa-Europe Radio Astronomy Platform.

4.7 Governance

We found the governance arrangements much improved since the 2015 Review. The Steering Committee is effective, its Terms of Reference are comprehensive, and the annual discussions between IAU and NRF/DSI ensure top level oversight. There is mutual confidence and we see no reason for change, although we might remark that the level of documentation required might be seen as burdensome.

4.8 IAU-NRF Agreement

We believe this should be renewed to the IAU GA in 2027, which means relatively straightforward changes to the text. We propose two substantial changes:

Replace the OAD's tasks in Section I with the 'Actions' from IAU Strategic Plan 2020-2030, thus ensuring a direct link between the renewed Agreement and the Strategic Plan;

and

add a new para 2 in Section XI. Steering Committee – Composition to say that the IAU and NRF will consult each other on appointees to the Steering Committee to ensure an appropriate spread of expertise.

4.9 The Future

We are confident that the OAD is well prepared to support the ambition of the IAU Strategic Plan 2020-2030 and we stress that the OAD should not be allowed to stand still, with corresponding loss of momentum built up over the past 10 years. In this context we welcome the clear understanding of 'development', the adoption of several UN SDG, and the selection of flagship projects. We do recognise that astronomy can only be used for development if there is astronomy in place to be used. While it primarily falls to other IAU initiatives to develop astronomy, some of the burden will fall on the OAD and a balance will continue to have to be struck.

One of the challenges facing the OAD (and IAU) is the need for a credible assessment process for longer term projects. This could be addressed by the OAD with the IAU and NRF, but we believe it requires a more specialised approach than can be offered by reviews such as the present one. There is also the need to assess the impact of the

OAD itself in the broader context of ‘science for development’, with possible lessons which could be transferred to other fields, potentially through the ISC.

We also note that the IAU General Assembly coming to South Africa in 2024 is a major opportunity to showcase the OAD, the SAAO, the IAU, and African astronomy to the world. This is an opportunity not to be missed, which again implies an increase in funding. However, we remark that the OAD will need to stay focused on ‘development’ and avoid distractions, no matter how interesting. We are confident that the Steering Committee will ensure that this is the case.

A progressive increase in funding will allow steady enlargement, and impact, of the programme, and enable a modest increase in size of core team. Increased pressure on the core staff must be avoided as the programme expands. Once again, we note that stability and security are essential.

The ROADs are important in many ways and increased funding will allow selected ROADs to develop greater autonomy and so reduce pressure on OAD staff while allowing them to play a greater role in flagship projects.

5.0 Recommendations

1. The OAD should continue at the SAAO with funding from IAU and DSI via NRF.
2. The IAU-NRF Agreement, modified to make explicit reference to the Actions in the 2020-2030 Strategic Plan, should be extended to the 2027 IAU General Assembly.
3. The IAU and NRF should consult each other on appointments to the Steering Committee to ensure it has the appropriate spread of expertise required by the ‘development’ mission of the OAD. This should be incorporated in the modified IAU-NRF Agreement.
4. A major effort, through fundraising and/or otherwise, should be made to increase resources, particularly for the proposed ‘Flagship’ programme, and to put more resources into the Regional Offices.
5. The Regional Offices are an important adjunct to the OAD and would benefit from increased funding and carefully monitored autonomy.
6. The OAD, working with the Steering Committee, should develop a prioritised strategy for addressing the actions for the OAD set out under Goal 3 of the IAU Strategic Plan 2020-2030.
7. In this context, consideration should be given to prioritising projects with demonstrably longer term development benefit.
8. A ‘development’ specialist would be a valuable addition to the core team; the optimal way in which this expertise could be provided should be studied urgently by the OAD working with the NRF and IAU. In addition, the OAD should explore and leverage closer relationships with development specialists at the regional universities.
9. The members of the Steering Committee should be encouraged to take a more direct interest in the progress of the Regional Offices.
10. The OAD should not be expected to take responsibility for fundraising, which would divert it from its core mission: that is an IAU responsibility and the OAD should provide appropriate assistance.

Acknowledgements

It is a pleasure to thank the Director of the OAD and his team for the extensive information they provided in advance of our commencing this review. We also thank all the people who made time for our remote interviews and everyone who provided us with written input. Not only were their contributions invaluable but the interviews were extraordinarily interesting and we learned a great deal.

The NRF provided excellent support without which we could not have completed our challenging schedule of interviews. We particularly thank Stephanie Harris who carried the major burden of organising all our Zoom meetings and providing general support, and Write Connection who provided comprehensive notes of our interviews in record time.

Annex A – Panel Membership and Terms of Reference

Ian Corbett (Convener) –IAU GS 2009-2012, ESO (retired)

Daya Reddy – University of Cape Town, ISC President 2018-2021

You-Hua Chu – ASIAA, Taiwan.



TERMS OF REFERENCE

FOR THE PANEL

FOR THE INSTITUTIONAL EVALUATION

OF THE INTERNATIONAL ASTRONOMICAL UNION

(IAU) OFFICE OF ASTRONOMY FOR DEVELOPMENT

(OAD)

2020

Contents

1. Assignment Title	5
2. Background	5
3. Purpose	5
4. Scope	5
5. Methodology	6
6. Evaluation Dimensions	6
7. Key Role-Players	8

Abbreviations and Acronyms

AP	Assignment Principal
COSPAR	Committee on Space Research
DSI	Department of Science and Innovation
DST	Department of Science and Technology
IAU	International Astronomical Union
ICSU	International Council of Scientific Unions
NRF	National Research Foundation
OAD	Office of Astronomy for Development
OAQ	Office for Astronomy Outreach
OYA	Office for Young Astronomers
RE	Reviews and Evaluations
SER	Self-Evaluation Report
ToR	Terms of Reference
UNOOSA	United Nations Office for Outer Space Affairs
URSI	International Union of Radio Science

1. Assignment Title

Evaluation of the performance of the International Astronomical Union (IAU) Office of Astronomy for Development (OAD) for the period 1 April 2014 to 31 March 2020.

2. Background

The IAU-OAD was established in March 2011 as a joint venture between the IAU and the NRF to implement the IAU decadal Strategic Plan, Astronomy for Development 2010-2020. The OAD then began operations with the appointment of the director, and was inaugurated in April 2011 by then South African Minister of Science and Technology, Dr Naledi Pandor. The strategic plan described “the creation of a small IAU Global Astronomy for Development Office”. The primary goal of the OAD was “astronomy for development”. The “development of astronomy” was still something that happened along the path to that primary goal. The new IAU Strategic Plan 2020-2030 makes clear this primary goal of the OAD to use astronomy to impact on development.

The mission statement adopted in 2011 is based on the “wheel” on the cover of the 2010-2020 Strategic Plan: “to help further the use of astronomy as a tool for development by mobilizing the human and financial resources necessary in order to realize the field’s scientific, technological and cultural benefits to society.”

The first evaluation of the OAD was conducted in 2015. The second evaluation is scheduled for 2020 and this document describes the implementation plan for the 2020 evaluation.

3. Purpose

A retrospective evaluation of the performance of the OAD in terms of the following specifics:

- i. Evaluate the performance of the OAD against its objectives within its resource constraints;
- ii. Examine the IAU/NRF agreement with a view to its possible enhancement;
- iii. Assess benefits that the OAD has brought to the IAU and DSI/NRF along the way to assist in determining whether the continuation of the OAD in South Africa would be desirable or not;
- iv. Evaluate the implementation of the IAU decadal Strategic Plan, Astronomy for Development 2010-2020; and
- v. Assess the extent of implementation of recommendations emanating from the previous (2015) evaluation.
- vi. Make recommendations/suggestions to optimise the future development of the OAD in the context of the IAU Strategic Plan 2020-2030;

4. Scope

The evaluation will cover the entire business of the OAD based in South Africa and will be a summative retrospective evaluation of the implementation of the IAU Strategic Plan astronomy for development 2010-2020. The period to be covered for this evaluation is 1 April 2014 to 31 March 2020. The review will also consider the future development of the OAD in order to strengthen and streamline its activities in fulfilment of the IAU Strategic Plan 2020-2030.

5. Methodology

The evaluation method will have 2 approaches (5.1 and 5.2 below). The idea and expectation is that these approaches should complement each other and provide information for triangulation of the results.

5.1 Reading and Analysis

Reading and analysis of relevant documents including in particular the Self-Evaluation Report (SER) from the OAD. Below is a listing of the reading material considered relevant to this evaluation, organised into Essential Reading Material and Useful Reading Material.

a. Essential Reading

- i. SER on the performance of the OAD in terms of its mission
- ii. Agreement between the IAU and the NRF concerning the hosting of the OAD, 2015
- iii. DST Letter to the IAU in 2015, committing to the funding for the OAD
- iv. OAD business plans for the evaluation period
- v. Combined business plan for all OAD Regional Offices
- vi. IAU Strategic Plan 2010-2020, with 2012 and 2019 updates on implementation
- vii. IAU Strategic Plan 2020-2030
- viii. Evaluation report 2015

b. Useful Reading Material

- i. OAD Annual reports for the years covered by the evaluation
- ii. Projects and Programme reports covering the period to be evaluated

5.2 Stakeholder Interviews and Written Submissions

Targeted interviews (video and telephone) will be conducted by the evaluation panel, with key individuals. The purpose of the interviews will be for the respondents to share their expectations, experience and perceptions on the performance of the OAD. The intention is to confine this method of submission of input to individuals in leadership positions that are key to the goals of the OAD and have a good understanding and experience of, as well as appreciation for, the area of astronomy. It is expected that the appropriate personnel in the OAD and the NRF will assist in the identification of these individuals.

Solicited and/or volunteered written submissions from key stakeholders could also serve as input material for the panel. This option of submission will generally be available to individuals who may have been targeted for interview, but who are not available for the interview or prefer to make written submissions.

6. Evaluation Dimensions

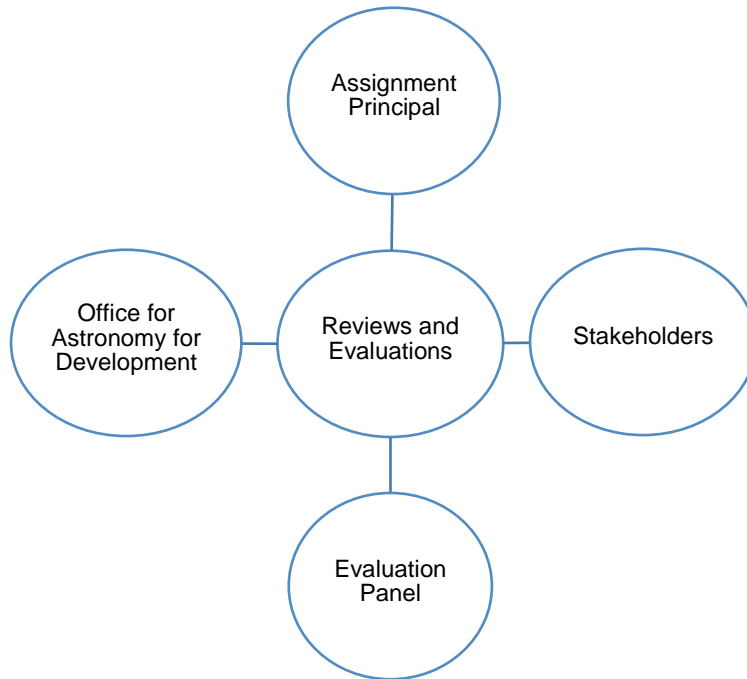
The panel is requested to assess the overall performance of the OAD in terms of the dimensions listed below, most of which is contained in the IAU-NRF Agreement, as well as the 2012 and 2019 updates of the IAU Strategic Plan 2010-2020.

- i. Management, coordination and evaluation of the IAU programmes worldwide in the area of development and education, including recruiting and mobilizing participating volunteers;
- ii. Organisation of oversight of the IAU development programmes and the formulation of their annual budgets;
- iii. Liaison with IAU Divisions and Commissions in planning and implementing relevant programs;
- iv. Liaison with IAU Regional Offices of Astronomy for Development and IAU Language Expertise Centres in planning and implementing relevant programs;
- v. Liaison with other international unions and agencies such as International Council of Scientific Unions (ICSU¹) Regional Offices, United Nations Office for Outer Space Affairs (UNOOSA), Committee on Space Research (COSPAR) and International Union of Radio Science (URSI), in planning and implementing relevant programs;
- vi. Liaison with other relevant IAU activities such as the Office for Astronomy Outreach (OAO) and the Office for Young Astronomers (OYA);
- i. Liaison with large international astronomical facilities and projects, such as the Square Kilometre Array;
- ii. Stimulation of communication on development matters between astronomers, IAU members and associated members, other relevant fields and interested parties through the maintenance of a website for development and education and appropriate forums;
- iii. Proactive coordination and initiation of fundraising activities and partnerships for programmes consistent with the goals of the Strategic Plan 2010-2020;
- vii. Management of OAD in terms of:
 - Leadership;
 - Staffing;
 - Commitment of institution hosting the OAD;
 - Location of the OAD;
 - Funding;
 - Strategic positioning of the OAD and future plans, particularly in relevance to the host country and the IAU broadly.
- xi. The extent to which the recommendations from the 2015 Evaluation of the OAD, which were accepted, have been addressed.

¹ Now called International Council for Science (ICS).

7. Key Role-Players

The key role-players are depicted in the illustration below, followed by the narrative which elaborates on their respective roles.



7.1 Assignment Principal

The Assignment Principal (AP) is the ultimate authority for the evaluation. In this case this role will be held jointly by the Deputy Chief Executive (DCEO): National Research Infrastructure Platforms (NRIP) of the NRF and the IAU General Secretary. The specific roles and responsibilities of the AP will be the following:

- i. Approve this Implementation Plan for the evaluation.
- ii. Approve the Terms of Reference (ToR) for the Evaluation Panel.
- iii. Appoint the Evaluation Panel Members, including a Panel Chair.
- iv. Accept the Evaluation Report.
- v. Approve and receive the OAD Management Response to the evaluation.
- vi. Approve placement of the Evaluation Report and Management Response in the public domain.
- vii. Submit and distribute (or direct the submission and distribution of) the above report and management response to the relevant recipients.

7.2 Office of Astronomy for Development (OAD)

The OAD Management will be responsible for the following:

- i. Provide input to the development of the Implementation Plan for this Evaluation.
- ii. Recommend potential panel members (NRF NRIP and IAU).
- iii. Recommend persons (including providing priority ranking and contact details) to be approached for the stakeholder interviews.
- iv. Facilitate the availability of OAD personnel and/or access to facilities, for purposes of the Evaluation.
- v. Assist with identifying and sourcing (preferably electronic versions) the relevant reading material, as well as categorising these into essential vs useful.
- vi. Produce and deliver the OAD-SER for the Panel. The SER should at least cover and/or be characterised by the following:
 - i. Background information.
 - ii. Focus on the period being evaluated.
 - iii. Report on performance with respect to the relevant contracts, strategies, plans and the Evaluation Dimensions.
 - iv. Share highlights and challenges, and should not exceed twenty (20) pages.
 - v. As far as is possible, claims of performance and achievements expressed in the narrative should be evidence-based, with this evidence being presented visually (pictures, tables, graphs, etc.), where helpful, and the granular data (where applicable), made available to the Panel.
 - vi. Conclusion.
- vii. Check the first draft of the Evaluation Report for factual accuracy.
- viii. Provide the Management Response to the Evaluation Report and send it simultaneously to the IAU General Secretary and the NRF.

7.3 Evaluation Panel

The roles and responsibilities of the Evaluation Panel will be to:

- i. Conduct the Evaluation, which includes:
 - a. Reading all relevant material;
 - b. Interviewing the targeted stakeholders to source information that may assist them in their task of addressing the ToR;
 - c. Giving a verbal feedback of their findings and recommendations to the OAD, IAU and NRF (these will be convened by RE) at the conclusion of the actual Evaluation;
- ii. Draft and finalise the Evaluation Report within a pre-determined time frame.

The following should characterise the Report:

 - a. Focusing and fully addressing the Evaluation Dimensions;
 - b. Being candid and honest but factual;

- c. Minimal on opinions;
 - d. Findings should be evidence-based;
 - e. There should be relevant benchmarking (local and international), where appropriate;
 - f. Recommendations should be substantiated.
- iii. In addition to the above, the Panel Chair will be expected to facilitate the smooth, timeous and effective functioning of the Panel. The specific additional responsibilities of the Panel Chair will include the following:
- a. Facilitating the meetings of the evaluation in a manner that enables participation by all;
 - b. Managing and steering proceedings and activities of the evaluation panel such that they align to the ToR and Programme for the evaluation;
 - c. Managing time allocation;
 - d. Facilitating consensus-based outcomes and decisions;
 - e. Ensuring that records of proceedings are captured in a manner and quality that is reasonably clear and informative;
 - f. Driving the consolidation and production of the Draft report and responding to submission of factual inaccuracies of the draft evaluation report;
 - g. Driving the consolidation and production of the Final Evaluation Report;
 - h. Delivering the Draft and Final² Reports (signed by all panelists) to the Director RE per the schedule for the Evaluation.
 - i. Facilitating presentation of evaluation findings to the AP.

Composition

Given the mandate of the OAD, it is critical to the Evaluation that the panel be comprised of highly credible, well-respected and experienced persons who have an in-depth understanding of the business of the OAD. It is also important that the Evaluation Panel, of four members, is diverse in terms of demographics and at least 60% of the members should be from outside of South Africa.

The panel will be supported by a Scribe, as and when necessary. The need for the scribe will be decided by the Panel Chair, in consultation with the Director: RE. The scribe will be responsible for:

- Capturing all proceedings and deliberations during the evaluation;
- Projecting/sharing the notes captured on the screen, as required by panel, to ensure factual correctness of the records.

² Final report is produced by panel after OAD has presented the factual inaccuracies of the Draft evaluation report

7.4 Stakeholders

This refers to persons from the various constituencies of the OAD, who have engaged with (from various perspectives) the OAD and/or have an interest or role in the objectives and offerings of the OAD. They are to be interviewed by the Panel. The following will be expected of them:

- i. To attend the interviews in person if requested and where possible and sensible, otherwise by video or telephone conference;
- ii. To share their knowledge as requested, on the subject/s under Evaluation;
- iii. To be frank, honest and objective in their interaction with the Evaluation Panel.
- iv. To complete an Evaluation survey, if so decided by the Evaluation Panel;

Annexure 2 is the list of names and other relevant details of persons to be considered as part of the stakeholders to be engaged.

Annex B – Interviews conducted with key Stakeholders

Dr	Gansen	Pillay	NRF	Acting CEO	NRF Management
Dr	Clifford	Nxomani	NRF	Deputy CEO	NRF Management
Prof	Teresa	Lago	International Astronomical Union	General Secretary	IAU Officers
Mr	Kevin	Govender	OAD	Director	OAD Team
Prof	Renée	Kraan-Korteweg	UCT	Research Chair	OAD Steering Committee
Prof	Ewine	van Dishoeck	International Astronomical Union	President	IAU Officers
A/Prof	Vanessa	McBride	OAD	Astronomer	OAD Team
Prof	Petri	Vaisanen	SAAO	Director	SAAO Management
Mr	Sivuyile	Manxoyi	SAAO	Head of SALT Collateral Benefits	SAAO Management
Mr	Ramasamy	Venugopal	OAD	Operations Manager	OAD Team
Prof	Ajit	Kembhavi	IUCAA	past Director	OAD Steering Committee
Mr	Takalani	Nemaungani	DSI	Director: Multiwavelength Astronomy	DSI Astronomy
Ms	Lina	Canas	IAU Office for Astronomy	International Outreach	IAU sister offices, (OAO, OAE, OYA)
Prof	Jamal	Mimouni	African Astronomical Society	President	Partners
Mr	Alemiye	Mamo	East Africa (Ethiopia)	Regional coordinator	Regional Offices
Dr	Areg	Mickaelian	South West and Central Asia (Armenia)	Regional coordinator	Regional Offices
Prof	Anna	Scaife	DARA Big Data	Project leader	Partners

Dr	Sandra Benitez	Herrera	Amanar: Under the same sky	Project leader	Project leaders
Ms	Sonal	Asgotraa	Astronomy for Himalayan Livelihood Creation and "Astrostays" Flagship	Project leader	Project leaders
Dr	Michelle	Gerbaldi	France/OYA/ISYA/C1	Reviewers oversight	Reviewers
Dr	Sulisa	Chariyalertsak	South East Asia (Thailand)	Regional Coordinator	Regional Offices
Dr	German	Chaparro	Andean Region of South America	On behalf of Dr J Forero-Romero Regional Coordinator	Regional Offices
Dr	Khotso	Mokhele	Former President: NRF	Past Steering Committee Chair	OAD Steering Committee

Annex C – Written input from Stakeholders

Dr	Bernie	Fanaroff	SARAO	past Director	OAD Steering Committee
Prof	Daniela	Lazzaro	International Astronomical Union	Vice President	OAD Steering Committee
Prof	José Miguel Rodriguez	Espinosa	IAU	Assistant General Secretary	OAD Steering Committee
Prof	Saalih	Allie	UCT	Professor	OAD Steering Committee
Prof	Megan	Donahue	Michigan State University	Past Steering Committee member	OAD Steering Committee
Prof	George	Miley	Leiden University	Past Steering Committee member	OAD Steering Committee
Prof	Kaz	Sekiguchi	NAOJ	Past Steering Committee member	OAD Steering Committee
Prof	Patricia	Whitelock	SAAO	Past Steering Committee member	OAD Steering Committee
Prof	Debra	Elmegreen	International Astronomical Union	President-Elect	IAU Officers
Dr	Thijs	Kouwenhoven	East Asia and Chinese Language (China)	Regional coordinator	Regional Offices
Dr	Awni	Khasawneh	Arab World & Arabic Language (Jordan_)	Regional coordinator	Regional Offices
Ms	Michelle	Willebrands	Europe (Netherlands)	Regional coordinator	Regional Offices
Dr	Bonaventure	Okere	West Africa (Nigeria)	Regional coordinator	Regional Offices
Dr	Rosa	Doran	Portuguese Speaking Countries (Portugal)	Regional coordinator	Regional Offices
Dr	Kate	Meredith	North America (USA)	Regional coordinator	Regional Offices
Mr	Prosperity	Simpemba	Southern Africa (Zambia)	Regional coordinator	Regional Offices
Prof	Melvin	Hoare	Development in Africa with Radio Astronomy (DARA)	Project leader	Partners

Prof	Cherryl	Walker	DSI/NRF SARCHI Research Chair in the Sociology of Land, Environment and Sustainable Development at University of Stellenbosch	Research Chair	Partners
Dr	Daniel	Nyanganyura	International Science Council Regional Office for Africa (ISC ROA)	Regional Director	Partners
Dr	Brian	van Soelen	South African IAU National Committee and GA2024 National Organising Committee	Chair	Partners
Dr	Markus	Poessel	IAU Office of Astronomy for Education (OAE)	Director	IAU Sister Offices (OAO, OAE, OYA)
Prof	Ed	Guinan	US/Villanova	Reviewers oversight	Reviewers
Prof	Richard	de Grijs	Australia/Macquarie University	Reviewer	Reviewers
Dr	Ofodum	Nworah	Nigeria	Reviewer	Reviewers

Annex D – Sources of Information

1. The OAD website www.astro4dev.org is the essential reference on the OAD and its programme. It contains links to all the OAD activities.
2. The following papers provided essential background information:
 1. The IAU Strategic Plans 2010-2020 and 2020-2030
 2. The OAD Self-Evaluation Report 2014-2020
 3. The OAD Annual Reports for 2015 to 2020
 4. The OAD Business Plans for 2011 to 2020
 5. The Combined Regions Business Plan 2016-2021
 6. The 2015 OAD Review Report and the Management response.
 7. The IAU-NRF OAD Agreement 2015.

Annex E – list of Regional Offices

Region	Host country	Host institutions	Established
South West and Central Asia	Armenia	Byurakan Astrophysical Observatory	2015
East Asia and Chinese Language	China	Beijing Planetarium and Yunnan Observatory	2012
Andean Region of South America	Colombia and Chile	Universidad de Los Andes, Parque Explora-Planetario de Medellín and Sociedad Chilena de Astronomía	2015
East Africa	Ethiopia	Ethiopian Space Science and Technology Institute	2014
Arab World and Arabic Language	Jordan	Arab Union for Astronomy and Space Sciences at UN Regional Centre for Space Science and Technology Education	2015
Europe	Netherlands	European Astronomical Society and Leiden University	2018
West Africa	Nigeria	Centre for Basic Space Science, National Space Research and Development Agency at the University of Nigeria	2015
Portuguese Speaking Countries	Portugal	Núcleo Interativo de Astronomia (NUCLIO) and Institute of Astrophysics and Space Sciences	2015
South East Asia	Thailand	National Astronomy Research Institute of Thailand	2012
North America	USA	Adler Planetarium, Associated Universities Inc., Association of Universities for Research in Astronomy, and Geneva Lake Astrophysics and STEAM Education	2020
Southern Africa	Zambia	Copperbelt University and University of Zambia	2014

Annex F – Standard Acronyms used by NRF

4IR	Fourth Industrial Revolution
AfAS	African Astronomical Society
ALMA	Atacama Large Millimeter/submillimeter Array
AVN	African VLBI Network
BRICS	Brazil, Russia, India, China, South Africa
CEO	Chief Executive Officer
COSPAR	Committee on Space Research
DCEO	Deputy CEO
DFID	UK Department for International Development (since Sept 2020 replaced with Foreign, Commonwealth and Development Office)
DG	Director-General
DSI	Department of Science and Innovation
DST	Department of Science and Technology (previous name of Department of Science and Innovation)
ESO	European Southern Observatory
GA	General Assembly
GS	General Secretary
H.E.S.S.	High Energy Stereoscopic System
HartRAO	Hartebeesthoek Radio Astronomy Observatory
HIRAX	Hydrogen Intensity and Real-time Analysis eXperiment
HR	Human Resources
HSRC	Human Sciences Research Council
IAU	International Astronomical Union
ICSU	International Council for Science
ISC	International Science Council
ISC ROA	ISC Regional Office for Africa
IT	Information technology
IUCAA	Inter-University Centre for Astronomy and Astrophysics
IUPAP	International Union of Pure and Applied Physics
IYA2009	International Year of Astronomy
KAT	Karoo Array Telescope
LOAD	Language Expertise Centre
MDG	Millennium Development Goal
MoA	Memorandum of agreement
MoU	Memorandum of Understanding
NAOJ	National Astronomical Observatory of Japan
NARIT	National Astronomical Research Institute of
NASSP	National Astrophysics and Space Science Programme
NOC	National Outreach Coordinator
NRF	National Research Foundation
NRIP	National Research Infrastructure Programme
OAD	Office of Astronomy for Development
OAo	Office for Astronomy Outreach
PI	Principal investigator
RISA	Research and Innovation, Support and Advancement
ROAD	Regional Office of the OAD
S&T	Science and technology
SA	South Africa
SAAO	South African Astronomical Observatory
SAASTA	South African Agency for Science and Technology Advancement
SADC	Southern African Development Community
SALT	South African Large Telescope
SARAO	South African Radio Astronomy Observatory
SARCHI	South African Research Chairs Initiative
SC	Steering committee
SDG	Sustainable Development Goal
SKA	Square Kilometre Array
SU	Stellenbosch University

ToR	Terms of reference
UCT	University of Cape Town
UN	United Nations
URSI	International Union of Radio Science
URSI	International Union of Radio Science
UWC	University of the Western Cape
VLBI	Very-long-baseline interferometry
VP	Vice President