

International Astronomical Union
Office of Astronomy for Development

2010 - 2015



ASTRONOMY FOR DEVELOPMENT

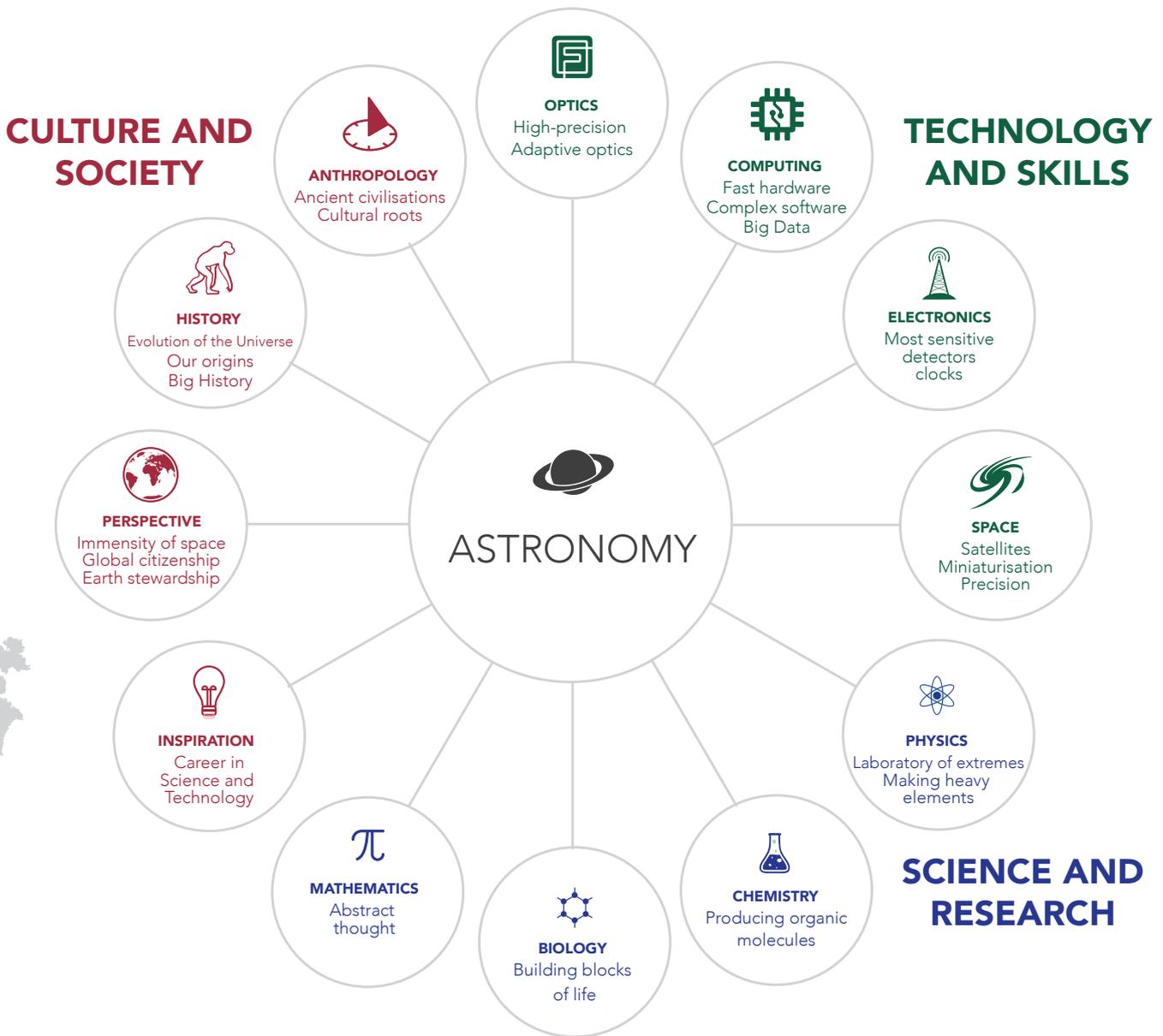
Astronomy is a field that combines science and technology with inspiration and excitement. As such it can play a role in facilitating education and human capital development. The skills related to the field of astronomy can also be used to further sustainable development throughout the world.

In 2009 the International Astronomical Union (IAU), the largest body of professional astronomers in the world, developed a decadal Strategic Plan. Central to this plan is the Office of Astronomy for Development (OAD), set up in partnership with the South African National Research Foundation (NRF).

The IAU Strategic Plan describes the potential of astronomy to contribute to sustainable development. The OAD was established to mobilise the human and financial resources necessary in order to realise the field's scientific, technological and cultural benefits to society.

The OAD is tasked with establishing and strategically coordinating Regional Offices and Language Expertise Centres across the world, as well as initiating, supporting and funding programmes in three core areas: Astronomy for Universities and Research, Astronomy for Children and Schools, and Astronomy for the Public.





The IAU Strategic Plan delineates the features of astronomy that can be used to address sustainable development challenges. The wheel above illustrates how astronomy training equips astronomers with interdisciplinary technological and scientific skills essential for the growth of knowledge economies. In addition, the wheel highlights astronomy's cultural and historical relevance to societies across the world.

OAD programmes leverage these features of astronomy by connecting the astronomy community to development challenges where related skills are required, and by using astronomy to develop education and improve social outcomes.

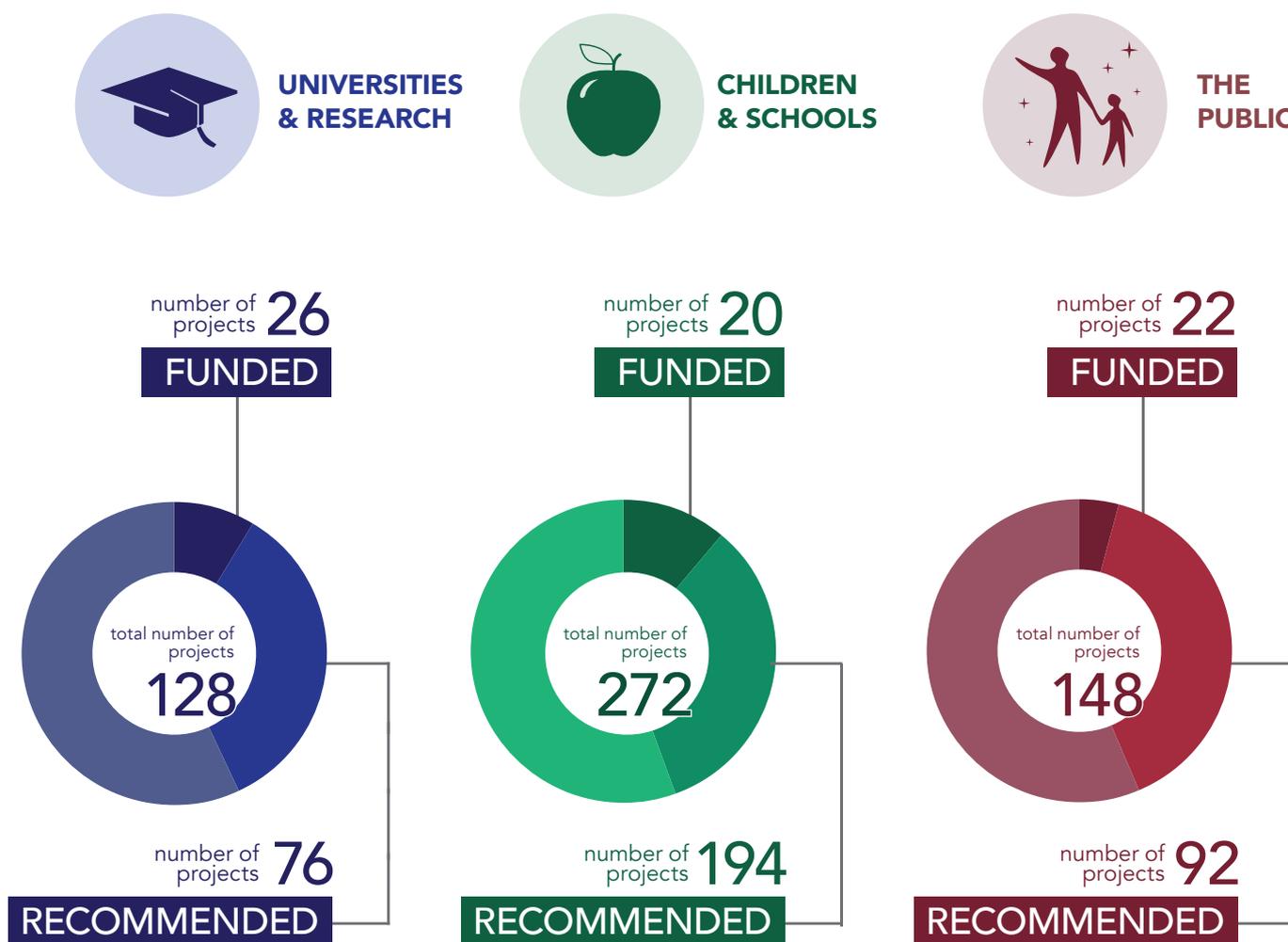
The IAU Strategic Plan emphasises the importance of furthering the Millennium Development Goals (MDGs) in all astronomy-for-development activities. In the global discussion led by the United Nations on development initiatives, the MDGs are being succeeded by the Sustainable Development Goals (SDGs), which represent general consensus on key challenges faced by all countries around the world. Furthering the SDGs through astronomy is a key task of the OAD.

ASTRONOMY FOR DEVELOPMENT PROGRAMMES

The OAD aims to use astronomy to further sustainable development by focusing on three main areas with guidance from experts in the field. The OAD initiates, supports and funds projects in each of these areas. Since its inception, the OAD has been involved in over 85 astronomy-for-development projects worldwide.

A key part of the OAD activities is the annual Call for Proposals, in which individuals and organisations anywhere in the world are invited to propose projects that relate to astronomy-for-development. All applications received by the OAD are reviewed by members of the OAD Task Forces. The IAU provides around €100,000 per year to fund successful proposals. The Call is announced annually around June, with a proposal deadline around September. For more information on the call, please visit www.astro4dev.org.

The image below shows the number of proposals received, funded and recommended thus far in each focus area.



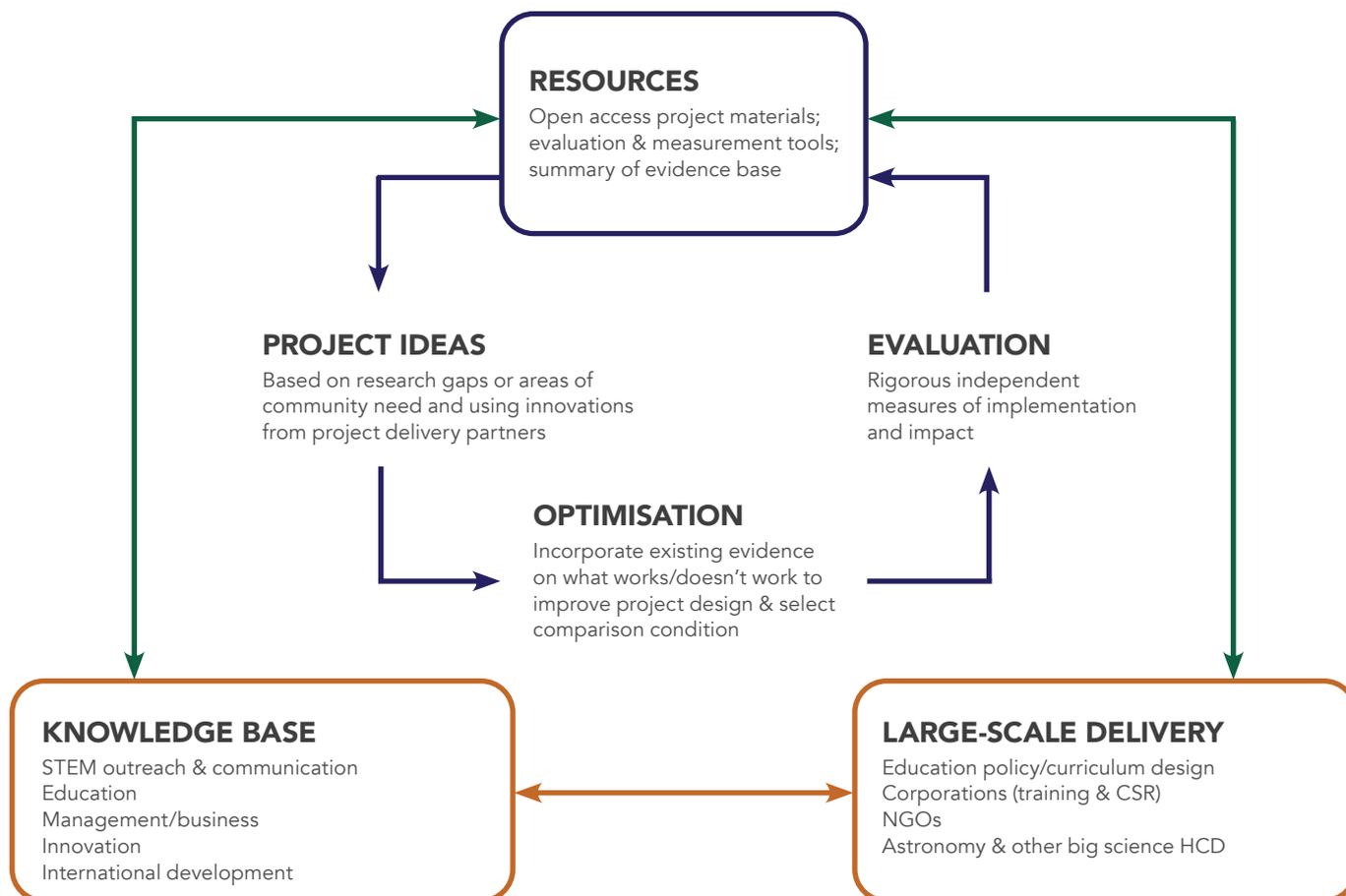
In the first three cycles of the Call, a total of €5,197,716 was requested for astronomy-for-development projects. Of the proposals received, the OAD allocated €297,453 for 68 projects.

Projects not funded directly by the IAU but still ranked highly by the Task Forces go onto an annual recommended list for which the OAD continues to search for funds. The total amount that would have been required to fund all projects on the recommended lists thus far is €2,939,312.

IMPACT CYCLE

The OAD believes that in order for astronomy-for-development activities to be effective, a scientific approach is needed. Evaluation is essential for identifying which projects work best, for whom and under what conditions. Evidence-informed project design and selection ensures that projects build on past lessons, thereby reducing the risk of negative unintended consequences and increasing the probabilities of positive cost-effective impacts.

The OAD Impact Cycle aims to enhance the OAD’s project design, selection and delivery systems to support such continual improvement and potential expansion. By determining what works and, importantly, what doesn’t work, the OAD can develop a library of evidence on best practice and ensure a positive feedback loop for projects.



At the Project Ideas stages the OAD would provide guidelines on previous experience and existing research to allow proposers to focus their ideas and build on what has been done. This is followed by Optimisation, in which selected projects are optimised by making their theoretical assumptions and target outcomes explicit and incorporating best practice and evaluation design in their implementation plan.

Where possible, the Evaluation stage applies experimental (i.e. scientific) research designs to obtain valid and publishable measures of impacts, while keeping the implementation as unbureaucratic as possible for the project leaders. The Resources are a continuously updated library of best practices, that will capture what we learn in previous steps. The evidence will then feed back into the Project Ideas stage to create a positive feedback loop.

The Impact Cycle will feed into a global Knowledge Base both through academic publications on evaluated projects and by providing data to serve the STEM education, outreach, evaluation and development communities. Contributions to the global evidence base on science for development, education, outreach and human capital development provide a platform for ensuring that innovative, high-impact projects inform practice on a larger scale. The cycle generates the high quality evidence needed by policymakers and donors designing Large-Scale education and human capital development interventions.



ASTRONOMY FOR UNIVERSITIES & RESEARCH

The OAD Task Force on Astronomy for Universities and Research focuses on using astronomy to support tertiary education, developing skills and building research capacity. Universities & Research projects include university twinning programmes, workshops on astronomy, coding or data reduction, as well as developing open access course materials for tertiary education. In total, the OAD has funded 26 projects in this focus area, with a small selection described here.

STRENGTHENING ASTRONOMY RESEARCH IN RWANDA

YEAR
2013

LOCATION
Rwanda

PEOPLE REACHED
111

TARGET POPULATION
Physics lecturers, students and public



The IAU donated 5 computers to the Physics Department of the Kigali Institute of Education to help students and lecturers use astronomy software. Given the growing number of initiatives to build telescopes in East Africa (e.g. the Entoto Optical Observatory in Ethiopia and the Square Kilometre Array radio telescope dishes planned for Kenya), a local astrophysics research team would be beneficial to the region.

With funding from the OAD, a workshop on optical data reduction and analysis (photometry and spectroscopy) was organised in Rwanda for Physics lecturers and students.

NATIONAL WORKSHOP ON ASTRONOMY & ASTROPHYSICS IN NEPAL

YEAR
2013

LOCATION
Nepal

PEOPLE REACHED
57

TARGET POPULATION
Physics lecturers and students



With the support of the OAD and the Government of Nepal, a National Workshop on Astronomy and Astrophysics was held in July 2013 at Tribhuvan University (TU). TU offers Master's level theoretical and computational astrophysics courses. The workshop exposed Nepalese students to virtual observatories, databases, software and basic programming languages commonly used in astrophysical research.

The success of the workshop was highlighted by students' request for a second edition of the school, which was also granted funding by the OAD.

By attending this program I learned to use programming languages to solve complicated problems in physics. I also developed self-confidence to express myself clearly in front of others.

Nepal National Workshop participant

ASTRONOMY TWINNING COLOMBIA & LEIDEN

 **YEAR**
2014

 **LOCATION**
Colombia

 **PEOPLE REACHED**
75

 **TARGET POPULATION**
Astronomy and physics students and the general public



The AstroTwinCoLO 2014 Meeting was the second event celebrated as part of the Astronomy Twinning Program between the University of Antioquia (Colombia) and Leiden Observatory (Leiden). The meeting was held in Medellín (Colombia) in August 2014.

Participants from Colombia and in general from the Andean region were invited to attend university-level courses that were offered during the meeting and the public was invited to public-level lectures by visiting professors.

ASTROVARSITY

 **YEAR**
Ongoing

 **LOCATION**
Digital

 **PEOPLE REACHED**
Not measured

 **TARGET POPULATION**
Mathematics and physics lecturers



The AstroVARSITY project intends to provide a package of course materials and tutorial resources for Mathematics and/or Physics lecturers at undergraduate level in order to use astronomy to enhance their teaching, as well as potentially introduce an astronomy module within their departments.

The project also offers hands-on activities, guidelines and exercises, which can be used with either an off-the-shelf small telescope-and-instruments package, robotic telescopes at a remote location, or online available data, such that relevant university departments can conduct practical teaching experiments and research.



ASTRONOMY FOR CHILDREN & SCHOOLS

The OAD Task Force on Astronomy for Children & Schools is aimed at pre-primary, primary and secondary education, as well as children and youth outside of formal education systems. The excitement of astronomy can be used to inspire and interest youth in science and technology. Astronomy can also support Science, Technology Engineering and Maths (STEM) education both formally and informally. In total the OAD has funded 20 projects in this focus area, with a small selection described here.

“A TOUCH OF THE UNIVERSE” FOR THE VISUALLY IMPAIRED

 **YEAR** 2013

 **LOCATION** Spain

 **PEOPLE REACHED** 230

 **TARGET POPULATION** Visually impaired individuals



A Touch of the Universe is a box of astronomical activities with materials that can be used by both the sighted and the visually impaired. It allows for a tactile and visual tour of the Moon, to feel and see a nebula with NASA’s Chandra X-ray Observatory’s prints, to learn about the Moon phases and to enjoy a planetarium show with special sound effects and a tactile representation of the night sky on a half-sphere.

The 3D printer files of the Moon and half-sphere, as well as the activity book in Braille, can be freely downloaded. In 2013, 30 kits were produced and have been sent around the world.

ASTROEDU

 **YEAR** Ongoing

 **LOCATION** Digital

 **PEOPLE REACHED** Not measured

 **TARGET POPULATION** Teachers and educators



A project of the Task Force on Children and Schools, astroEDU makes the best astronomy activities accessible to educators around the world. It is an open-access platform for peer-reviewed astronomy education activities. astroEDU is a place for educators to discover, review, distribute, improve, and remix educational astronomy activities. Partners include UNAWA and LCOGT.

The astroEDU website is hosted by the IAU: <http://astroedu.iau.org/>

The Scientix Award for Best Resources in Science, Technology, Mathematics and Engineering is a great recognition to the astroEDU approach to improve science resources

Pedro Russo, Co-Chair of the Task Force on Children & Schools

PROYECTO MIRADAS FOR CENTRAL AMERICA

 **YEAR**
2014

 **LOCATION**
Central America

 **PEOPLE REACHED**
650

 **TARGET POPULATION**
Primary school teachers and children



Working with the international educational project Universe Awareness (UNAWA), Proyecto Miradas travelled through Central America providing astronomy educational training and resources to teachers and children in the region. Schools were visited by Proyecto Miradas carrying the UNAWA hands on educational resource "Universe in a Box", other UNAWA materials, locally developed educational materials and telescopes. The programme lasted one week per school, and was centred on direct activities with the children, teacher training (with the assistance of the UNESCO national coordinators), and public events. After the training, teachers received binoculars, a small telescope and visual materials to set up astronomy clubs at their schools.

THE MATHARE AMBASSADORS OF ASTRONOMY, KENYA

 **YEAR**
2013

 **LOCATION**
Kenya

 **PEOPLE REACHED**
2321

 **TARGET POPULATION**
Primary school teachers and learners



The Mathare Ambassadors project aimed to promote astronomy among primary school teachers and students in the Mathare "slum" of Nairobi (Kenya). The project improved knowledge and skills, provided educational aids and created a network of teachers capable of both training their fellow teachers and introducing students to the exciting world of astronomy. Science teachers completed an intense training that prepared them to train colleagues about teaching with astronomy.

The project organised teacher training on how to excite students with astronomy through practical activities and educational software.



ASTRONOMY FOR THE PUBLIC

The OAD Task Force on Astronomy for the Public focuses on the public in the broadest sense; in this case, the public consists of all groups that do not fit into the Task Forces Universities & Research or Children & Schools. Astronomy for the Public projects relate to public outreach, scientific literacy, inclusion in science as well as interactions between history, art, culture and astronomy. In total the OAD has funded 22 projects in this focus area, with a small selection described here.

ASTRONOMÍA PERIFÉRICA: ART & ASTRONOMY IN COLOMBIA

 **YEAR**
2013

 **LOCATION**
Colombia

 **PEOPLE REACHED**
150

 **TARGET POPULATION**
People without access to museums and universities



Astronomía Periférica is a project aimed at bringing the poetic force of astronomy into the periphery of Latin-American cities, through art, design and science.

The target public are those who do not have immediate access to museums, universities or planetariums. The project was implemented in Bogota, Colombia using a setup that could be implemented in other Latin-American cities.

BRINGING ASTRONOMY TO REMOTE AREAS IN VIETNAM

 **YEAR**
2013

 **LOCATION**
Vietnam

 **PEOPLE REACHED**
850

 **TARGET POPULATION**
Teachers, amateur astronomers and the general public



This project aimed at building up a coherent, unique online website to coordinate activities of amateur astronomy clubs in Vietnam and to organise observing nights and hands-on activities in remote provinces of Vietnam to increase awareness of astronomy. During the project the Vietnamese Amateur Astronomy Clubs website was developed, the first National Vietnamese Amateur Astronomy Meeting was organised and more than 10 visits to schools and universities in other provinces were conducted.

OAD's AstroSense is engaged in levelling the field for people with all learning styles, to contribute meaningfully to science and work together towards the discovery of the unknown.

Dr Wanda Diaz Merced, OAD collaborator, Professional astronomer and AstroSense project lead

COMMUNICATION SKILLS FOR YOUNG ASTRONOMERS

 **YEAR** 2014  **LOCATION** South Africa  **PEOPLE REACHED** Not measured  **TARGET POPULATION** Young astronomers



Astronomers are under pressure to sustain public and political support for their discipline and are realising that the need for public outreach is growing. It is therefore essential to equip young astronomers with the confidence and skills to successfully engage a wide range of audiences, from young children to senior politicians, successfully.

This project, coordinated from Stellenbosch University, developed a communication guide focused on the needs of scientists and engineers who are involved in public communication of astronomy, astrophysics and related engineering fields.

ASTROSENSE

 **YEAR** Ongoing  **LOCATION** Digital  **PEOPLE REACHED** Not measured  **TARGET POPULATION** Visually impaired youth and researchers



Since 2013, the OAD has worked on projects that facilitate access to astronomy and science for individuals with visual impairments. Ongoing projects include the development, evaluation and dissemination of (1) tactile educational tools for primary school science education (2) adapted implementation of NASA's Radio Jove module for solar and planetary radio astronomy in schools (3) tools and techniques for auditory data analysis that can be used by professional astronomers and students. The AstroSense project has been driven by Dr. Wanda Diaz Merced.

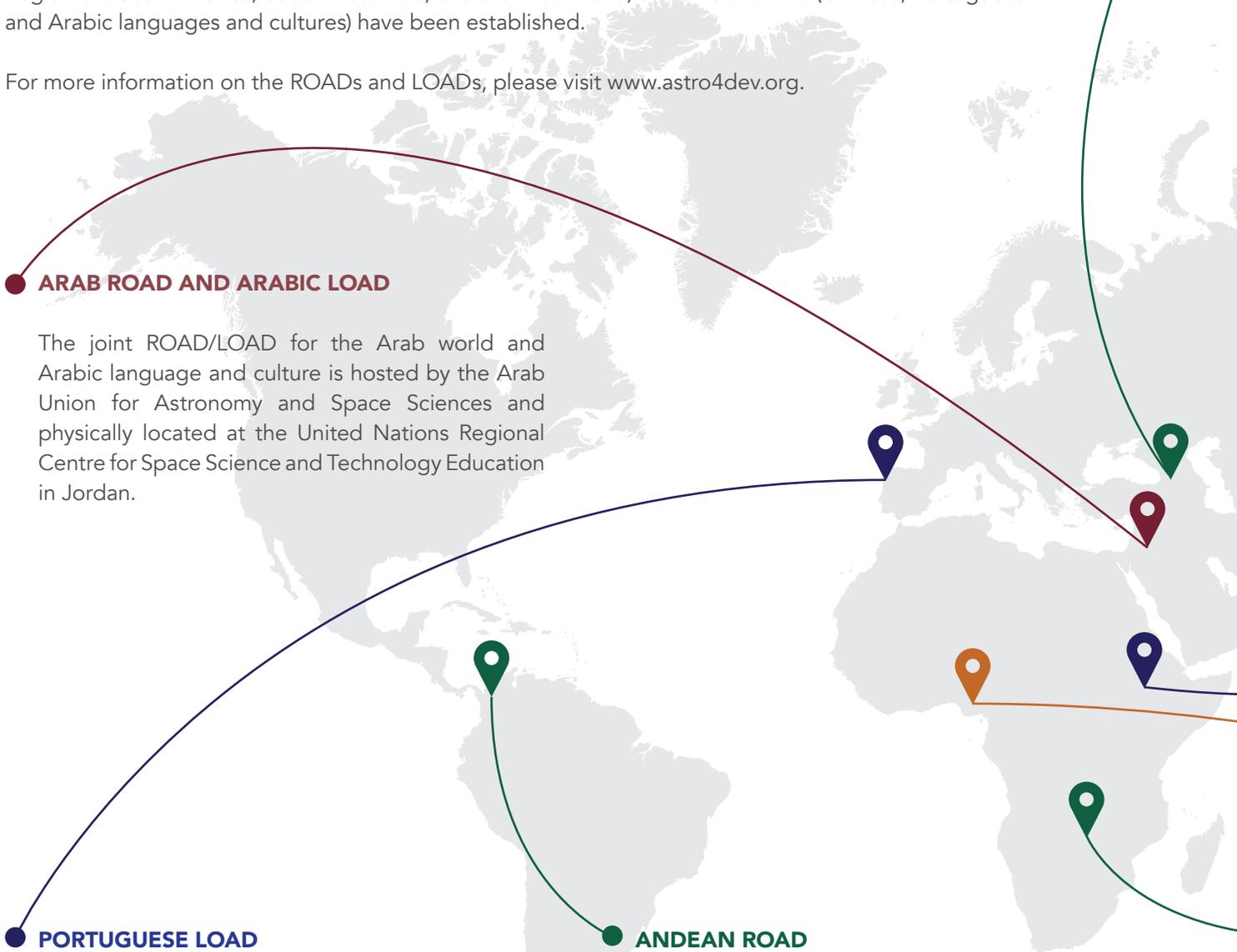
REGIONAL OFFICES

A single international office cannot sufficiently understand the local needs and cultures in all regions of the world. It is therefore extremely important for the OAD to receive regional input and support from local drivers. As such, the OAD has an open Announcement of Opportunity for the establishment of Regional Offices of Astronomy for Development (ROADs) and Language Expertise Centres for the OAD (LOADs).

ROADs are offices similar to the OAD, established within host institutions and employing a full time coordinator, with a focus on activities in a specific geographic region. LOADs have a similar structure but with a focus on a particular language or cultural region, which sometimes stretches across the entire world.

As of July 2015, eight ROADs (East Asia, South East Asia, East Africa, Southern Africa, West Africa, the Andean Region of South America, South West Asia, and the Arab world) and three LOADs (Chinese, Portuguese and Arabic languages and cultures) have been established.

For more information on the ROADs and LOADs, please visit www.astro4dev.org.



ARAB ROAD AND ARABIC LOAD

The joint ROAD/LOAD for the Arab world and Arabic language and culture is hosted by the Arab Union for Astronomy and Space Sciences and physically located at the United Nations Regional Centre for Space Science and Technology Education in Jordan.

PORTUGUESE LOAD

Núcleo Interativo de Astronomia (NUCLIO) is the lead organization of this LOAD, in collaboration with the Institute of Astrophysics and Space Sciences. This centre has a considerable network in Brazil, Cape Verde, Sao Tome and Principe, East Timor and Mozambique, and coordinates with other Portuguese-speaking countries.

ANDEAN ROAD

The Andean ROAD is hosted at the Universidad de los Andes in Bogota, Colombia. The countries officially part of the Andean ROAD are Bolivia, Chile, Colombia, Ecuador, Peru and Venezuela. There are over twenty institutions collaborating in the Andean ROAD.



SOUTH WEST ASIAN ROAD

Byurakan Astrophysical Observatory (BAO) in Armenia is the host institution for the South West Asian ROAD. Armenia has hosted several IAU meetings in the past and BAO is home to a regional branch of the International Center for Relativistic Astrophysics Network, as well as the Armenian Virtual Observatory.

EAST ASIAN ROAD AND CHINESE LOAD

The East Asian ROAD/Chinese LOAD coordinates astronomy-for-development activities in countries within the geographical region of East Asia. The LOAD activities deal with all aspects relating to (mainly) the Chinese language and culture. The impact of the latter may spread well beyond the geographical region to other parts of the world.

SOUTH EAST ASIAN ROAD

The South East Asian ROAD (SEA-ROAD) is committed to astronomy-for-development in the ASEAN region (Association of South East Asian Nations) and is hosted at the National Astronomical Research Institute of Thailand (NARIT), in Chiang Mai. NARIT is the lead organisation in the South East Asia Astronomy Network (SEAN).

EAST AFRICAN ROAD

The East African ROAD is driven locally by the Ethiopian Ministry of Science and Technology, Ministry of Education, Ethiopian Space Science Society and Addis Ababa University. The establishment of the East African regional office in Ethiopia has received strong support from the East African Astronomical Society (EAAS).

SOUTHERN AFRICAN ROAD

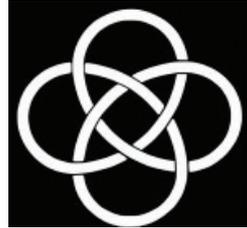
The Southern African ROAD is hosted by Copperbelt University (CBU) in Zambia. This region of the continent is very active in developing world-class astronomy facilities including the optical Southern African Large Telescope (SALT), the radio Karoo Array Telescope (MeerKAT) and the gamma-ray High Energy Stereoscopic System (HESS).

WEST AFRICAN ROAD

The West African ROAD is hosted by the Centre for Basic Space Science (CBSS), National Space Research and Development Agency (NASRDA) at the University of Nigeria, in Nsukka, Nigeria. Nigeria has one of the larger astronomical communities on the continent has been host to two West African Regional Summer Schools.

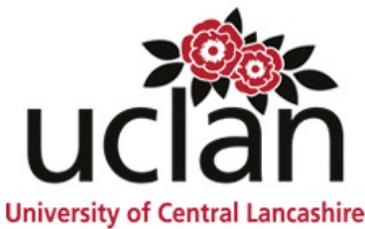
PARTNERS

The OAD has established several partnerships and collaborates with organisations sharing common interests. These partnerships include visiting scientist programmes, funding of workshops, scholarships, joint funding proposals, sharing of expertise and provision of staff time.



Inter-University Centre for Astronomy and Astrophysics

International Centre for Theoretical Astrophysics



Netherlands Organisation for Scientific Research



Galileo Teacher Training Program

A LEGACY OF THE INTERNATIONAL YEAR OF ASTRONOMY 2009



The OAD remains open to exploring partnerships with other organisations in the area of science for development. The whole is greater than the sum of its parts!

GETTING INVOLVED

There are many ways to engage with the OAD. We welcome your ideas and input towards the vision of Astronomy for Development.

The bulk of the implementation of projects is carried out by volunteers, supported by the OAD and the ROADS/LOADs, with advice and guidance from the Task Forces, and oversight by an international Steering Committee. The greatest resource enabling the OAD to achieve its vision is therefore its volunteer community.

Assistance is sought on an ongoing basis from professionals, amateurs, educators, students or members of the public anywhere in the world. There is an active call on the OAD website for volunteers to register their skills, preferred target regions and interests so that the OAD can match volunteers with opportunities. There is also a call for organisations or projects to submit requests for volunteers, with the OAD facilitating the volunteer matching process. The OAD currently has over 500 volunteers who are regularly called upon to engage and support various projects and activities.

Volunteering with the OAD offers opportunities to make new friends and develop international collaborations; travel; develop new skills; learn about science for development and policy research; publish in peer-reviewed journals; be recognised for your contributions; and, most of all, use your time and energy to make a difference.



PUT YOUR HAND UP TO



Volunteer / Request a Volunteer



Propose a Project



Adopt a Project



Fund a Project



Set up a Regional Office



Partner with the OAD



Be a Mentor or a Mentee



Become an OAD Intern or Fellow

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Twitter

[@astro4dev](https://twitter.com/astro4dev)

Mailing list

<http://www.astro4dev.org/emaillists/>

This brochure was produced in July 2015. All activity photos used were submitted to the OAD by the respective project leaders.

More information on project leaders and photo credits can be found on www.astro4dev.org. Cover image credit: Our Ecosystem by ESA/NASA

"Astronomy provides an inspirational and unique gateway to technology, science and culture [...] By mobilizing large numbers of talented and creative scientists, engineers and teachers in the service of international development the plan will be a cost effective spinoff of one of the most profound adventures of our civilization — the exploration of the Universe."

George Miley

"Since its establishment, OAD performance has been outstanding, particularly given the very limited resources that have been made available to an organisation with such ambitious terms of reference. [...] Comments we have heard about the work of the OAD include: 'done exceptionally well'; 'amazing they have managed to do as much as they have'; 'Remarkable achievement.'"

OAD Review Panel: Jocelyn Bell Burnell, Ron Ekers, George Ellis

www.astro4dev.org
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science
& technology

Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA



SAAO
South African
Astronomical Observatory