



SCIENCE ENGAGEMENT
HIGHLIGHTS REPORT

2014-2015



SAASTA

South African Agency for Science
and Technology Advancement

Celebrating light

In 2015, SAASTA joined the rest of the world in celebrating the International Year of Light. The United Nations General Assembly 68th Session proclaimed this year as the International Year of Light and Light-based Technologies (IYL 2015).

The importance of light in our everyday lives is irrefutable – even more so since the exponential growth of light-based technologies and the impact of these on sustainable development and providing solutions to challenges in many sectors, including energy, education, industry, agriculture and health. The science of light has revolutionised the way we communicate, how we treat our sick, how we defend our nations – in fact, the cross-cutting qualities and solutions offered by light and light-based technologies are leaving lasting impressions on every aspect of life, from nature to arts and culture.

In a sense, SAASTA's role is to light the way for closer science and society engagement. This report demonstrates exactly that and it is fitting, in the spirit of continuous science communication, to intersperse the agency's achievements with moments of celebrating light.

The highlights featured in this report exclude the examples of amazing work being done by other role players in the National System of Innovation – science centres, national facilities, science councils, etc. – to effect greater science engagement. Shedding the light on science is truly a collaborative effort.

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Light box

Light travels very, very fast. The speed of light in a vacuum (an area empty of matter) is around 300 000 kilometres per second. Light takes 1.255 seconds to get from the Earth to the moon. But, light travels slower through different mediums such as glass, water and air. These mediums are given a refractive index to describe by how much they slow the movement of light. Glass has a refractive index of 1.5, meaning that light travels through it at around 200 000 kilometres per second. The refractive index of water is 1.3 while the refractive index of air is 1.0003, meaning that air only slightly slows down light.

The National Research Foundation and science engagement

The National Research Foundation (NRF) acknowledges the role of science engagement in the achievement of its strategic goals.

To fully realise the social, economic and environmental benefits of the significant investment in science, research and innovation, the NRF endeavours to engage the wider community more fully in science and in an understanding of the knowledge economy.

One of its business units, the South African Agency for Science and Technology Advancement (SAASTA) is tasked with facilitating the communication and advancement of science. SAASTA and the NRF's national research facilities interact closely with a network of science centres, higher education institutions, science councils, professional science associations and a host of other science-based entities at national and international levels to engage the public in science, engineering and technology.

All science promotion or awareness programmes within the NRF reside under three key strategic areas that combine to form an integrated and seamless approach. The three areas are interdependent, each enhancing the effectiveness of the other – often an educational event will also enhance science awareness or a science communication intervention in the media will add to readers' education:



Through **EDUCATION** we build up the supply of tomorrow's scientists and innovators.



Through **COMMUNICATION** we celebrate South African achievements in science and technology and build the public's appreciation of the benefits of science.



By growing the **AWARENESS** of science through exploration, exhibitions and actual experience, we instil in people an enthusiasm about the wonder and application of the subject, while encouraging greater public engagement.



A kaleidoscope is a cylinder with mirrors containing loose, colourful objects such as beads or pieces of glass, and mirrors that reflect off the objects as the cylinder is rotated to create a multi-coloured symmetrical pattern. Graphic designers, artists and quilt makers often use kaleidoscopes as sources for new design inspirations. Psychologists have used kaleidoscopes as therapeutic tools to revive patients' sense of purpose and wonder, as well as to study the relationship between human perception of symmetry and of colour (www.opticalwonders.com).

Group Executive's message



“SAASTA has the opportunity to exponentially raise its already impressive track record to a next level, impacting the way South Africans communicate about, experience and engage with science, technology and innovation.”

– Dr Beverley Damonse

The approval of the Department of Science and Technology's (DST's) Science Engagement Framework this year heralds an exciting next chapter in the existence of SAASTA. Key to this framework is developing a scientifically literate public who can critically engage on science and technology (S&T) issues affecting their lives.

For this to happen, a number of imperatives have been identified and while these involve the whole National System of Innovation (NSI) – including higher education institutions, science councils, science centres, science-related professional bodies, etc. – SAASTA will be strengthened in its role as the coordinator of science-society engagement across the NSI.

Though we are moving forward in key areas of science, much of the amazing innovation coming from the NSI remains the knowledge of relatively few. This must change if we are to support a scientifically literate public who not only has the wherewithal to participate in scientific discussions but who are also excited by the good-news S&T stories. And, it is only by working together to compile and tell the science story of South Africa and the broader African continent that we will succeed.

A welcome clarification in the framework concerns the use of the term 'science engagement'. The framework recognises that this term is used

interchangeably with others but that each of these are limited in some way and does not illustrate the vast scope of this discipline. Science engagement is taken to include science promotion, awareness, two-way communication and public understanding of S&T.

Upping the ante

The framework also addresses the shortcomings in the science engagement system and acknowledges that coordination of initiatives has been generally ad hoc with SAASTA playing a “related role without a formal mandate and with inadequate financial and human resources” for its mammoth task. In addition, science engagement does not form an explicit part of the National Research Foundation's (NRF) mandate, requiring amendments to be made to the NRF Act (No. 23 of 1998). Another vehicle to move the system forward is the research chair for science communication, established as part of DST's unfolding science engagement programme under the DST-NRF South African Research Chairs Initiative.

Of course, while we celebrate the progress made by SAASTA and other NSI role players in promoting science engagement, we are deeply aware that SAASTA will have to re-invent itself as the framework – and associated implementation plan – gains traction. Its new strategy calls for critical dialogue and the establishment of relevant

and accessible S&T platforms facilitating such; reaching broader audiences; and supporting researchers as they are also increasingly called on to take responsibility for the science-society engagement vision.

Inroads have been made in using radio and community media outlets, but more innovative ways of engaging are necessary. We have to connect to big global projects. SAASTA is already doing this to some degree – initiatives such as FameLab, the Bloodhound SSC and projects in collaboration with the United Nations Educational, Scientific and Cultural Organization are a good foundation from which to extend our global conversation.

Apart from joining global initiatives, SAASTA must also continue to develop and host initiatives advancing science engagement on a global level where all the different science engagement role players are brought together to share resources and knowledge, transitioning from a silo approach to thinking broader and with impact in mind.

Telling the right story

The support for science-society engagement has never been so pronounced. We have to move towards illustrating the impact of science and the funding that makes the science possible. For this, we have to understand the whole evaluation framework. This is critically important but still difficult in science engagement.

The Science Engagement Framework places special emphasis on the need for improved monitoring and evaluation.

If the story of impact is to be told intentionally, one of the many questions we still have to debate is where in the process of science do we bring the research, researcher and public community into a critical and meaningful conversation.

SAASTA will have to approach its mandate with this big picture – including evaluation – in mind as opposed to following a transactional methodology. It is not so much about doing one project after another anymore, but about engagement and longer-term dialogue with a public that is enabled to participate in the science story.

Rising to the challenge

2016 is a critical year for SAASTA and will be characterised by the start of a process to effect a culture change. Changing a communication culture is a great challenge but there is an increasing number of passionate researchers willing to engage; they want to take this forward and we must be able to support them.

SAASTA now has the opportunity to exponentially raise its already impressive track record to a next level, impacting the way South Africans communicate about, experience and engage with science, technology and innovation.

I wish to thank SAASTA Managing Director Dr Jabu Nukeri and his team for their commitment and hard work during 2014-2015.

Dr Beverley Damonse

Group Executive: Science Engagement and Corporate Relations of the National Research Foundation

The DST's Science Engagement Framework has four strategic aims, all of which impact SAASTA's mandate:

1. To popularise science, engineering, technology and innovation as attractive, relevant and accessible in order to enhance scientific literacy and awaken interest in relevant careers.
2. To develop a critical public that actively engages and participates in the national discourse of science and technology to the benefit of society.
3. To promote science communication that will enhance science engagement in South Africa.
4. To profile South African science and science achievements domestically and internationally, demonstrating their contribution to national development and global science, thereby enhancing its public standing.

Managing Director's message



“SAASTA has come of age and through its role as coordinator of science engagement in the country it affirms itself as a critical, strategic body in the South African science system. The approval by the Minister of Science and Technology and the appointment of SAASTA as national coordinator is a game-changer.”

– Dr Jabu Nukeri

Although a number of countries have been involved in science engagement for a while, it is still a relatively new field in most countries. However, based on a number of interactions we've had with some of our international partners, we realise that as a country we are doing well. While we are ahead of some developed countries in a number of aspects, they are ahead of us in others. We can all learn from each other.

Some of these partnerships are formal and others occur on an *ad hoc* basis. One of the formal agreements is the long-term science and technology exchange and cooperation agreement between SAASTA and the Beijing Association for Science and Technology (BAST). We go there twice a year, but the highlight is always the September visit to the Beijing Science Festival when we join people and organisations from around the world to exchange ideas.

During our fourth visit to the festival in 2014, we showcased the Southern Hemisphere skies using constellation puzzles, and conducted science shows. The SAASTA-led South African delegation has over the years included delegates from science centres and councils, and from National Research Foundation (NRF) facilities.

Internationally, SAASTA has found that it is unique in that its science engagement activities span the fields of science communication, science

awareness and science education – whereas other bodies in different parts of the world tend to focus on one or maybe two of these fields only. By embracing all three fields, we believe we help develop a critical public that actively engages and participates in the discourse of science for the benefit of society.

SAASTA also represents South Africa in a groundbreaking, global science engagement project involving Europe, China, Russia and Africa. The 24 partners from across the world jointly requested funding from the European Union (EU). South Africa was the first African country to sign the memorandum of understanding when this project was initiated. The aim of the consortium is to develop, support and implement inclusive and sustainable approaches to Responsible Research and Innovation or RRI. During the year we moved closer towards finalising this agreement.

Locally, SAASTA has been involved in drawing up a strategic plan to integrate science engagement more consistently across NRF-funded projects. As part of the plan, emerging researchers are invited to attend SAASTA's various science communication development workshops, critical thinkers' forums and round tables.

In January 2015, the Minister of Science and Technology approved the *National Science Engagement Framework* with four distinct strategic

goals. The framework spans 2015 to 2030. All Department of Science and Technology (DST) entities are now required to be involved in science engagement. An enabling regulatory framework is being facilitated through the revision of the NRF Act to formally incorporate science promotion and engagement as a mandate of SAASTA.

Now that we've been given this responsibility, we need to prepare ourselves to drive this endeavour. We are formalising funding and reporting related to these activities. We are looking at our funding model, the human capacity and skills we will need to play the role of national coordinating body and our infrastructure requirements. We are also investigating grant-making systems. We will have to collate and analyse all the science engagement information provided by all the DST entities and report on how the system is performing and we will have to do impact analyses.

Beyond that we will be required to engage with other players in the science system – higher education institutions, other government departments and professional associations are all our stakeholders.

SAASTA has come of age and through its role as coordinator of science engagement in the country it has affirmed itself as a critical strategic body in the South African science system.

In March 2015, the NRF wrapped up its *Vision 2015* document and we now move on to the *Vision 2020* document that looks intensively at science engagement. That is where our future focus will be.

Smashing the one million mark

Between April 2014 and March 2015 our programmes and activities reached over a million participants. We are extremely proud of this achievement. If you include the numbers from our facilities, part of programme two, you are looking at between 1.6 and two million people reached – and this despite our limited resources!

Casting light on the benefits of S&T in national development

Another milestone was the celebration of the 50th National Science Olympiad in 2014. By looking back over the past 50 years, we realised that the winners of the 2014 Olympiad will be walking in the footsteps of the giants who have participated in the past and have reached the pinnacle of their professions.

At the July 2014 awards ceremony we not only celebrated the winners but also launched a book looking at SAASTA's role in identifying and nurturing talent through programmes such as the Olympiad and profiling exceptional people who participated in the Olympiad. These included Prof. Nithaya Chetty, the NRF Group Executive for Astronomy, Mteto Nyati, MD of Microsoft South Africa, award-winning poet Imraan Coovadia, many other inspiring people as well as the next generation of innovators.

This is the impact our Olympiads have. The young people were there on the night to meet these inspiring leaders who have risen to top positions in the country.

New ways of getting the science message across

We are slowly starting to work with the media to take science to the people using different platforms – broadcast, print and social media. Our reach has been far better than previous years, and analysis shows that we're also getting a nice spread by province and by language. English has dominated, but that is something we are trying to address.

We are exploring social media because that is where the youth are active. If one shares something on social media it can spread like a bushfire, so it is a very quick, powerful and cost-effective platform.

SAASTA is increasingly becoming involved in new ways to get the science message across. One of these is to raise awareness among community media – a platform that is very important to me. In 2014 we made a commitment to communicate science in all eleven official languages and look at issues that are critical to local communities. We teamed up with the Media Development and Diversity Agency (MDDA), which coordinates community media development nationally.

We've started with a pilot in Limpopo Province where we've identified three community radio stations and three community papers – with a good spread of location and language – to disseminate information to the public on new technologies such as biotechnology and nanotechnology. The organisations are very willing despite limits to human capacity and skills. We provide them with science and technology content, we secure slots and we collaborate with them to identify topics relevant to their communities.

The pilot was so successful that in December 2014, SAASTA signed a memorandum of understanding (MoU) with Radio Turf, Giyani Community Radio, Phalaborwa FM, Nthavela News, Seipone News and Ngoho News in Polokwane to formalise the relationship. In terms of the MoU, SAASTA will provide training on science engagement to community media staff and will engage with them to get a better understanding of their information needs, environment and challenges. In the process we have trained some 50 staff members on the basics of science communication.

The pilot project is being evaluated by SAASTA's newly formed Monitoring and Evaluation (M&E) unit.

SAASTA profiles not only itself and the NRF, but also other organisations that are doing good work. We have exposed over 10 000 people to career guidance and opportunities in science, engineering and technology. We introduce them to role models and provide them with resources.

Research chairs in science communication

During the year under review, we saw the establishment of research chairs in science communication at Stellenbosch University (SU) and at Rhodes University. This is definitely good news because these chairs will go a long way in assisting us to develop capacity in the science engagement arena, especially in science communication. We do not have enough science communicators in the country and these chairs will help produce a pool of accredited people to play that role. The

programmes are being spearheaded by Prof. Peter Weingart at SU and Prof. Janice Limson at Rhodes, so they are in very capable hands and will add value going forward. SAASTA will work very closely with them.

Other highlights

SAASTA continues its involvement with the exciting Bloodhound supersonic car (SSC) that will attempt to break the current land speed record of 1,228 km an hour at Hakskeen Pan in the Northern Cape during 2016. The event presents a special opportunity to engage and inspire South Africa's youth about the potential and excitement of cutting-edge science and engineering.

The DST recognised the need to support the engagement with the media and the educational and outreach activities of the science and engineering associated with the project, and commissioned SAASTA to become involved in these aspects. The Bloodhound education team is involved in an ongoing project of visiting schools, focusing particularly on the Northern Cape, to inspire learners and educators to use the project's free educational resources to make science, maths and engineering come alive in the classroom.

Another ongoing project is the science centre accreditation process. DST has assigned us the responsibility of ensuring that the country's existing, and emerging, science centres are accredited and where necessary further developed. SAASTA's new M&E unit will study the impact of this process.

So, in summary, science communication is no longer a one-way flow. It is a dialogue. As a country, we are moving away from the deficit model and towards science engagement, a two-way exchange where scientists and the community meet and listen to each other, debate, share information and engage. SAASTA will be consistently at the forefront of this effort, in partnership with people and organisations, both locally and internationally.

Dr Jabu Nukeri,

Managing Director, SAASTA



**SCIENCE
EDUCATION**

SCIENCE EDUCATION

SAASTA helps to build the supply of tomorrow's scientists and innovators. South Africa is rapidly reaching the forefront of science and technology advancement in Africa and internationally, and has the potential to become a rich source of up-coming scientists, engineers and innovators.

Activities within this strategic area include school science support, such as educator and learner programmes; science enrichment projects; competitions; promotion of science, engineering and technology (SET) careers; science resources, including those supporting the school science curriculum; enrichment materials; web-based materials; and online learning.



Light box

The Sun is our oldest energy source – some 4.5 billion years old! Apart from helping us to see clearly in daytime, the Sun causes weather patterns and allows plants to manufacture oxygen and our food from carbon dioxide and water. The use of sunlight in photosynthesis, to make oxygen and carbohydrates from carbon dioxide and water, is a process first established over two billion years ago by cyanobacteria. They made the large quantities of oxygen in the atmosphere which allowed oxygen-breathing life to evolve. Today plants use chlorophyll to achieve the same result.



X-rays stream off the sun in this image showing observations by NASA's Nuclear Spectroscopic Telescope Array, or NuSTAR, overlaid on a picture taken by NASA's Solar Dynamics Observatory.

Science education through competitions

Celebrating 50 years of the National Science Olympiad

SAASTA celebrated 50 years of the National Science Olympiad in 2014. Southern Africa's top young science performers in 2014 were honoured at an award ceremony in Gauteng on 10 July, where they were inspired by some of the past winners to excel in their chosen professions one day.

"It's remarkable to note that this is the 50th year of the Olympiad. It's remarkable enough on its own, but the Olympiad is much more than a science and biology exam competition. It's the jewel in the crown of our Youth into Science strategy, which is all about identifying and nurturing talent. The Olympiad also identifies talent. It identifies talent that teachers have nurtured in schools across the length and breadth of the country," said the Minister of Science and Technology, Mrs Naledi Pandor, in her keynote address at the event.

Of the 30 000 learners writing either the Physical Sciences or Life Science paper, the 100 best performing learners were invited to attend the Science Focus Week in Pretoria where they were entertained and exposed to careers in science and technology. They were treated to lectures, excursions and industry visits to, among others, a Harmony Gold mine, the National Zoological Gardens, Necsa, Denel, the Agricultural Research Council, the Johannesburg Observatory and Nissan.

The four top achievers in grade 12 in 2014 were taken on an all-expenses-paid trip to attend the London International Youth Science Forum in July 2014, and two top achievers in grade 11 attended the Australian National Youth Science Forum in January 2015. Past participants all agree these trips provided the opportunity of a lifetime.

SAASTA also launched a book to celebrate this project's 50th anniversary. This book takes a look at SAASTA's role in identifying and nurturing talent

through programmes such as the National Science Olympiad and profiles exceptional people who participated in the Olympiad, such as Prof. Nithaya Chetty, the NRF Group Executive for Astronomy; Mteto Nyati, MD of Microsoft South Africa; award-winning poet Imraan Coovadia; and many other inspiring people as well as the next generation of innovators.

"Uncovering the names of past winners for the book provided SAASTA with a proud heritage of science leaders and innovators."

- Dr Albert van Jaarsveld, former CEO of the NRF

It also focuses on the endless possibilities that a solid school-level foundation in Science and Mathematics can offer a person in terms of career choices. It does this using the words of people who have followed a variety of paths, but all of whom share a passion for science, and all of whom have participated in the National Science Olympiad over the years.



• Top achievers in the National Science Olympiad, Thomas Orton of Bishops High School in Cape Town, Ishaq Lakhi of Raisethorpe Secondary School in KwaZulu-Natal and Rebecca Rogers of Reddam House Atlantic Seaboard in Cape Town attended the 2015 London International Youth Science Forum.

Olympiad stars attend Australian National Youth Science Forum

Three learners who perform exceptionally well in SAASTA's National Science Olympiad are selected each year to attend the Australian National Youth Science Forum (NYSF) with assistance provided by SAASTA. In 2014, Luthundo Mdadane, Thomas Orton and Keitumetse Mokoena were chosen to attend this prestigious event, and in 2015 Hamandishe Mathivha and Danielle Vellema enjoyed that honour.

One of the most important elements of the forum is the half-day visits to research and industry facilities. Learners embark on a range of visits depending on their stated areas of scientific interest. The range covers physics, maths and computing, chemistry, biomedicine, animal and plant biology, earth and environmental sciences, and engineering.

The aim is to inform, inspire and challenge learners to consider what working in different fields is really like. They have a unique opportunity to talk to dozens of practising scientists and engineers at and about their work.

About 200 learners attended the forum, with the majority coming from Australia and a number of international learners from countries such as Fiji, New Zealand, Germany, Canada and others.

"Talking to different scientists from various fields was a big highlight for me. It's an experience you don't get to have every day. It was really cool to hear about the diverse career opportunities in science."

– Hamandishe Mathivha



◀ Hamandishe Mathivha (left), Rochelle Dowding from Zimbabwe (second from left), SAASTA's Zinzi Madioppe (second from right) and Danielle Vellema on the Wollongong/ Kiama Coastal Walk in Sydney, where they saw the world's largest blowhole spouting water more than 20 metres into the air.



◀ The learners admire the dome at the Australian National University.



◀ The group of learners outside the Research School of Chemistry Lab, where they attended a career guidance presentation hosted by the Australian National University.

Learning more about the world in the Natural Science Olympiad

2014 marked the fourth annual Natural Science Olympiad, which encourages learners from Grade 4 to 9 in all provinces to gain an understanding of how the world and universe work by covering five major fields of study: Chemistry, Astronomy, Earth Science, Physics and Biology. The annual written examination comprised questions set by field experts in Natural Sciences.

The Olympiad aims to increase the number of learners who opt for Physical Science, Life Science, Accounting and Mathematics at high schools; and to act as a feeder for SAASTA's National Science Olympiad for grades 10 to 12.

Once the examination has been concluded, the top learners and schools are identified and awarded prizes including laptops, iPods, book vouchers and digital cameras.

The prize-giving event took place in October 2014 and coincided with the finals of the 2014 AstroQuiz. SAASTA invited the top performing learners and representatives of the top performing schools in the Olympiad, together with the AstroQuiz finalists, to take part in an all-expenses-paid trip to Pretoria for the awards event. The learners also visited the National Zoological Gardens and Sci-Enza Science Centre at the University of Pretoria.

Preparation for the Natural Science Olympiad starts at the beginning of the year, when schools register for the competition and learners start preparing for the examination. The national paper is usually written in May.

Although the prizes are significant, most of the past participants have noted that it was participation in the Natural Science Olympiad that was most important to them as it exposed them to fascinating new knowledge.



• A. Rukanda of Forest Hill Primary School in Gauteng, one of the top performing learners in Grades 4 and 5, receives her prize from Moloko Matlala, Manager of SAASTA's Science Education unit (left) and Dr Jabu Nukeri, Managing Director of SAASTA.



• A. Sibi of King Edward High in the Eastern Cape, national winner in the category for Grades 7 to 9, receives one of her prizes from Bersan Lesch of the Science and Youth Unit at the Department of Science and Technology.



◆ *Gift of the gab – the team from Queen's College Boys' High took top honours in the 2014 SAASTA National Schools Debates competition. From the left: Louise Featherstone (educator), Lawrence Lwanga, Emilio Smith, Qhawe Bula, SAASTA's Dr Jabu Nukeri, Ndayeni Manzi and Aphenkulwe Ngqola.*



◆ *The first runner up was St Michael's School for Girls. From the left: Nthabiseng Nkeane, Mathilda Milisan Marais (educator), Angeline Wong, Nokuzola Taliwe, Dr Jabu Nukeri, Neo Kabi and Tshегоfatso Mafata.*

National Schools Debates verbal about science

The provincial finals for the 2014 SAASTA National Schools Debates competition were held on 4 December at the 3M Innovation Centre in Woodmead, Johannesburg.

The following schools represented their provinces at the finals: Queen's College Boys' High, Eastern Cape; St Michael's School for Girls, Free State; Crawford College Pretoria, Gauteng; Durban Girls' High, KwaZulu-Natal; Thengwe High School, Limpopo; Suikerland Secondary School, Mpumalanga; Kimberley Boys' High School, Northern Cape; and Settlers High School in the Western Cape.

The learners were asked to research and debate the following question: "In facing our current and future health challenges, do you think we should be investing in the discovery of new drugs and medicines, supported by fields such as biotechnology and crystallography?" This topic was particularly relevant given the outbreak of the Ebola virus in our continent.

The main objective of the SAASTA National Schools Debates competition is to stimulate interest among learners (Grades 9 to 11) to study towards careers in SET through researching and debating high-level topics. In addition, the competition aims to advance public awareness, appreciation and engagement of SET in South Africa.

The competition also introduces learners to broader scientific topics and encourages them to consider how science relates to everyday life.

Queen's College Boys' High (Eastern Cape) came out tops as the 2014 winners and was awarded the ultimate prize of a trip to New York, which includes an exciting programme of scientific exploration. The first runner up was St Michael's School for Girls (Free State) and the second runner up was Crawford College Pretoria (Gauteng), who all received prizes of Apple iPods.

Adding social media

For the first time, social media was incorporated into the competition. This added extra appeal and relevance to the experience of its teenage participants.

SAASTA collaborates with Beijing Association of Science and Technology

Participating in the Beijing Youth Science Creation Competition

A science project that won the 2013 Department of Energy Learner Focus Week competition, gave two learners from Matatiele in the Eastern Cape the opportunity to present their findings at the 34th Beijing Youth Science Creation Competition in 2014.

The Learner Focus Week competition, adjudicated by SAASTA, aims to encourage students in rural areas who are studying science and maths to enter careers in these fields. Participants are tasked with finding solutions to the energy problems in their communities.

Grade 11 learner Refuoe Faltein and grade 12 learner Peter Theron's project demonstrates the generation of alternative energy through harnessing charges in the atmosphere to create a power station.

Participation in the Beijing Youth Science Creation Competition in March formed part of the learners' reward for winning the Learner Focus Week competition. Organised by the Beijing Association for Science and Technology, the annual competition has become a platform to demonstrate science and technology practices and innovations ranging from robots to environmental pollution research from elementary and middle school students in Beijing.

Around 300 000 learners from around the world participated in the 2014 preliminary contest. Some 1 885 projects were submitted. Learners and educators from 12 countries and regions participated in the event.

Faltein (a learner at Mosabisi High School) and Theron (a learner at Focused High School) were accompanied to Beijing by the Mosabisi High School Physical Sciences educator Nontembiso Ramabele, SAASTA Nanotechnology Public Engagement Programme Coordinator Mthuthuzeli Zamxaka, and Lulama Ntshaba of the Eastern Cape Department of Basic Education (DBE).

Theron and Faltein's project, the only entry from Africa, won a silver medal. The two bright sparks say the lack of electricity and the high incidence of lightning in their region prompted them to look for a way to harness it. They haven't solved the fundamental problem of lightning strikes being positively or negatively charged yet, says Faltein, but they are working on it.

A few months later, in March 2015, a team of two South African girl learners unveiled their award-winning research project at the 35th Beijing Youth Science Creation Competition.

Yenziwe Mbuyisa and Nokwanda Mbonane, learners from Ladysmith High School, shared with the audience their research to determine which fertiliser is best for plant growth and soil health. They argued that the use of chemical fertilisers is detrimental to plants and that the use of natural fertilisers is far more beneficial for vegetative



▲ ***Daniel Motsapi from the ArcelorMittal Science Centre used substances that can be found in any household in his science shows.***



▲ ***SAASTA's Hubert Mathebula flanked by two of the interpreters allocated to the South African delegation.***



▲ *Peter Theron (left) and Refuoe Faltein (centre) explain their project to fellow exhibitors.*



▲ *From the left: Dr Jabu Nukeri, Managing Director of SAASTA, Yenziwe Mbuyisa, Nokwanda Mbonane (learners who showed off their winning creation at the 35th Beijing Youth Science Creation Competition) and James Tlhabane, SAASTA Project Coordinator.*

production. They proved that chemical fertilisers change the structure and smell of soil.

The main sponsors – SAASTA in collaboration with the Beijing Association of Science and Technology – are optimistic that these educational trips have not only inspired the learners participating in the competition, but have also built bridges to a broader international science and technology platform.

At the Beijing Science Festival

For the fourth consecutive year, a delegation from South Africa joined a wide range of exhibitors such as science centres, universities, outreach organisations and private institutions from countries across the globe to participate in the Beijing Science Festival in September 2014.

This time, SAASTA showcased the Southern Hemisphere skies using constellation puzzles, and conducted science shows using easily obtainable household materials.

Dr Anton Binneman from SAASTA led the South African delegation and was involved in the conference that is organised to coincide with the festival and various round table discussions. Daniel Motsapi from the ArcelorMittal Science Centre was responsible for the science shows, while Hubert Mathebula from SAASTA manned the exhibits.

Daniel used substances that can be found in any household, such as vinegar, cooking soda, drinking straws, candles and other easily available

substances in his science shows. The biggest attractions were the vuvuzela and an air pipe that is swirled around to produce different musical notes depending on the speed.

The festival's main aim is to attract young learners and pre-school children between three and 12 years of age. School groups visited the exhibitions during weekdays.

One three-year-old visited the South African stand with his dad. He did not want his father to assist him to complete the constellation puzzles and managed to complete them on his own in record time. He was awarded a SAASTA/South Africa key ring for his impressive effort.

Foreign participants in the festival included science festivals from Germany and Russia; a Maths outreach programme from Arizona, USA; a science museum from Boston; an agency for science advancement from Argentina; and a public outreach institution from France.

The representatives from SAASTA gave a presentation on the digitalisation of science advancement and communication in the South African context, which is showing good progress, but still lags behind that of most Western countries. The round table discussion profiled SAASTA's different units and how these function in science advancement. During both sessions it was clear that SAASTA can compete with the best in the world when it comes to science communication and advancement.

AstroQuiz a boon for astronomy education

AstroQuiz is a competition aimed at grade 7 learners. It is based on themes around astronomy. In October 2005, the Sci-Bono Discovery Centre received a grant from SAASTA to plan, implement and manage an astronomy quiz for Gauteng primary schools as part of the national Astronomy Platform Month. Based on the success of the Sci-Bono project, SAASTA expanded the project into a competition, now implemented in all provinces.

Western Cape

Of the 38 schools taking part in the Western Cape third and fourth rounds, only 16 schools went through to the final fourth round which would determine who was to be the winner. Outeniqua Junior won by correctly answering 28 of the 30 questions they were tested on. The team spent a night at the on-site guesthouse of the South African Astronomical Observatory (SAAO) to be on time for the competition the following day. When asked to share their recipe for the win, they said, "The walls of the observatory permeate astronomy information; so much so that in our sleep our brains must have been soaking it all up. The win was therefore inevitable."



▶ Even though *Supernova*, the all-girl team from Outeniqua Junior was one person short, they triumphed in the Western Cape AstroQuiz finals.

Northern Cape

Sutherland organised the final round by inviting the two top achieving schools from all the districts in the province, and ended up with a total of six schools participating in the final round.

Sutherland hosted six schools for the finals of the AstroQuiz in the Northern Cape. Loeriesfontein Primary School's team of two boys and two girls won by 28 points.

The first two rounds at both Sutherland and Cape Town were taken online on the AstroQuiz website hosted by SAAO. Educators register their schools and the team of four learners chosen to participate in the quiz. The website also serves as a communication tool for disseminating information about the quiz. Before each school's team could take the formal quiz, the organisers allowed them to take a trial quiz, which helped iron out glitches and issues that could have impacted negatively on the smooth progress on the day of the actual quiz.



▶ Loeriesfontein Primary School's team of two boys and two girls won by a large margin in the Northern Cape AstroQuiz finals.

SA learners showcase their projects in India

In August 2014, sixteen learners from two schools in KwaZulu-Natal represented South Africa at a worldwide learners' conference in New Delhi, India, after successfully developing research projects aimed at saving the environment.

The conference, the GLOBE Learning Expedition, is held every few years to allow learners from around the world to showcase their research efforts and meet scientists and young people with similar interests. More than 300 members of the GLOBE community from 28 countries took part in the 2014 GLOBE Learning Expedition. The theme was GLOBE for Sustainable Communities, with a focus on water.

The GLOBE programme in South Africa is one of the activities under the Department of Science and Technology's Youth into Science Strategy, which aims to promote science literacy among the youth, and nurture young people's talent for science, engineering and technology-related careers.

“Scientists commented on the level of intelligence displayed by our learners throughout their participation and in their questions and their interaction.”

– Nomathemba Mdlalose, SAASTA

The South African learners presented their research findings to their peers as well as to GLOBE scientists at the event. They were accompanied by Nomathemba Mdlalose and Thandi Esbie of SAASTA and Mokgadi Madiga of the Department of Science and Technology.

Locally relevant

The learners started their investigation with the collection of simple daily measurements in their chosen field of study under one of the GLOBE themes. They learnt to analyse the data, make conclusions and share this information by uploading it onto the international database for use by learners and scientists around the world. They progressed to a stage where they successfully conceptualised their own research projects relevant to their locality within GLOBE's hydrology, soil, atmosphere and land cover themes.

Empangeni High School presented their research findings on the effects of industrial waste on the fresh water in the communities around Lake eNsaleni in the uMhlatuze Local Municipality. Vryheid Landbou (Agriculture) shared their findings on the impact of 'worm tea' on plant growth, whether compost heat could be harvested for warming purposes, and using grey water for irrigation as an alternative to the borehole water on their school premises.

The compost heat research project was prompted by the learners' curiosity when they recycled food scraps to minimise unpleasant odours. In the process, they observed that the compost heat was higher than the room temperature and they wondered if the heat could be harvested.



◆ The learners present their research findings to their peers and GLOBE scientists.



◆ Diana Mngomezulu (right) from Vryheid Landbou explains how heat can be extracted from compost.

Science education through skills development

Training the trainers of our future bio- and nanotechnologists

Cutting-edge technologies like biotechnology and nanotechnology do have a place in the school curriculum, but educators often find it difficult to convey the knowledge of these fascinating, fast-changing fields to their learners.

Realising this, the Department of Science and Technology's Public Understanding of Biotechnology (PUB) programme, managed by SAASTA, initiated educator training sessions on biotechnology in 2009 with the Nanotechnology Public Engagement Programme (NPEP) following a few years later.

Educator workshops and manuals

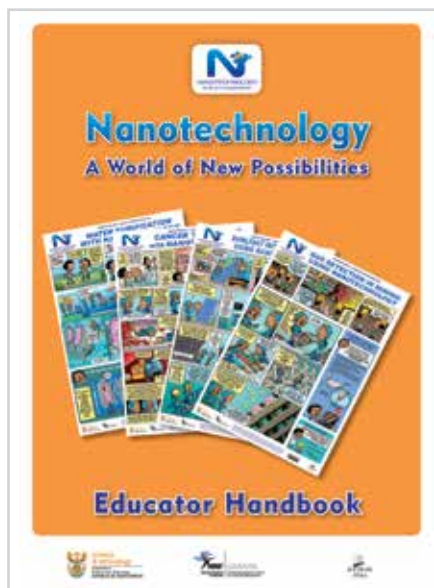
In terms of nanotechnology, SAASTA has developed an educator and a learner manual as well as four posters, with the assistance of Jive Media Africa, to be used to introduce nanotechnology at both primary and secondary schools. They moreover developed more educator and learner manuals for grades 10 to 12.

SAASTA also held a nanotechnology educator workshop at Meiringspark Primary School in Klerksdorp in September 2014, facilitated by Professor Sabelo Mhlanga of the University of Johannesburg. The workshop was organised by SAASTA with assistance from Fortunate Nchoe

from the Department of Basic Education (DBE) in North West.

Other nanotechnology resources distributed during this workshop were nanotechnology learner guides, a nanotechnology-based game (for grades 1 to 4), posters, notepads, pens and fact sheets.

SAASTA, together with DBE and its appointed facilitators, also presented educator workshops in Central Cape Town and the Cape Winelands, where educators were offered similar training in teaching and communicating the science behind nanotechnology.



SAASTA's Nanotechnology Educator Handbook gives educators access to extensive information on nanotechnology with material linked to the curriculum.



Light box

A laser is an optical amplifier - a device that strengthens light waves. Some lasers have a well-directed, very bright beam with a very specific colour; others emphasise different properties, such as extremely short pulses. The key feature is that the amplification makes light that is very well defined and reproducible, unlike ordinary light sources such as the sun or a lamp.

In the fifty years since its discovery, the laser has become an indispensable tool in our daily lives. The laser's many uses stem from its unique properties; for example, the ability to achieve high power while being focused to a pinpoint makes the laser ideal as a precision scalpel in medicine or as a means to slice through thick plates of steel. Other industries reliant on lasers include telecommunications, medical diagnostics, manufacturing, environmental sensing, basic scientific research, space exploration and entertainment. (Source: www.light2015.org)





🔹 *Mthuthuzeli Zamxaka, coordinator of SAASTA's Nanotechnology Public Engagement Programme - NPEP (left) and facilitator M.J. Schwarts (back row, right) with the workshop participants.*



🔹 *M.J. Schwarts explains what nanotechnology is all about.*



🔹 *The science of the very small leaves the audience spellbound.*

Spotlight on the science of the very small

SAASTA, in collaboration with the Unizulu Science Centre, hosted a two-day workshop at the University of Zululand in Richards Bay, KwaZulu-Natal.

The purpose of the workshop was to train science centre practitioners to conduct nanotechnology workshops developed by the Unizulu Science Centre as part of the NPEP grant aimed at encouraging participation and sharing between science centres to promote understanding of nanotechnology.

Positive feedback

"The workshop was a great success, and greatly appreciated by all the participants," said SAASTA's Mthuthuzeli Zamxaka, who attended the workshop. Zamxaka is the coordinator of both NPEP and the Hydrogen South Africa Public Awareness and Demonstration Platform.

Two delegates each from the Unizulu, Cape Town, KwaZulu-Natal, and University of Limpopo Science Centres and the National Museum Bloemfontein (all NPEP grant holders), as well as ArcelorMittal Newcastle Science Centre and the Isibusiso Esihle Science Discovery Centre were selected to participate in the pilot workshop.

"This workshop can benefit other science centres that are not part of the NPEP grant holders by means of the science centre capacity building programme for science centre staff," says Thandi Mtsweni from SAASTA. "I think the Introduction to Nanotechnology workshop at their centres could add even greater interest to their programmes." The science centre capacity building programme is managed by SAASTA on behalf of DST.

"I would like to thank SAASTA for allowing us this opportunity. We learned a lot and shared with one another."

– Muneerah Jacobs, workshop participant

Science education through expos

SAASTA inspires class of 2015 at career expo

SAASTA participated in the 16th annual Working World Career Expo at the Nelson Mandela Bay Stadium for the first time in March 2015. More than 11 000 Grade 12s representing more than 150 schools were targeted by this comprehensive event.

The Working World Expo is the largest career guidance initiative of its kind in South Africa and the class of 2015 grabbed the opportunity to be inspired and informed as it began to prepare applications for various study directions after school. Running over three days, participating matriculants interacted with 70 exhibiting organisations representing a diverse range of career, study and funding options.

Apart from SAASTA, exhibitors included the South African Police Services, Nelson Mandela Metropolitan University, Vodacom, Rhodes University, the South African Institute for Aquatic Biodiversity, the South African Environmental Observation Network, Old Mutual and the Engineering Council of South Africa.



🔹 *The class of 2015 grabbed the opportunity to be inspired and informed. (Picture: www.workingworldexpo.co.za)*

Science education through international projects

Developing hands-on crystallography kits for schools

Three volunteers in the NRF/SAASTA programme who are stationed at the Research and Development in Mathematics, Science and Technology Education (RADMASTE) programme of the Wits School of Education, assisted in the development and trials of four hands-on activities for learners that featured in Bloemfontein and Orange Farm (near Johannesburg) during National Science Week.

The volunteers developed the hands-on activities to create awareness and interest in crystallography in 2014, the International Year of Crystallography. Chosen for their cost-effectiveness and links to the curriculum, the activities focused on growing crystals, crystals great and small, modelling crystals and diffraction. They assembled the equipment and chemicals for the four activities into a crystallography kit with a facilitator's guide and worksheets, which was used at science centres around the country.



🔹 *The challenge of selecting a seed crystal. Image: RADMASTE*

SAASTA takes on the Bloodhound project to inspire SA's youth

The Bloodhound SSC (Supersonic Car) is a jet-and-rocket-powered car that will attempt to break the current land speed record of 1 228 km/h by approximately 30%, to just over 1 600 km/h, at Hakskeen Pan in the Northern Cape in 2016.

The car, built in the UK, arrived in South Africa in 2014 for a series of test runs at speeds of up to 1 300 km/h.

Breaking the world land speed record is not the main goal of the Bloodhound SSC project. The key objective is inspiring the next generation of scientists and engineers by sharing the excitement of this engineering adventure and engaging educators and families. This fits in with the DST's Youth into Science strategy to build a pipeline of engineers, researchers and scientists. In this regard, the project is sharing the research, data, design, manufacturing and testing of the car with as many educators, learners and students as possible around the world, but with a focus on South Africa and the UK.

The DST recognised the need to support the engagement with the media and the educational and outreach activities of the science and engineering associated with the project, and commissioned SAASTA to become involved in these aspects of Bloodhound SSC.

About the Bloodhound SSC

The Bloodhound SSC is the result of remarkable engineering that will allow this ultimate racing car to travel 1,6 kilometres in just 3,6 seconds. The car weighs in at just over seven tonnes and is nearly 14 metres long. Its engine produces more than 135 000 horsepower (more than 100 000kW). That is more or less the same horsepower as 160 Formula 1 cars.



▶ *The Bloodhound SSC, a jet-and-rocket-powered car, will attempt to break the current land speed record at Hakskeen Pan in the Northern Cape in 2016.*

▶ *Bloodhound SSC is the result of remarkable engineering that will allow this ultimate racing car to travel 1,6 kilometres in just 3,6 seconds.*



▶ *Bloodhound's engine produces more or less the same horsepower as 160 Formula 1 cars.*



As soon as the Bloodhound SSC project was launched, the search for a suitable run site (or race track) began. After two years of studying satellite images and visiting sites around the world, the perfect run site was identified: Hakskeen Pan in the Northern Cape. Supported by the Northern Cape Provincial Government, the local community has completed the enormous task of preparing the track. About 300 members of the Mier community cleared 6 000 tonnes of stones and rocks from the 1,1 km wide and 20 km long stretch of desert.

The project has generated global public and media interest, and presents a special opportunity to engage and inspire South Africa's youth about the potential and excitement of cutting-edge science and engineering.

For SAASTA and the NRF it presents an opportunity to add further substance to the mandate of

advancing science, and identifying and nurturing talent among South African youth.

Education boost

The Bloodhound education team in South Africa is engaged in an ongoing project of visiting schools, focusing particularly on the Northern Cape, to inspire learners and educators to use the project's free educational resources to make science, maths and engineering come alive in the classroom. To date, 532 schools in South Africa (92 in the Northern Cape) have registered as participating schools. The education team's first visit was to Hakskeen Pan and the first schools registered were Groot Mier Primary and Rietfontein High School.

The Bloodhound SSC project enabled a variety of science education materials and opportunities, from educational resource materials, including cardboard model kits, fact sheets, educational

applications for mobile devices and online games; to school workshops focusing on targeted primary and secondary schools to improve mathematics and science outcomes; and high-quality media materials, including photos, video clips on YouTube and other social media platforms, with innovative communication materials and projects based on augmented reality applications.

SAASTA, in addition to other awareness raising and educational activities, facilitated the attendance of seven journalists to an event at Hakskeen Pan in November 2014. The Bloodhound team ran a successful test of the locally developed high-speed communication technology necessary for the record attempt at Hakskeen Pan. The event also provided an opportunity to thank the Groot Mier community, the Northern Cape Provincial Government and the South African sponsors for making the attempt possible.



🔵 An L39 jet aircraft ready to fly over the Bloodhound's specially prepared desert track during the speed communications test at Hakskeen Pan.



🔵 The jet is synchronised with two Jaguars (a new all-wheel-drive Jaguar F-TYPE R coupé and a Jaguar XF), reaching speeds of up to 800 km/h.



**SCIENCE
COMMUNICATION**

SCIENCE COMMUNICATION

The essence of good science communication lies in providing credible and accurate information that is accessible to all South African communities. It strategically develops and implements new science communication initiatives in response to national

challenges and needs and in line with international trends in the field of science communication.

SAASTA's science communication efforts focus on the following areas:

- Science and the media, which includes media-scientist networking, events and the facilitation of workshops to assist media practitioners and scientists to popularise science;
- Science promotion, which includes various communication tools and resources that are used to promote science to the general public; and
- Science communication and capacity building, which includes developing the media and communication skills of researchers, enabling them to share their achievements more effectively in priority research areas.



Light box

In physics, light refers to electromagnetic radiation. The light we normally talk about in everyday life refers to the visible spectrum (the part of the electromagnetic spectrum that the human eye can see). Some animals can see parts of the spectrum that humans can't. For example, a large number of insects can see ultraviolet (UV) light. UV light can be used to show things the human eye can't see, coming in handy for forensic scientists.



Science communication through competitive platforms

SA scientists brave the spotlight at FameLabSA

The FameLab competition, fondly known as “pop idols for science”, is an exciting international competition which nurtures and promotes science and technology by creating a space for scientists and engineers to find their voices and reach and communicate with public audiences. It seeks out and nurtures science communication talent. Engagement between scientists and society is essential to grow a critically informed society and ensure that science remains relevant and responsive to societal needs.

Sixteen young scientists were selected from heats across the country, and flown to Grahamstown for a science communication master class hosted by Dr Emily Grossman, a renowned science communicator from the UK.

This training was supported by the British Council, which encourages the strengthening of links between South African and UK science. After an intense two-day master class to hone their science communication and presentation skills, the 16 finalists competed in a semi-final, from which the top ten were selected to go through to the finals.

Topics ranged from novel drug delivery systems using engineered particles so small they can enter cells to release their contents, to better understanding neural responses affecting wellbeing and happiness – the subject of the winning talk. Energy-saving window coatings, super bacteria and satellite imaging to monitor scarce water resources were all presented to the judges.

Content, clarity and charisma

Speakers were judged on the content, clarity and charisma of their talks and had just three minutes to convey their science topic. The judges included Sarah Wild, former Science Editor for the Mail and Guardian; Dr Sandile Malinga, CEO of the South African National Space Agency; and Professor Robin Grimes, Chief Science and Technology Advisor to the Foreign and Commonwealth Office in the UK.

2015 South African winner

Stevie Biffen’s talk “The Science of Happiness” won her a first place in the 2015 FameLab South Africa finals, which was held at Scifest Africa in Grahamstown on 20 March 2015. Biffen is a Master’s student in neuroscience at the University of Cape Town.

In her winning talk, she shared how instantaneous negative emotions we all experience from time to time do not have to lead to negative thoughts and a negative lifestyle. We use the frontal lobe of our brain to interpret emotions on a higher level. While happiness is important, Stevie’s own research project for her Master’s degree is looking at something of a darker reality of life for some in the Western Cape. She is studying the possible effects of prenatal alcohol exposure on various neuroanatomical structures in children from the Western Cape.

She will be taking her science and her gift of the gab to the Cheltenham Science Festival in the United Kingdom in June 2015 to compete in the international FameLab finals.

Worthy runners up were Edgar Phukubje, a microbiologist from the University of Limpopo and Natasha Botha, a mechanical engineer from the CSIR. FameLab is produced by Cheltenham Festivals (all rights reserved). The competition is run collaboratively in South Africa by Jive Media Africa, SAASTA and the British Council.



🔵 *The winner of FameLab South Africa 2015, Stevie Biffen from the University of Cape Town, spoke on the structure of the brain and how to be happy.*

Young Science Communicators' Competition identifies gifted communicators

The Young Science Communicators' Competition is just one of the competitions run by SAASTA to encourage scientists to communicate their work. This competition alternates biennially with the Southern African Science Lens competition, which awards the use of photography as a mode of communicating with and engaging audiences on science and technology.

The judges of the 2014 competition lauded the efforts of Alexander Venter, whose winning entry was titled "Food for thought: What's at steak?" An MSc student in Sustainable Agriculture at Stellenbosch University, Venter successfully communicated some sobering information about our current state of food production and its impact on the environment, through his well-structured and creative piece, with thoughtful analogies and clever play on words.

Overall, feedback from the judges on the quality of entries of this Young Science Communicators' Competition was positive. The competition aims to encourage young scientists to communicate their work through various media, and is used as a platform to identify young and talented science communicators.

The number of entries received for the competition shows that many young scientists are passionate about communicating. In line with SAASTA's purpose of developing science communication skills, the feedback from the judges for each entry is made available to encourage the young scientists to develop their skills and to take their passion for communication further.

The four categories of the 2014 competition included a newspaper or magazine article, a radio script, a viral video and a new open category to include different types of communication tools such as poetry or graffiti.

Science communication through media engagement

The Science Inside: A new resource for science communication



A weekly radio show devoted to improving the public understanding of science has been launched by the Wits Radio Academy and Voice of Wits 90.5.

The Science Inside is broadcast on VoW 90.5 at 6pm on Mondays and made available online. Each week the show goes inside the science of a theme or story in the news, such as fracking, rhino poaching, a train crash, the salvage of the Costa Concordia or the shortage of ARVs. The programme is aimed at the youth, and is being produced with support from the Department of Science and Technology (DST) and SAASTA. It intends to make scientific topics interesting and entertaining without sacrificing accuracy.

Prof. Franz Krüger, director of the Wits Radio Academy, said the new project is a very exciting one. "Radio is a great medium to extend interest in science. It's an important challenge: as we know, South Africa's science and maths education was ranked second last in the world in 2013, just ahead of Yemen, according to a World Economic Forum Report."

The show relies on interviews with top journalists, researchers and activists, and also features listeners' questions, answered by a university student in the appropriate field. A regular feature called "Two-minute Science" looks at new developments, while another, "The Science OUTside" takes the show on a trip out of the studio.

Tweeting for science

During the reporting year, SAASTA posted an impressive 2 077 tweets. Through social media outlets such as Twitter, SAASTA provides insight into what is happening in research, especially research that affects its growing follower base.



Not only is SAASTA providing bite-sized science information, but it needs to do so in a way that makes it easy for followers to share the information by retweeting what they learn. That often means identifying science and technology stories that are fascinating and entertaining.

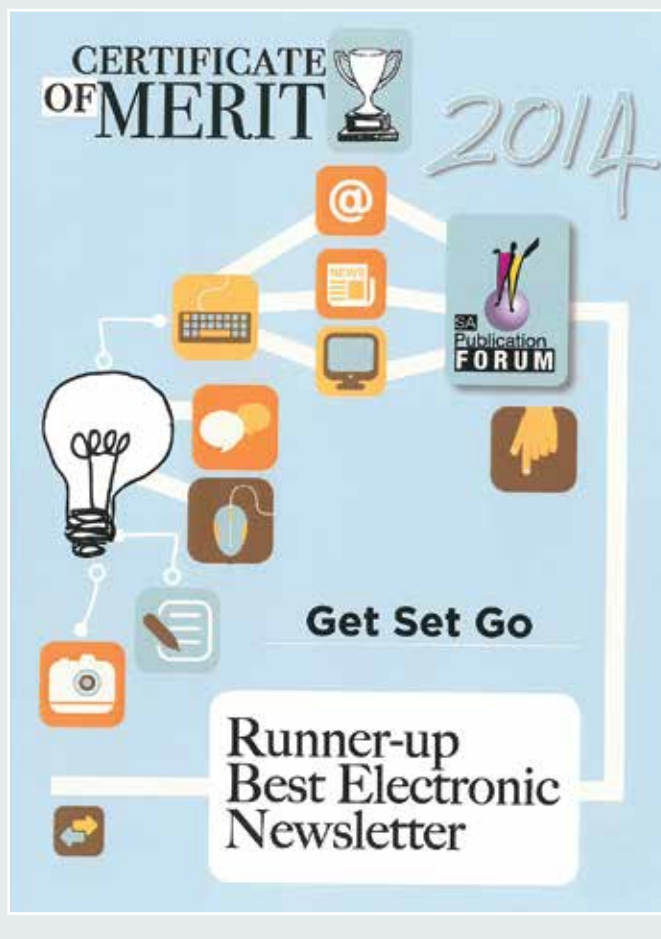
Time is spent daily to scan local and international news sites for science and technology-related stories. Choosing the stories is important – there has to be a balance across the myriad fields of science and technology, as well as in terms of the technical intensity of the stories. Once the ‘right’ information has been identified, the tweets are composed in a challenging 140 characters or less with a click-through to the actual story.

Tweets are scheduled using a social media management system that enables the tweets to be posted at key times in South Africa – around teatimes, lunch breaks and just before home time during weekdays – when there’s a general spike in social media usage. If a story profiles South African research that would interest an international audience, it is scheduled to be posted later in the day or early in the morning South African time.

SAASTA also uses other social media channels and in the past financial year had 693 posts on Facebook, followed 803 conversations about SAASTA’s work, and achieved 4 242 interactions with SAASTA’s posts. These interactions reached more than 3 100 people.

Accolade for GetSETgo

GetSETgo, SAASTA’s external electronic newsletter, was selected as runner-up in the Best Electronic Publication category of the 2014 SA Publication Forum Awards. The publication also received a Certificate of Merit for scoring more than 75% in the categories of writing, communication, design and photography.



Bright future for science journalism in SA

The Minister of Science and Technology, Mrs Naledi Pandor, has hailed a partnership to strengthen science journalism training in South Africa, saying this would greatly assist in increasing effective science communication in the country.

Addressing the South African National Editors' Forum (SANEF) Science Journalism Colloquium at the University of the Witwatersrand in September 2014, the Minister said effective science communication was vital for South Africa's development. The colloquium was attended by, among others, members of SANEF, academics involved in training journalists, and staff from the DST, the National Research Foundation and SAASTA.

The colloquium, a collaboration between the DST, SANEF and the United Nations Educational, Scientific and Cultural Organization (UNESCO), looked at increasing the teaching of science journalism at South African universities at undergraduate, postgraduate and professional development levels.

Prof. George Claassen, who runs the science journalism courses at Stellenbosch University, shared with the gathering a science journalism curriculum he developed for UNESCO and which has been incorporated into the UNESCO Model Curricula for Journalism Education. The delegates reviewed existing science journalism programmes and courses; discussed the introduction of Prof. Claassen's curriculum and its application at undergraduate, postgraduate and mid-career level, and identified opportunities where science journalism can be included in existing journalism courses.

Science literacy

As several studies have shown that many journalists lack the numerical skills to interpret statistics and data, the Minister urged that a partnership be formed between journalism schools, SAASTA, the NRF and the science councils in support of science journalism teaching and training done by the journalism schools; as well as the involvement of professional bodies like the South African Science Journalism Association.

"It should be considered giving all journalism students a measure of science literacy by exposing them to important fields of thought and selected theories of science and science communication. In this way, journalists could be empowered with the skills they require to report on statistical data, particularly in respect of the health sciences, bioethical matters and environmental science. This will also improve relations between researchers and journalists by fostering better communication between the two groups."

- Mrs Naledi Pandor, Minister of Science and Technology



◆ Minister Pandor with members of SANEF, academics involved in training journalists, and staff from the DST, NRF and SAASTA at the Science Journalism Colloquium.

Valuable media partner in Limpopo

SAASTA has always considered the media to be a very valuable partner in enabling people and science engagement. A drive was initiated to reach out to the heart of rural communities with the message that there is a better future for all South Africans through science education, communication and awareness, in the home languages of these communities.

Pilot project

A pilot project was launched with three community radio stations and three community papers in Limpopo to disseminate information to the public on new technologies such as biotechnology and nanotechnology. On 1 December 2014, SAASTA signed a memorandum of understanding (MoU) with Giyani Community Radio, Phalaborwa FM, Nthavela News, Seipone News and Ngocho News in Polokwane to formalise the relationship.

In terms of the MoU, SAASTA will provide training on science engagement to community media staff and will engage with them to get a better understanding of their information needs, environment and challenges. SAASTA will also provide science communication resources and prizes for related competitions. Members of these media will also be invited to participate in various SAASTA activities and initiatives. The media are required to provide time slots and space for engaging their audiences with science.

“This approach will enable SAASTA to communicate science to the public in their home languages,

which include English, Northern Sotho, Sepedi, Shangaan, Venda, Isiswati and Ndebele,” says Dr Jabu Nukeri, Managing Director of SAASTA.

Monitoring and evaluation

The Media Development and Diversity Agency will be an important partner in this enterprise and will follow the progress closely.

To date, interviews with biotechnologists have been hosted on Giyani FM and Phalaborwa FM in slots specially dedicated to science. Topics included genetic modification, stem cells, the role of government in growing the biotechnology sector and diagnostics for diseases of economic importance in animals. To mark the International Year of Crystallography (2014), an interview was dedicated to this topic. The stations have also hosted talks on science careers, and on how nanotechnology is used to detect diseases, helps to detect gases in mines, and how it is applied in the production of new medicines.

“This approach will enable SAASTA to communicate science to the public in their home languages, which include English, Northern Sotho, Sepedi, Shangaan, Venda, Isiswati and Ndebele.”

– Dr Jabu Nukeri,
Managing Director of SAASTA



Themelihle Sibeko of the Media Development and Diversity Agency gives the audience an introduction to the agency's work with community radio and print media.



Prenorman Tshabane of Giyani Community Radio signs the MoU with his colleague, Tiyani Chuma looking on. On the left is Dr Jabu Nukeri, Managing Director of SAASTA.

Science communication through focused programmes

PUB celebrates 10 years of communicating SA biotechnology

The Who's Who of biotechnology in South Africa gathered in Johannesburg on 25 November 2014 to celebrate the 10th anniversary of the Public Understanding of Biotechnology (PUB) programme and to recognise the contributions made by individuals, including established and upcoming researchers, in this frontier science.

The PUB programme, an initiative of the Department of Science and Technology (DST), has since 2003 played a significant role in engaging the South African public on critical issues and exciting developments in this rapidly emerging arena. More than ten years down the line, noteworthy contributions made by South Africa's own scientists in the global understanding of biotechnology were recognised at a book launch hosted by the PUB programme.

10-year celebratory book

The PUB 10-year celebratory book profiles 25 successful nominees in four categories (Biotechnology Communication, Agricultural Biotechnology, Biotechnology and Health, and Industrial and Environmental Biotechnology) who have helped to shape the South African biotechnology landscape.

The book, edited by Prof. Jennifer Thomson with profiles written by Clinton Whittstock, tells the fascinating stories of the achievements of the profiled scientists.

At the book launch Dr Jabu Nukeri, Managing Director of SAASTA, said that his organisation is proud to have been hosting the PUB programme since its inception in 2003. "The mandate of the PUB programme complements that of SAASTA and together we have been able to create far greater societal awareness about science and technology matters than we would have managed on our own," he said.



▶ Carolyn Hancock, Director of the DNA Project, receives her copy of the PUB book 'Blazing a biotechnology trail' from SAASTA's Dr Jabu Nukeri (right).

▶ Prof. Jennifer Thomson, editor of the book and lead adjudicator of the evaluation process to select the people profiled, in conversation with Dr Kingston Mashingaidze at the book launch.



▲ The PUB 10-year celebratory book profiles 25 successful nominees in four categories who have helped to shape the South African biotechnology landscape.

New Public Understanding of Biotechnology newsletter launched

SAASTA's PUB programme has started a digital, multi-media newsletter which is distributed every two months.

The new PUB newsletter is aimed at informing the public, industry, government, funding organisations, researchers and other interested or affected persons about local and international developments in biotechnology.

Readers can expect short bites of the latest published research, profiles of leading companies and researchers, information about upcoming events, and stories about the indispensable role of biotechnology in solving global challenges like the Ebola epidemic.



PUB programme participates in Water Efficient Maize for Africa workshop

The PUB programme was invited by the Agricultural Research Council to participate in the Water Efficient Maize for Africa (WEMA) stakeholder engagement session in Jozini, KwaZulu-Natal.

The purpose of the meeting was to present and discuss progress on development and deployment of conventional and genetically modified drought-tolerant hybrids in South Africa. Participants had an opportunity to visit field trials and seed production blocks of conventional maize hybrids at the Makhatini Research Station.

Royalty-free, drought-tolerant maize varieties


Maize is one of the most important grain crops in sub-Saharan Africa, where it is a staple food for more than 300 million people and a major grain feed. But maize is particularly susceptible to drought and, with climate change already causing serious concerns, there is an urgent need for maize crops that are more resilient.

WEMA, a public-private partnership coordinated by the African Agricultural Technology Foundation (AATF), aims to benefit smallholder farmers and their associated rural communities in particular, as small-scale farming in the region is frequently affected by droughts. For this purpose, WEMA is developing royalty-free, drought-tolerant and insect-protected maize varieties for their use.

PUB used the platform to profile the programme and distribute useful resources.

- ▶ *Maize is one of the most important grain crops in sub-Saharan Africa.*



The image features a dark purple background filled with numerous small, light blue and white stars. In the center, there are two concentric circles. The inner circle is a solid, dark purple, and the outer circle is a lighter, glowing purple with a soft, ethereal glow. The text "SCIENCE AWARENESS" is centered within the dark purple inner circle.

**SCIENCE
AWARENESS**

SCIENCE AWARENESS

Science is often thought of as something that is abstract and generally out of reach for the average South African. The main aim of SAASTA's Science Awareness Platform is to literally put the world of science in society's hands through exhibitions and through hands-on experience of science. It provides science that the public can see, touch, feel and experience. In this way, science is demystified, is less foreign, becomes tangible and practical and, most of all, becomes fun.

Focus areas include festivals and events such as INSITE, Science Unlimited, SciFest Africa, Sasol Techno-X and National Science Week; science and technology centre networks, i.e. human capacity development at science centres and other special programmes; and mobile programmes or exhibitory.



Photographs courtesy CSIR



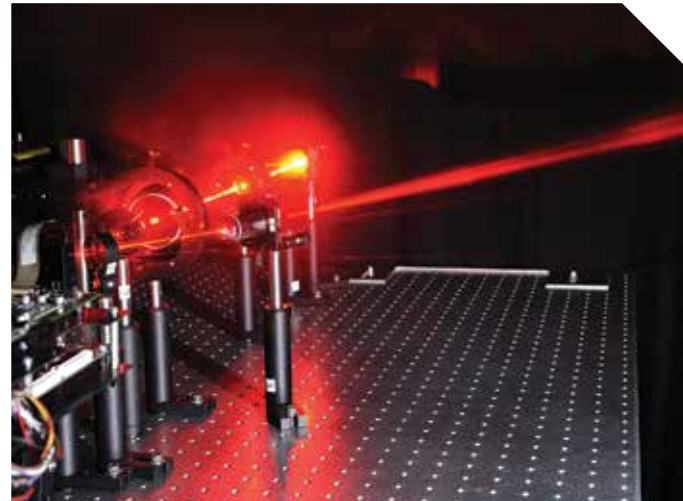
Light box

Researchers at the Council for Scientific and Industrial Research (CSIR) have demonstrated a world-first laser* cladding system that offers a permanent solution to sealing leaks and repairing cracks at power stations.

The laser beam-welding and leak-sealing technology aids in the maintenance of South Africa's power stations, particularly in sealing and repairing leaking water coolers without having to drain them before conducting the repair work.

The design and development of this technology has proved that the application of lasers extends much further than could have been foreseen when they were first demonstrated a few decades ago. The application of lasers also extends to all aspects of modern manufacturing, especially in the technology of refurbishment and maintenance.

* **L**ight **A**mplification by **S**timulated **E**mission of **R**adiation



Science awareness through national events

National Science Week inspires

“Events such as National Science Week (NSW) are aimed at boosting interest in scientific and technological development and innovation, helping the country transform into a knowledge-based economy,” said Mrs Naledi Pandor, Minister of Science and Technology, speaking at the launch of NSW at the University of the Free State (UFS) in Bloemfontein on 2 August 2014.

The NSW, managed by SAASTA on behalf of the Department of Science and Technology (DST), is an annual week-long event aimed at celebrating the role that science, mathematics, engineering and technology play in everyday life and encouraging more young people to follow careers in these fields. It attracts thousands of members of the public, learners and educators to workshops, science shows and exhibitions at universities, schools and science centres countrywide.

Altogether 76 organisations, including science centres, schools, science councils, higher education institutions and museums participated in NSW 2014, bringing the world of science to the public of South Africa.

► *The Human Genetics Department of the University of Cape Town (UCT) packed a lecture room to capacity with learners from schools they invited to their Learners' Open Day. In this picture learners with lab coats and gloves run an experiment with guidance from lab scientists.*



Today's science, tomorrow's world

The 2014 annual focus week took place under the theme “Today's Science, Tomorrow's World”. More than 4 000 people including learners, educators and parents, as well as a delegation from the Beijing Association for Science and Technology in China, converged on the UFS campus to experience ‘science at work’, featuring an array of science activities including a sky-viewing opportunity at the nearby Boyden Observatory.

“Our success depends on whether our country is ready to harness the advantage of large numbers of young people who are able and willing to work. This is where the provision of education becomes an important resource in ensuring that our young people are well prepared and equipped with knowledge and skills to handle life,” Mrs Pandor said.



► *P-STEM is a foundation that runs mini science fairs in rural and township communities to create awareness around STEM (Science, Technology, Engineering and Mathematics) opportunities and education in South Africa.*

► *SAASTA staff members and volunteers headed to rural Limpopo to spread the fun and excitement to the communities of Tshaulu Manzemba and Bochum.*



SAASTA wins award at Sasol Techno X

SAASTA project officer Happy Vilakazi was awarded the first position in the category Best Lecture at Sasol Techno X in 2014 in recognition of his excellent presentations in the SAASTA mobile planetarium. The award was presented at the festival exhibitors' function in Sasolburg on 14 August 2014.

The SAASTA mobile planetarium remains a popular feature of science festivals around the country. The igloo-shaped, inflatable planetarium can accommodate an audience of up to 35 at a time. Learners enjoy crawling through the entrance of the igloo, where images of the sky are projected against the domed structure.

Asked what he did that was so special to be awarded the prize, Vilakazi said, "I've been presenting these lectures on the objects in the sky such as stars, planets and the moon for a while and have learnt to keep it simple, make it fun and exciting, and answer the questions that are asked to get an indication of the prior knowledge of the learners." Fifteen groups attended the planetarium lectures at the event.

Sasol Techno X is an annual science festival organised by Sasol through the Boithjorisong Science Centre. In 2014, the festival drew 20 023 learners from as far as Lesotho and from seven of South Africa's nine provinces.



▶ Bafedile Kgwadi presents a science show at Sasol Techno X.



Light box

Light in art and culture

Paintings and murals in all cultures of the world show how artists have used light and shade and colour to illustrate mood and create atmosphere. Modern technological possibilities allow artists to use light in new ways in entertainment and performance, and large-scale lighting installations can dramatically highlight the beauty of architecture. Think about:

- **Laser light shows:** The precision and strength of lasers allow for light to illuminate crowds, create designs on infrastructures, and can even be seen in the night sky.
- **Stained glass:** One of the oldest examples of light in art, stained glass dates back to the fourth century. This form of art relies on natural light to illuminate its brilliance and great detail.
- **Photography and cinematography:** Light is essential in producing photos and film. In photography, lighting can be the difference between an incredible shot and a terrible one. In cinematography, light is necessary to create an image exposure on a frame of film or on a digital target. Lighting contributes considerably to the emotional response an audience has watching a motion picture.
- **Theatre and dance:** In live performances, effective lighting is so important that it typically warrants a working crew, commonly known as lighting technicians. Stage lighting in performance arts pieces not only allows the audience to see what's happening on stage, but can also be used to set the tone, direct focus, or alter one's position in time and space.
- **Architectural illumination:** With advancements in LED technology, building illumination has become a common form of light art. Displays on buildings and even major landmarks are executed for both celebratory and advertising purposes.
- **Art restoration:** Modern conservation laboratories use light-based scientific equipment such as microscopes, spectrometers and x-ray instruments to better understand objects and their components.

Source: www.light2015.org

Science awareness through mobile programmes

Mobile lab to boost Science and Mathematics at Cofimvaba schools

Excited learners and teachers from the rural Cofimvaba District in the Eastern Cape welcomed the handover of a mobile laboratory unit by the former Minister of Science and Technology, Mr Derek Hanekom, in April 2014.

The facility was jointly funded by the Department of Science and Technology (DST), through its programmatic support grant funding managed by SAASTA, and a private sector partner, the Sasol Inzalo Foundation.

Handing over the lab at Cofimvaba Secondary School, Mr Hanekom encouraged learners to make full use of the facility to improve their performance in Mathematics and Science. He said that this would pave the way to exciting and worthwhile careers in science and technology.



▶ *The mobile lab makes apparatus available to teachers and learners to do the practical work required for mastering Mathematics and Science.*

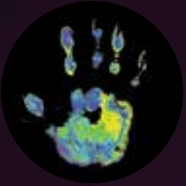
The mobile science lab is equipped with science apparatus and chemicals to enable teachers and learners to conduct prescribed school experiments. The facility will pay scheduled visits to targeted schools on a daily basis to conduct hands-on science experiments with the learners to enable them to acquire an understanding of science concepts through practical work.

Activities of the mobile lab will involve providing mentorship to Science and Mathematics teachers in targeted schools. Through this intervention, regular visits will be paid to teachers in their schools for coaching and mentoring sessions. This will involve class visits and one-on-one reflection. This approach will focus on empowering individual teachers in accordance with their strengths and needs.



▶ *In future, learners from the rural Cofimvaba District in the Eastern Cape will be able to conduct hands-on science experiments under the expert guidance of the mobile lab facilitators, with the assistance of their teachers.*

Did you know?



Humans are bioluminescent from metabolic reactions, but our glow is 1 000 times weaker than the naked eye can register.



In a double rainbow, light is reflected twice inside each water droplet, and the colours in the outer arc appear in reverse order.



The world's longest-lasting light bulb, the Centennial Light in California, has reportedly been burning since 1901, with a few interruptions during power failures.



Sunlight can reach a depth of 80 metres in the ocean. Roughly 2 000 metres deeper lives the bioluminescent anglerfish, which has a 'lure' of glowing flesh to attract prey.



Fireflies emit cold light through a chemical reaction with near-100-percent efficiency. Scientists are working to mimic nature's design to make LEDs more efficient.



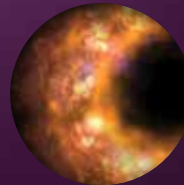
If the Sun were suddenly snuffed, nobody on Earth would notice until eight minutes and 17 seconds later – the time it takes for sunlight to reach us. But don't worry, the Sun has about five billion years of fuel left.



Light has momentum. Researchers are developing ways to harness that energy in big sails to power space travel.



More than 1 000 billion photons of light strike a tip of a needle every second (unless it is tucked quite deeply in a haystack...).



Despite the name, black holes are actually the brightest objects in the universe. Even though we can't see past the event horizon, they can generate more energy than the galaxies in which they are housed.

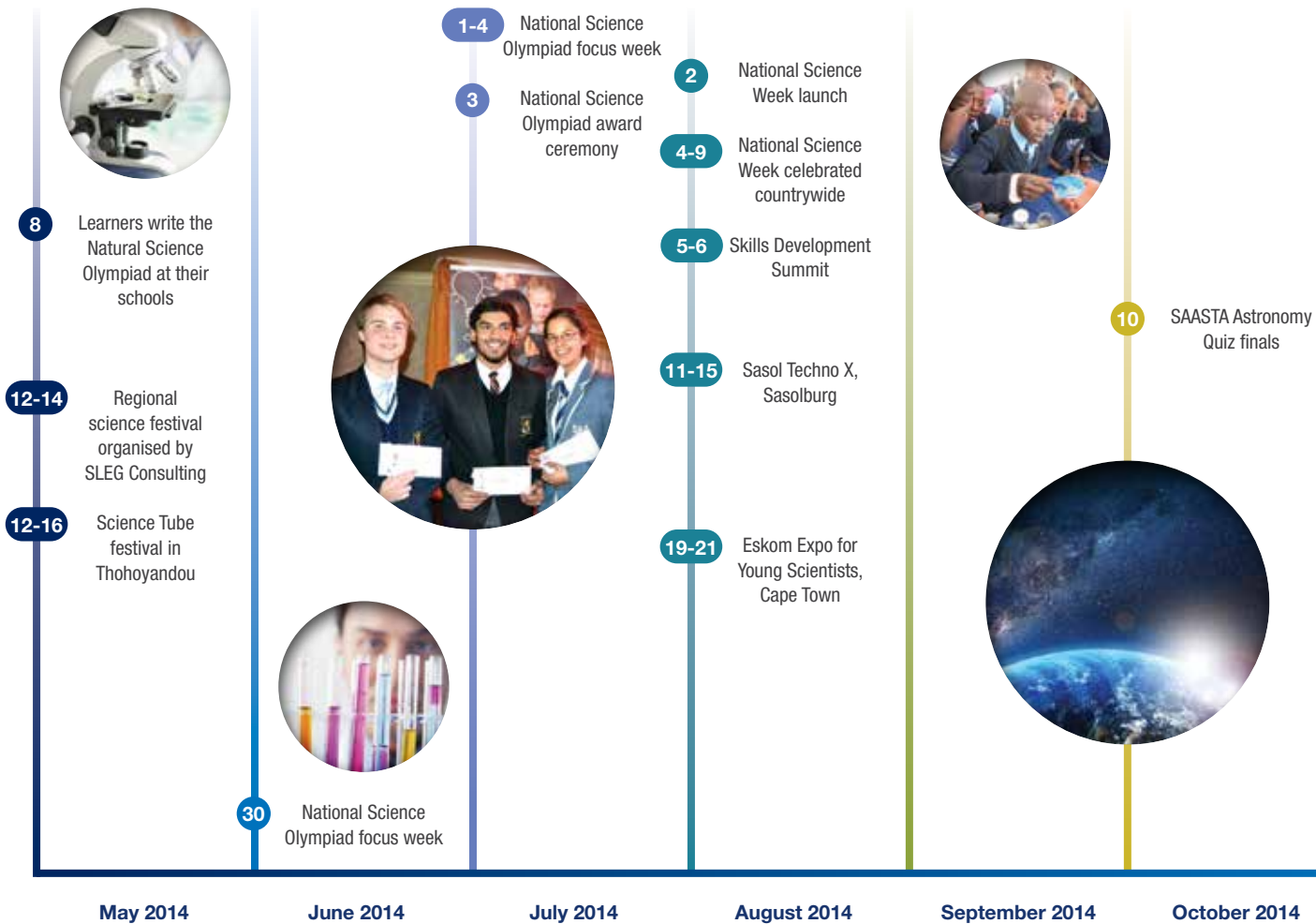


The photic sneeze reflex, which causes uncontrollable sneezing in the presence of bright light, affects roughly 18-35% of the population, though nobody is quite sure why. One suggested cure: sunglasses.

(Source: Perimeter Institute for Theoretical Physics, Canada)

Science engagement at a glance

SAASTA's activities take time to plan; resources are carefully compiled and produced and stakeholders are conscientiously engaged to ensure education, communication and awareness messages and interventions are spot-on. The following gives a snapshot of SAASTA's national event calendar for 2014-2015. It excludes interventions such as forums, media events, workshops and community outreaches.





17-20

SAASTEC
Conference

25

Launch of a new
Public Understanding
of Biotechnology (PUB)
book to celebrate the
10th anniversary of
the programme

November 2014

4

National Schools
Debate Competition



December 2014

1-31

FameLab:
Regional heats
(during January
and February)

5

Closing date for
entries in the
Young Science
Communicators'
Competition

30

Final closing date
for entering the 51st
National Science
Olympiad

30

Final closing date for
entering the Natural
Science Olympiad for
learners in grades
4 - 9

January 2015

1-28

FameLab:
Regional heats
(during January
and February)

9-13

Science Tube
Festival,
Northern Cape



February 2015

2-6

Mpumalanga
Festival, Nkangala

18-24

Scifest Africa
2015



27

TechnoYouth
Awards

March 2015

Managing Director's Office



Dr Jabu Nukeri
Managing Director



Chrisna van Staden
Personal Assistant



Gaongalelwe Tiro
Corporate Editor



Daphney Molewa
Corporate
Communicator



Sophie Ramaboya
HR Practitioner

Finance Unit



Eida Tshidi Seboni
Financial Officer



Medupe Moeng
Administrative Controller
(Building)



Marlize Delport
Financial Controller



Jolien Martins
Receptionist



Jacob Manchidi
Registry



Michael Monametsi
Driver/Messenger



Mariet Tolmay
Financial Officer



Randall Jacobs
Maintenance Officer



Lindie Muller
Supply Chain Administrator



Mari-Louise Snyman
Manager



Bonginkosi Maluleka
Financial Officer



Maphefo Chauke
Grants Officer

Monitoring and Evaluation Unit



Dr Anton Binneman
Audience Analyst



Denzil Phillips
Administrative Assistant



Gugu Mtsweni
Project Coordinator



Luyanda Mahlanza
Project Coordinator

Science Education Unit



Moloko Matlala
Manager



Brenda Edwards
Administrative Assistant



Sello Rasodi
Project Officer



Vhutshilo Nekhwalivha
Project Officer



Onica Phayane
Project Coordinator



Bongiwe Sibiya
Project Officer



Kedibone Monyebodi
Project Officer



Erna Taljaard
Project Coordinator



James Tlhabane
Project Coordinator



Thandi Esbie
Payroll Administrator



Zinzi Madiopo
Administrative Assistant



Debbie van der Westhuizen
Administrative Assistant



Irene Lephuru
Project Officer



Lotty Mathabatha
Project Officer

Science Communication Unit



Michael Ellis
Science Communication
Manager



Mthuthuzeli Zamxaka
Project Coordinator



Sizwe Khoza
Project Officer



Martha Mkgoko
PUB Administrator



Nhlanhla Madide
ICT Coordinator



Lithakazi Lande
Project Officer



Joanne Riley
Science Editor



Zamuxolo Matiwana
Media Coordinator



Refilwe Mogami
Unit Administrator

Science Awareness Unit



Shadrack Mkansi
Manager



Vanessa Naidoo
Snr Administration Officer



Bafedile Kgwadi
Project Coordinator



Edwin Ramonnye
Maintenance



Hubert Mathebula
Project Coordinator



Mavis Mohumotjie
General Assistant/
Receptionist



Happy Vilakazi
Project Officer



Thandamanzi Mtsweni
Project Coordinator



Nomathemba Mdlalose
Project Officer



Michael Machete
General Assistant/
Messenger

Notes

Notes

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