SAASTA 2017/18
SCIENCE ENGAGEMENT HIGHLIGHTS REPORT

science & technology
Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA

NRF National Research Foundation
SAASTA South African Agency for Science and Technology Advancement

CONTENTS

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.

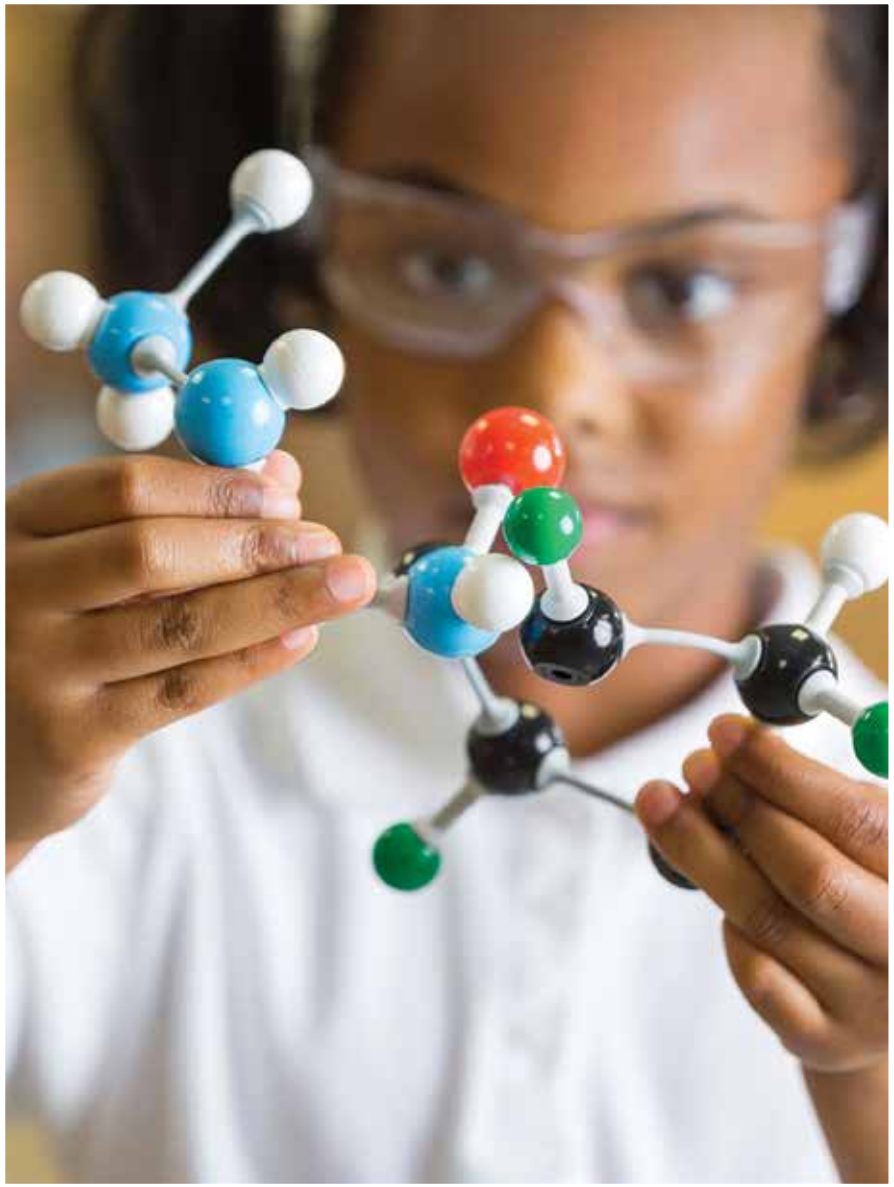
One of its business units, the South African Agency for Science and Technology Advancement (SAASTA) is tasked with facilitating the communication and advancement of science. SAASTA and the NRF's national research facilities interact closely with a network of science centres, higher education institutions, 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.

SAASTA is a business unit of the NRF with the mandate to advance public awareness, appreciation and engagement of science, engineering, innovation and technology in South Africa. SAASTA's contribution to the NRF's vision is to grow the pool of quality learners today who will become the scientists and innovators of tomorrow.

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 in Science, Engineering and Technology (SET) issues.



MESSAGE FROM THE MANAGING DIRECTOR

Welcome to the South African Agency of Science and Technology Advancement's (SAASTA's) Highlights Report for the period 2016/18. Once again, we are proud to share with you some of the work that has been completed by SAASTA's constituent and patrons in support of the science engagement strategy. In addition, we have also included some accomplishments in terms of supporting the communication and advancement of science.

Our focus this reporting period is on our contribution to growing the awareness of science through exploration, exhibitions and actual experience. Critical to this area is the support we provide to growing the pool of quality learners today, who will become the scientists and innovators of tomorrow.

It is then against this background that SAASTA, a business unit for the National Research Foundation (NRF), stands for the advancement of public awareness, appreciation and engagement with Science, Technology, Engineering, Mathematics and Innovation (STEMI). We believe that creating a future for the new generation with job opportunities for all, better health and wealth to all our people is a vision that is shared by all South Africans and must be consciously and tirelessly pursued and invested in by both Government and the business sector.

We strongly believe that for any country to be globally competitive in the fourth industrial revolution, an investment by Government and the business sector is critical. These outcomes will not be possible or achieved without an investment in STEMI education because the applications of Science, Engineering and Technology (SET) lead to new products and services that can make our world and our country a better place for all. Therefore, for South Africa to make its mark, we need to prepare our youth to be effective citizens in the envisaged fourth industrial revolution era, which will be underpinned by a scientific, mathematical and technological world which we can only dream of as of now.

This is a social and strategic responsibility that SAASTA has embraced since its inception in 2002. One of the key platforms that SAASTA is using to identify and nurture talent in SET is running SET Olympiads and Competitions (AstroQuiz, Famelab®, National Science Olympiad, Natural Science Olympiad, Schools Debates and Young Science Communicators Competition) targeting both primary and secondary school learners and students at Higher Education Institutions (HEIs) across the country. It is through these competitions and programmes that we are able to create opportunities for our new generation, making an impact by contributing to the economic development of this country and beyond.

Our scientific knowledge is also being used to address increasingly complex scientific issues. This includes communicating science to the broader public in an exciting and engaging way through interactive exhibits and a mobile planetarium at seven national science festivals. We are educating the public on emerging technologies, such as nanotechnology and hydrogen fuel cells, through exhibit stands and information dissemination at outreach programmes and conferences.

Our international footprint continues to grow; we're making an impact in different areas of science engagement. We are currently entrenched in the following countries, Malta, the United Kingdom, China, New Zealand, Japan, Ireland and five SADC countries namely: Namibia, Zimbabwe, Lesotho, Malawi and Mozambique.

We hope that you enjoy the report that we have produced for this review period to show how we used science, engineering and technology to make a difference in the world. We trust that the generated will facilitate a better world.

Dr Jabu Nukeri
SAASTA: Managing Director

LIST OF ACRONYMS

ASTC	Association of Science-Technology Centres
ASTEMI	Association of Science, Technology, Engineering, Mathematics and Innovation
BAST	Beijing Association for Science and Technology
CA	Curriculum Advisers
CTF	Critical Thinker's Forum
DST	Department of Science and Technology
DBE	Department of Basic Education
ECSITE	European Network of Science Centres and Museums
EUSEA	European Science Events Association
HEI	Higher Education Institutions
HSRC	Human Sciences Research Council
HySA	Hydrogen South Africa Public Awareness Platforms
IKS	indigenous knowledge systems
IPRDP	Innovation Partnership for Rural Development Programme
JOCV	Japanese Overseas Cooperation Volunteers
JPSC	Jaguar Primary Schools Challenge
LIYSF	London International Youth Science Forum
MoA	Memorandum of Agreement
MST	Mathematics, Science and Technology
NASA	National Aeronautics and Space Administration
NPEP	Nanotechnology Public Engagement Programme
NRF	National Research Foundation
NSO	National Science Olympiad
NSTF	National Science and Technology Forum
NSW	National Science Week
NUCLEUS	New Understanding of Communication, Learning and Engagement in Universities and Scientific institutions
NYS	National Youth Service
PUB	Public Understanding of Biotechnology
RRI	Responsible Research and Innovation
SAASTA	South African Agency for Science and Technology Advancement
SAASTE	South African Association of Science and Technology Educators
SAASTEC	South African Association of Science and Technology Centres
SADC	Southern African Development Community
SAIAB	South African Institute for Aquatic Biodiversity
SAMF	South African Mathematics Foundation
SANSA	South African National Space Agency
SCWS	Science Centre World Summit
SET	Science, Engineering and Technology
SETI	Science, Engineering, Technology and Innovation
SKA	Square Kilometre Assay
STEMI	Science, Technology, Engineering, Mathematics and Innovation

SAASTA VENTURES INTO THE GLOBAL ARENA

	COUNTRY / PROGRAMME	FINANCIAL YEAR	DESCRIPTION
1	**Malta**	2016/17 and 2017/18	A consortium of 24 partners from 14 countries assembled to form a project called NUCLEUS (New Understanding of Communication, Learning and Engagement in Universities and Scientific institutions), which was established to engage with the scientific society on the concept of Responsible Research Innovation (RRI).
2	**United Kingdom**	2016/17	▪ Tshiamo Legoale represented SAASTA at the FameLab® International finals and at the Cheltenham Science Festival in UK. ▪ The National Science Olympiad sent top performers to the London International Youth Science Forum.
		2017/18	Five learners that participated in the National Science Olympiad were selected to attend the London International Youth Science Forum. During the trip, learners participated in tours that included the Cambridge and Oxford Universities.
3	**People's Republic of China**	2016/17	▪ The Memorandum of Understanding (MoU) between SAASTA and BAST was recently renewed for the next five years. ▪ SAASTA attended the 2017 Beijing International Science Communication Round Table (Innovating Ideas and Leading Practices in Science Communication) and presented at the 5th Beijing International Science and technology Film Festival.
		2017/18	▪ SAASTA presented at the Beijing Science Festival. ▪ SAASTA invited by China Association of Science and Technology to attend the World Conference in Science Literacy and participated in drafting and finalising the Beijing Declaration on Science Literacy at part of the 25 invited organisations across the world.
4	**New Zealand**	2017/18	SAASTA was represented at the International Public Communication of Science and Technology Conference. A poster titled; "NRF|SAASTA: an interface between science and society through science communication"
5	**Japan**	2017/18	The International Partnership for Hydrogen and Fuel Cells in the Economy (IPHE) was established as an international partnership to accelerate the transition to clean and efficient energy and mobility systems using hydrogen and fuel cells technologies (HFCT).
6	**SADC**	2016/18	Five SADC countries were involved in the National Science Olympiad: Namibia, Zimbabwe, Lesotho, Malawi and Mozambique.
7	**Ireland**	2017/18	Two schools, Empangeni High Schools and George High School, participated in the Global Learning Expedition in Ireland, where seven learners presented on five environmental studies.

1. Situational Analysis

SAASTA drives science engagement across the NRF through Programme 2.

NRF|SAASTA contributes to the National Development Plan, the DST's Ten-Year Innovation Plan (2008), Youth into Science Strategy (2006), the Science Engagement Strategy (2015) and also the National Research Foundation (NRF) Vision 2020, thus playing a key role in contributing to the National System of Innovation (NSI).

The promotion of science engagement within the NRF is addressed through one of its strategic goals namely ***"Entrench Science Engagement"***. To achieve this and align science engagement programmes across the NRF, SAASTA's core functions are underpinned by the three focus areas of Science Education, Science Awareness, and Science Communication, all of which are inter-connected and used as a vehicle to build the relationship between science and society.

To deliver on NRF|SAASTA's core function the three focus areas are driven by the following eight business unit objectives for Science Engagement which are aligned to the four objectives of the DST Science Engagement Strategy:

Table 1: Objectives contributing to the three focus areas - SAASTA SCIENCE ENGAGEMENT OBJECTIVES

SCIENCE EDUCATION	SCIENCE AWARENESS	SCIENCE COMMUNICATION	OTHER*
1 Improving learner and educator participation in SET based programmes *(Contributes towards strategic objectives 1 and 4 of the Science Engagement Strategy)*	**3** Stimulating the communication of SET with public audiences *(Contributes towards strategic objectives 2 and 3 of the Science Engagement Strategy)*	**5** Increase the quality and quantity of science reporting with regards to print and broadcast media *(Contributes towards strategic objective 3 of the Science Engagement Strategy)*	**9** Establish NRF|SAASTA as a brand to enhance, promote and position NRF|SAASTA as the science awareness agency of choice in South Africa *(Contributes towards strategic objectives 3 & 4 of the Science Engagement Strategy)*
2 Increasing learner and student exposure to SET-based careers *(Contributes towards strategic objective 1 of the Science Engagement Strategy)*	**4** Provision of public access to relevant scientific and technological information through exhibits *(Contributes towards strategic objective 2 of the Science Engagement Strategy)*	**6** Develop communication media suitable for target audiences *(Contributes towards strategic objective 3 of the Science Engagement Strategy)*	**10** Drive NRF|SAASTA corporate social responsibility activities
		7 Effective profiling of NRF researchers and scientists *(Contributes towards strategic objectives 1, 3 and 4 of the Science Engagement Strategy)*	
		8 Building capacity amongst science communications practitioners *(Contributes towards strategic objective 3 of the Science Engagement Strategy)*	

2. Summary of Performance Highlights

The scope includes programmes that target learners, educators, undergraduate and postgraduate students, and the public. The expected outputs are driven by a number of programmes. The STEMI Olympiads and Competitions; in particular, the National Science Olympiad™, Famelab® and National School Debates Competition recently showed their effectiveness in identifying and nurturing talent in SET.

One learner, Angus Thring, secured first place in the National Science Olympiad Physical Sciences stream for two consecutive years out of a pool of over 30 000 learners with a mark of 94%. Thring was subsequently awarded with a registration fee to the value of R30 000 towards a science or technology qualification. Anza Tshipetan, who won in the category of Top Girl Learner from a Historically Disadvantages school, was one of the top achievers selected to attend the London International Youth Science Forum (LIYSF) in London during July. As reported in R.News[1], "Tshipetane said she has been working towards this achievement and her zeal to achieve against all odds pushed her to use university materials to prepare for the exam. 'With such a great deal of preparation, it is quite obvious that I was aiming for this, but still, I was really shocked when the results were announced,' she said. A Mintek scientist, Tshiamo Leogale, not only managed to walk away as the national winner of Famelab®, but maintained the top position at the international finals in the United Kingdom as well. In addition, the winners of the 2016 National School Debates had the opportunity to meet and engage with the world-renowned astrophysicist and science communicator, Prof. Neil Degrasse-Tyson. Not only are these programmes effective in identifying talent; they contribute to the internationalisation and mobility of learners and scientists alike.

SAASTA continued to communicate science to the broader public in an exciting and engaging way through its interactive exhibits and mobile planetarium at seven national science festivals, and educated the public on emerging technologies, such as nanotechnology and hydrogen fuel cells, through exhibit stands and information dissemination at

[1] R.News (2017). Top grade 12 science learners to jet off to London, R.News. Accessed: https://www.rnews.co.za/article/15512/top-grade-12-science-learners-to-jet-off-to-london

outreach programmes and conferences. The ability of these projects to consistently meet their targets could indicate that there is a systematic rise in public interest in science. In addition, National Science Week was launched by the Minister of Science and Technology, Mrs. Naledi Pandor, at the Nelson Mandela Metropolitan University on 05 August 2017. The focus week was driven by 93 service providers (Science centres, Higher Education Institutions, Science Councils, Museums and other organisations) in all nine provinces. They literally brought the wonders of science to society through facility tours, night-sky viewing, science shows, parachute demonstrations, science cafes and presentations, among others.

In an attempt to improve access for society to science a total of over 157 science engagement grants were awarded the sector and in particular science centres for infrastructure development, which includes mobile laboratories. Once completed, these mobile laboratories could be used to take science to the farthest and most remote areas of our country. An appeal for support was made to Minister Pandor by a grade 10 learner, Luzuko Lusawana, from Little Flower School (Eastern Cape) for science and technology resources. This appeal set the wheels in motion and SAASTA was deployed through the Small Grants Support Programme to evaluate the state of science in this school. Soon, this school will have a fully functional science lab and computer technology room where their rough diamonds can be polished and prepared for a journey into the field of science.

On the communication front, a recent study by the Pew Research Group highlighted the scientific community's inability to effectively communicate their findings to the public[2]. It is one of the main objectives of SAASTA to address this shortcoming. The SAASTA/ Nanotechnology Public Engagement Programme (NPEP) Science Communication Workshop that was facilitated in collaboration with iThemba Labs, aimed to help equip members of the science community with the necessary skills to effectively communicate with the general public, as well as provide these scientists with a better understanding of how to use popular writing to develop a narrative about their work to further increase awareness.

[2] Funk, C., Raine, L. & Page, D. (2015). Public and Scientists' Views on Science and Society, Pew Research centre, 1-111

The Science and Technology Youth Journalism Programme provided interns with the opportunity to cover some major events. These events included the Youth in Science and Innovation Indaba, the Pre-Lindau Nobel Laureate Meeting, and Alumni Networking Meeting. Mbalenhle Shandu received an acknowledgment at the 2017 Liberty Radio Awards as one of the Bright Stars in the radio industry for her reporting on R&D and other science-related content. A notable achievement is that a number of the interns whose contracts ended has returned to the community radio stations as volunteers to continue honing their skills.

In the internal arena SAASTA continues to make an impact in the areas of science engagement. Recently a five-year MoA was renewed between SAASTA and Beijing Association for Science and Technology. Furthermore, the NUCLEUS Programme, with 24 consortia in Europe, Asia and Africa, of which SAASTA is a member, is gaining momentum, which resulted in the establishment of a Nucleus in one of the NRF facilities, namely SAIAB during October 2017. Nationally the relationship between SAASTA and the following Government departments is gaining momentum and bearing fruits in terms of Science engagement: Basic Education, Public Works and Energy.

Entrench Science Engagement

SCIENCE EDUCATION

NEW PARTNERSHIP FOR SCIENCE EDUCATION TAKES OFF

SAASTA's Science Education Division recognises the importance of nurturing talent in STEMI as it helps to reinforce concepts that are being taught in the classroom. Through nurturing, talent can be identified and groomed. The Komatsu programme which is mainly funded by the Komatsu Development Trust, aims to nurture and identify talent, and has over the past three years selected and tracked learners from three provinces Mpumalanga, Northern Cape and Limpopo.

The learners joined the programme while they were in grade 10 in 2015. Now in 2017, the programme is in the last phase. Learners from all three provinces attended camps where facilitators engaged them on topics such as genetics, electro chemistry and trigonometry.

Chalk powder on pants and hands, scribbles and questions continued to the last minute of the camps. It is always a treat to witness a class of 30 plus learners finding an "Ah ha!" moment, finally being able to use trig identities to prove LHS = RHS. Mathematics classrooms sounded like choir practice sessions with learners following as facilitators were showing them how to solve problems.

During Life Sciences sessions, concepts such as "heterozygous" and "phenotype" were explained and definitions highlighted on information sheets. Physics and Chemistry sessions were intense, with learners making notes and carefully working on the exercises given. The camps were very successful, with support provided by the principals.

The project also invests in educator training focusing on three subjects, namely Physical Sciences (which includes Physics and Chemistry), Mathematics and Life Sciences. In these refresher workshops facilitators focus on topics which educators have identified as challenging, but educators are also exposed to new concepts.

The workshops were content packed, discussing principles and methods as well as analysing old examination papers. Dr Duduzile Nkosi encouraged educators to look beyond the curriculum in order to better explain certain Chemistry concepts to the learners.

In the Physics workshops concepts were unpacked and new methods of problem solving were shared. The workshops sparked interest and passion in classrooms and resulted in great participation from educators. Life Sciences workshops were well received, generating interest beyond expectations with good attendance and in some cases educators and DoE officials requesting more workshops in future.

Fikile Vilankulu, Life Sciences facilitator with the learners at the Komatsu camp in Limpopo.

The facilitator, Dr Duduzile Nkosi from the University of Johannesburg and science teachers from various schools in Limpopo attending the Komatsu camp.

Garikai Mashiri with learners during a science lesson at the camp.

JAGUAR PRIMARY SCHOOLS CHALLENGE

Following a successful project facilitation and software training for teachers for the Jaguar Primary Schools Challenge during October, two official races have taken place at Sci-Bono Discovery Centre in Johannesburg.

The Jaguar Primary Schools Challenge (JPSC) programme, facilitated by Sangari Education, saw 14 teams from various primary schools across Gauteng in the Science, Technology, Engineering, Mathematics (STEM) challenge.

The JPSC engages primary school learners and teachers across South Africa in the same way as the F1 in School Challenge. The challenge is open to learners in grades 5 to 11 and involves designing and manufacturing the fastest car possible, emulating the design and engineering processes employed by real engineering companies such as Jaguar Cars.

Each team designs an F1 racing car on 2D drawing software, using 160gm/s cardboard paper to create it. After manufacturing, teams race their cars, which are powered by gas chargers, on a 20-metre racetrack.

Pieter du Plessis, F1 in Schools Programme Manager at Sangari Education, (the company responsible for bringing the challenge to South Africa) said, "At first it was a challenge getting both learners and teachers to buy into the concept of designing and racing a miniature F1 car. But the concept has now caught on and interest is growing rapidly."

"The JPSC-F1 is literally STEM education in action. Teacher involvement is critical for learners, who need both emotional and physical support," he said.

"The JPSC offers primary school pupils the opportunity to take part in a fun, hands-on STEM activity, tackling real-life problem solving, design, manufacturing, team work, and communication and business skills."

Du Plessis further emphasised that, "Teachers' and parents' involvement plays an integral part of the programme as it motivates children to maintain their focus and determination in the challenge."

Christo Jones, Deputy Chief Education Specialist for Technology at the Gauteng Department of Education said, "Partnering with Sangari Education to bring active STEMI education to primary schools is a good starting point towards improving the education in the country. Seeing young people design F1 model cars on computers, manufacture and then race them is really inspiring."

Tebalo Tsatsi, Project Coordinator from SAASTA said, "Primary schools play an integral part in shaping and bringing out the best in a learner's life. These learners need to be nurtured and guided in the direction of becoming future engineers, designers and architects. This programme is a stepping stone as it addresses this need to the core."

Pieter du Plessis – F1 School Programme Manager from Sangari, holds the audience captive with his presentation.

THE COSMO-NAUT TALE OF HARD WORK

The prolific inventor Thomas Edison once stated, "Our greatest weakness lies in giving up. The most certain way to succeed is always to try just one more time". This notion was echoed by the life story of Dr Don Thomas who is an engineer and a former (National Aeronautics and Space Administration) NASA Astronaut.

Dr Thomas is not only a dream catcher but also an engineering wizard who shaped his future beyond the realms of Earth. Dr Thomas, who has been on four NASA Shuttle missions, and has spent over 1 040 hours in space, shared his inspirational story with learners from Cosmo City Secondary school on 8 November 2017.

Through a partnership between SAASTA and Living Maths, learners from Cosmo City Secondary school had a chance to interact with the former astronaut. Dr Thomas' main narrative throughout his presentation was about hard work, encouraging learners not to lose focus of their dreams in life. The presentation was a realistic blend of science, practicality, fun and adventure. The learners gravitated towards the former spaceman as he explained that he only achieved his dream when he was in his late 30s, after failing three times to get into the NASA programme.

Learners soon realised the power of imagination when Stephen Sherman, the self-proclaimed Chief Imagination Officer from Living Maths commented about astronomy and space science in South Africa. He told learners about the Square Kilometre Array (SKA) project, SANSA's contribution to - and implementation of astronomy and the available bursaries, but most of all how Mathematics is an enabler to many possibilities.

The question and answer session opened a can of inquisitive worms with learners seeking scientific explanation and logic about concepts such as black holes, galaxies, and constellations and asking questions such as if it is possible for human beings to be Martian men one day.

The elasticity of the learners' imaginations was truly stretched by the experience. The fear of failure quickly faded, as they were motivated and encouraged to become dream catchers too.

Dr Thomas' last words were inspirational, mentioning that a combination of opportunity, leadership and hard work through learning are all necessary ingredients for success. He closed off by quoting Rosabeth Moss Kantor: "Leaders are more powerful role models when they learn than when they teach."

Space gear fitting with Dr Don Thomas.

Dr Don Thomas interacting with learners.

WORKING TOWARDS A CHANGED LANDSCAPE IN STEMI OLYMPIADS AND COMPETITIONS

Nobel Peace Prize laureate, Kofi Annan, once said "Knowledge is power, information is liberating and education is the premise of progress in every society". This is in line with what the annual STEMI Olympiads and Competitions Community of Practice Conference, held in Pretoria on 14 to 16 March this year, aimed to achieve. The event provided a platform to empower community of practice members through information sharing, and to ultimately contribute towards positive change in science, technology, engineering, and mathematics (STEM) education. The community of practice specifically uses Olympiads and competitions as a tool to identify and, subsequently, nurture learner talent in the relevant subjects.

This year, delegates from the Association of Science, Technology, Engineering, Mathematics, and Innovation (ASTEMI), the Department of Education, and various other organisations and stakeholders in the sphere of STEMI, came together to share their passion for STEMI education and collectively seek methods to improve Olympiad and competition practices.

Chief Executive Officer of BRIDGE, Vuyiswa Ncontsa, delivered a keynote address that highlighted methods to cultivate and manage a community of practice, and touched on the importance of knowledge management within such a community. She encouraged delegates to seize opportunities to effect positive change within the system and provided valuable insight on the sustainability of an effective community. The concept of change resonated throughout the conference and was the main focus of the majority of the presentations and academic papers. A number of these presentations were based on individual experiences within the Olympiad and competition or academic sphere, which facilitated the exchange of ideas, concepts, and practices during the presenter engagement sessions.

The concept of play captured the attention of many when Brent Hutcheson from Hands-on-Tech, demonstrated the basic laws of motion by using Lego blocks, and Steven Sherman from Living Maths added some comedic laughter to the event by having the delegates participate in a fun, online learning application.

The use of modern technology echoed throughout the conference and revealed that its potential benefit in education can no longer be ignored. The synergy between practical play and technology was showcased as the main stimulating factors in steering STEMI towards a changed landscape.

The presentations and exhibits on topics such as robotics and computer-aided activities exposed the ethos of this synergy. However, not only did practical application enjoy attention, but the impact of science communication was explored and fundamental insight was shared on how effective communication and the communication medium affects the attitudes of learners.

Breakaway sessions were facilitated to generate ideas and model frameworks on the style of mentoring and coaching that could be introduced within the education system, to increase and sustain interest in STEMI. The conference encouraged industry organisers and government to formulate support systems through collaborations, and shift focus to mentoring and coaching in order to establish a knowledgeable foundation of support that can be consistently tapped to improve learner performance now and in the future.

Shadrack Mkansi (Manager: SAASTA Science Awareness, left) accompanied by Vuyiswa Ncontsa (CEO: BRIDGE, centre) and Bersan Lesch (Deputy Director: DST) after her captivating address on Community of Practice.

Conference delegates actively engaging in the concept of play during the presentation by Brent Hutcheson from Hands-On-Tech: "Explore it, Play it, Question it", igniting an early interest in STEMI.

Gordon Africa from Bright Ideas Project during the interactive competitive application on Kahoot that was facilitated by Steven Sherman from Living Maths.

1. National Science Olympiad top grade 12 science learners jetted off to London

The top National Science Olympiad performers in grade 12 flew to the United Kingdom to attend the London International Youth Science Forum (LIYSF). Ambroise Muller, Jailiang Yu and Anza Tshipetane attended the two-week residential LIYSF that was held at Imperial College London. These learners were exposed to science lectures and demonstrations from leading scientists, and visits to industrial sites, research centres, scientific institutions and organisations, including world-class laboratories and universities.

Speaking about the National Science Olympiad, 18-year-old learner, Tshipetane, said the exam was very challenging and required her to think critically. "The questions were broad and went beyond the confines of the syllabus," she added.

The 16-year-old learner, Muller, said the exam was challenging and required knowledge that is not required for final examinations. "However, a lot of the questions were based on the matric topic, 'Genetics and Genetic Engineering', and we had fortunately finished that section of work the previous week in class. This helped me a lot to answer the questions in the Olympiad," he added.

Tshipetane is proud of herself and the hard work she put in order to be a top Girl Learner and top Learner from previously disadvantaged schools. She comes from a humble background from Tshisahulu village in Limpopo and was raised by a single mother. Tshipetane said she has been working towards this achievement and her zeal to achieve against all odds pushed her to use university materials to prepare for the exam. "With such a great deal of preparation, it is quite obvious that I was aiming for this, but still, I was really shocked when the results were announced," she said. She is very excited and anxious to see what else the world of science has in store for her. She is looking forward to meeting other science "geeks" like her from around the world. She believes that this opportunity will inspire her.

"It is such a great honour to be selected to represent not only my school and community but my country as a whole at such a prestigious event," she said. Tshipetane is passionate about science and the opportunity will inspire her to explore the scientific world and broaden her scientific thinking. Next year she plans to study Medicine at the University of Cape Town. Speaking about the trip to London, Muller said he was surprised and did not expect to travel to London. "This truly means a lot to me and I am truly grateful to SAASTA for granting me this fantastic and unique opportunity," said Muller.

"I trust that this will be an extraordinary experience for me, attending world-class lectures, being able to walk through universities such as Cambridge and Oxford, visiting London... I am sure that the LIYSF will be very enriching," he added.

LIYSF attracts more than 400 of the world's leading young scientists aged between 17 and 21 years from more than 60 participating countries. There is an active social calendar with events designed to enable those from around the world to learn about different cultures. The scope of LIYSF extends further than broadening scientific understanding to engaging students in learning about other cultures and helping them develop lasting, international friendships.

The official group photo from the 2017 LIYSF.

Anza Tshipetane, Vhotshilo Nekhwalivha (SAASTA Project Coordinator), Jailiang Yu and Ambroise Muller.

The National Science Olympiad is one of the flagship projects of the South African Agency for Science and Technology Advancement. Since 2005, the 53-year-old project has offered learners in grades 10 to 12 an exciting opportunity to compete in science with fellow learners from Southern African Development Community (SADC) countries such as Lesotho, Zimbabwe and Namibia. In 2017, about 37 000 learners from all nine provinces and three SADC countries participated, including learners from Harmony Gold Mining areas in Gauteng, North West and Free State provinces.

The main aim of the competition is to identify talent, to encourage excellence in science education and to stimulate interest in the sciences. It seeks to inspire young people to consider careers in science and technology.

2. SAASTA Youth Olympiad and Competitions National Awards

It all started with young minds from various schools across South Africa sitting for science exams, quizzes or doing battle in multiple debates. The Natural Science Olympiad was written in May 2017 with a total of 37 818 learners participating, while 7 264 more learners went through four grilling rounds answering questions on astronomical concepts in the Astronomy Quiz (AstroQuiz), the provincial winners from these NRF/ SAASTA competitions were then brought together from 5 to 7 October 2017 for their well-deserved awards. The event took place in Pretoria.

AstroQuiz

All learners arrived on Thursday morning, 5 October, in Pretoria - the city beautifully adorned with purple-blossomed Jacaranda trees. Thirty-six AstroQuiz participants were taken on a tour around the National Zoological Gardens that, despite the pouring rain, was interesting to the energetic learners as they watched the tiger prowl and the alligator laze. The learners also climbed the great heights of the bird aviary (one of the largest in Africa), where a magnificent view of Pretoria (and a few barbets) can be seen. Their helpful guide explained the habits and diets of the animals as they walked around looking at all their favourites. After they had enjoyed the tour and lunch, the nine teams (four learners per school team) went ahead to battle with each other for the National Final Round of the AstroQuiz.

The quiz consisted of 30 questions. Dr Yusuf Dadoo Primary School from Gauteng had participated in the national finals nine times before. This year, on 10th tenth attempt the school was clearly in line for first position. There was a tie for second place between Laerskool Park and Mariadze Primary School after the first 30 questions. Laerskool Park, from Western Cape, took the second position in their province and came to the national finals after the provincial winner declined to attend for religious reasons. Mariadze Primary School from Limpopo was participating in the AstroQuiz for the very first time and made it to the national finals.

They were then engaged in a set of five tiebreakers where they still achieved the same mark. Ten new questions were brought in to break the tie. With the two schools still in a tie after the first five questions, Laerskool Park correctly answered a tricky question six, which saved the day for them.

Natural Science Olympiad

At the same time, fourteen Natural Science Olympiad winners were touring the SAASTA Johannesburg Observatory. They were given a lecture on astronomy, and had the opportunity to explore and interact with the world of science through the exhibits at the centre. Learners then later joined the AstroQuiz team at the National Zoological Gardens.

The AstroQuiz winners receiving their awards, Dr Yusuf Dadoo Primary School, Gauteng.

Students from Mbekeweni Primary sharing 1st place as the top 5 achievers from Gr 4 - 6 in the Natural Science Olympiad.

3. SA Learners Scoop International Science Awards

Two South African learners, Mandisa Xaba and Veeasha Pickirisami, scooped international science awards and flew the South African flag high at the 2017 Beijing Young Scientist Creation Conference, held recently at the University of China Academy of Sciences. The conference was attended by more than 80 young scientists from around the world.

Mandisa, whose project was titled Aspects: Physics, Chemistry, Mathematics and Clean Energy Technology, is from Sakhelwe High School in KwaZulu-Natal. Veeasha's project was titled Biodegradable Eat-Tensils. She is from Kimberly Girls' High School. Their innovative projects generated a lot discussion among the conference delegates. SAASTA assists learners such as Mandisa and Veeasha who are passionate about science and innovation to attend the conference on an annual basis.

The participation at the conference is an offshoot of SAASTA's partnership with the Beijing Association of Science and Technology. SAASTA Project Coordinator, Mr Chipa Maimela accompanied the learners to Beijing. The learners were selected to attend the international conference in Beijing after they had participated in and received awards for their projects in the Eskom Expo for Young Scientists.

Veeasha Pickirisami shows off her medal.

Mandisa Xaba is pleased with her achievement.

OUTREACH TO ENRICH

Breaking new ground is not always about new inventions or technological advancements— it can also be about interactions and the effective communication of the role of science. In career profiling, to break new ground is to establish a connection, inspire and to give guidance to those who are in need of such an intervention. Breaking new ground may also refer to exceeding expectations. The NRF and SAASTA have had a marathon of career profiling interventions in the past few months, leaping from one province to another and touching base on new and old grounds. "Educationists should build the capacities of the spirit of inquiry, creativity, entrepreneurial and moral leadership among students and become their role model" – Abdul Kalam, scientist and former president of India.

Based on the core values of NRF/SAASTA and the strategic aim of the Science Engagement Strategy, career profiling is one programme that is committed to transforming lives and popularising science through the engagement and outreach of local, active participants in the science-orientated fields. The late struggle icon and former president of South Africa, Nelson Mandela, once stated, "Education is the most powerful weapon which you can use to change the world." The career profiling programme echoes the teachings of Mandela by involving qualified science and engineering graduates to invest time to interact with the country's most valuable investment, the school learners. Exposure is an essential element of education; thus through profiling, learners can be encouraged to pursue careers in science.

According to the 2016 study that was conducted by the Human Sciences Research Council of South Africa (HSRC): "There is a significant shortage of science and technology-based occupations at both the professional and technician level". Career profiling is a platform that creates awareness about the problem of career mismatch at the workplace; hence the focus of the programme includes providing learners information about the workplace. Unfortunately, the "take a child to work" campaigns cannot reach the vast numbers of learners in South Africa, but through this programme, NRF/SAASTA can reach and tackle issues such as career mismatch, direct learners on to the relevant career paths, and lead them to the correct doors to knock on. Material provided to the leaners enables the learners to start thinking about their future. Nothing stops an individual with access to accurate information.

Together with critical strategic participants such as non-profits and government departments, collaborations are providing beneficiation for the programme. Through their assistance, NRF/SAASTA is now able to extend its reach and open doors to new opportunities. It is always a positive indication when communities are independently mobilising and inviting NRF/SAASTA to get involved in schools' career days/expos. To date, many of the role modelling campaigns, which have taken place with an element of community involvement, can be perceived as breaking new ground. Communities are realising the importance of the programme and are eager to tap into our passion for excellence in this regard.

Although the career profiling marathon is far from ending, the Science Education Division of NRF/SAASTA appreciates the enablers for the collective successes of the programme. The commitment to transforming lives and passion for building scientifically inclined communities remains at the heart of NRF/SAASTA's objectives.

Lufuno Mudzhigi (NRF/SAASTA) and Harry Vuyo Jonas (Manyeo) addressing learners in Bizana.

Nontobeko Khuzwayo advising learners on how to build and maintain a successful career in engineering.

Words of encouragement from Makhanana Nkhwashu (NRF/SAASTA) outlining possible career ventures in chemistry.

Entrench Science Engagement

SCIENCE AWARENESS

NUCLEUS: FACING THE CHALLENGE TO ALIGN RESEARCH WITH SOCIETY'S NEEDS

The NRF was represented by SAASTA and the South African Institute for Aquatic Biodiversity (SAIAB) at the NUCLEUS Conference in Hannover, Germany in October. Dr Jabu Nukeri, Shadrack Mkansi and Penny Haworth took part in the conversations and workshop activities around ways to conduct Responsible Research and Innovation (RRI) at universities and research institutions.

NUCLEUS – which stands for New Understanding of Communication, Learning and Engagement in Universities and Scientific institutions – is a four-year, Horizon 2020 project (now in its second year) that investigates how to make RRI a reality. Fourteen countries from around the world, including South Africa, represented by NRF/SAASTA are taking part to ask some fundamental questions on how the research agenda operates in each country: Are institutional barriers preventing organisations from engaging with their stakeholders to align research with society's needs? How can these challenges be overcome? The overall aim is that NUCLEUS will implement new policies and programmes in 30 international test sites. One of these sites will be hosted by SAIAB and coordinated by Haworth.

"Facing the Challenge: Obstacles and Opportunities of RRI in Scientific Institutions" was the motto of this annual conference, and participants brainstormed on how to create action plans for their institutions to address these obstacles and create opportunities.

South Africa played a big part at the event as Mkansi and Haworth presented on the work of both their organisations, while the keynote speaker was Michael Gastrow from the HRSC, who presented "Groot Karoo: Big Science, Human Development, and the Rule of Unintended Consequences". He spoke about the integration of the SKA project into the community by outlining the successes and challenges of that endeavour.

Penny Haworth and Shadrack Mkansi exchange ideas with Karina Wardak from the University of Applied Sciences, Fulda, Germany.

Going forward, SAASTA and SAIAB will be working with delegates from European universities and the NUCLEUS consortium to exchange ideas and resources to build a model of RRI that can operate in South Africa. SAIAB will be the test-hub for this research, with analysis and reporting currently underway.

The team had a useful and stimulating time in Hannover, and the project will be strengthened by the work and connections created there.

SAASTA ACCOLADES: TWO TIMES WINNER AT SASOL TECHNO X

From the left are Conrad Mogane, Happy Vilakazi and Tebogo Lejaka, accepting the Sasol Techno X Award for the Second Best Exhibition by a government institution.

SAASTA walked away with two awards from Sasol Techno X, an annual science festival organised by Sasol in collaboration with Boithjorisong Science Centre. The festival, one of the largest in the country, attracted 23 646 learners, 975 educators and 1 389 members of the public from all nine provinces. It took place in Sasolburg from 15 to 19 August.

SAASTA had a big presence with interactive exhibitions, the Great South African Inventions exhibit (which was awarded as second best exhibit), astronomy presentations and various workshops.

The highlight of the festival was the exhibitors' award function where participants received awards in recognition of outstanding contributions. SAASTA competed in four categories, namely Science Shows, Exhibitions and Demonstrations, Workshops and Astronomy Presentation. SAASTA was awarded the Certificate of Recognition for contributing to the development of a generation of learners who are smarter, more knowledgeable, entrepreneurial and productive, and for second place for best exhibition by a government organisation.

NATIONAL SCIENCE WEEK TAKES A TOUR OF SCIENCE

National Science Week (NSW), an annual week-long event coordinated by the South African Agency for Science and Technology Advancement on behalf of the Department of Science and Technology, is now in its 18th year and will run from 5 to 12 August 2017. NSW is a countrywide celebration of science, technology, engineering, mathematics and innovation (STEMI), and exposes public and learners to the wonders of science.

Over 90 organisations, including three National Research Foundation facilities, two science councils, 24 science centres, five universities and 59 other organisations, will participate in bringing the world of science to the South African public. In 2016 NSW reached millions of people in South Africa.

Each year a different theme is chosen and the activities are offered around the theme. The 2017 theme is "Advancing Science Tourism" and it is aligned with the United Nations' International Year of Sustainable Tourism for Development. This year, South Africa aims to showcase what it can offer when it comes to science tourism and celebrate the possibilities that science creates. The theme will allow all South Africans from all walks of life in different provinces to celebrate a link between science and tourism. It will encourage discussions around what makes South Africa special and showcase natural diversity.

Over 15 million tourists visited South Africa in 2015 for adventures and a taste of an African experience. Science and tourism are connected and the National Science Week theme will showcase the connection and strengthen the bond.

Science can be a tourist attraction and it plays a major role in improving tourists' experiences. Tourists can explore scientific landmarks and scientific attractions such as the Square Kilometre Array, Cradle of Humankind, observatories, science centres, national parks, botanical gardens and zoos.

Science centres and museums around the country have an opportunity to create unique and exciting places for tourists to visit. The research around the human genome and interest in the history of humanity brings tourists to see the Cradle of Humankind.

NSW is run in all nine provinces simultaneously at multiple sites per province.

NSW aims to boost interest in scientific and technological development and innovation, helping the country transform into a knowledge-based economy. The event celebrates the role that science, mathematics, engineering and technology play in everyday life and encourages 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.

The Honorable Minister, Naledi Pandor, engaging with the exhibits.

Participants engaging with the SAASTA exhibits.

Science show at the opening of National Science Week.

SCIENCE FESTIVAL HIGHLIGHTS

Science festivals are public events aimed at exciting people about SET and its relevance for the development of human capital in STEMI. The project provided funding support to ten national festivals, including the Mpumalanga Science Festival, Science Tube Thohoyandou, EiSEF Polokwane, Zululand Science Festival (ZuluFest), Science Unlimited – Kwalata, Sasol Techno X. EiSEF North West, Mpumalanga Science Festival, and Scopexl.

Science festivals best moments:

- Professor Azwinndini Muronga from Nelson Mandela Metropolitan University prepared an astronomy presentation at the Tshilala Secondary School in Dumasi village of Limpopo province. The presentation focused on simplifying the concept of Astronomy in indigenous language. The topics covered included, the position of the Milky Way galaxy and Earth's orbit around the Sun.
- SAASTA won a bronze award for the Best Exhibition and Edutainment category at the Rand Easter Show in Gauteng.
- The Minister for Science and Technology, handed over a mobile computer laboratory to Sigidisabathembu Primary School in the iLenge-Majuqule village.
- The DST Africa Day, launched a booklet by the Minister which profiled exceptional African researchers that contributed to ground-breaking research addressing the socioeconomic challenges of poverty, unemployment, and inequality.

Racheal Rayner, SAASTA staff, with learners at Sci Fest.

SCIENCE ADVANCEMENT OUTREACH ACTIVITIES

A number of science and technology programmes targeting learners, educators and the public are being implemented on-site at the Johannesburg Observatory. These activities include curriculum-based activities with learners and educators, interactive exhibits, and sky-viewing with the public.

- In collaboration with an NGO called Three2Six, the observatory hosted 149 refugee learners in grades 1 to 7, on 6 and 7 September and for sky-viewing on 14 September as well. The sky-viewing season is attracting attention with many groups showing interest and coming for the evening packages, which include an astronomy presentation and then a view of the celestial bodies through the Innes Telescope.
- May every year is the Cell C initiative: Take a Girl Child to Work. The Johannesburg Observatory hosted 60 girl learners from Soweto. The learners learnt about a host of science careers that they did not have prior knowledge of. The highlight of the day was when they made their own telescope and got to take it home.
- On 01 June 2018, the Observatory hosted Heather Massie, an American actress who spoke on HEDY! The Life and Inventions of Hedy Lammar. The evening was topped off with sky viewing.
- On 27 July, hundreds of people rushed to the Observatory site to view the lunar eclipse and on 23 August, the Observatory hosted the WITS Astronomy Club.
- On 7 August, 60 girl learners participated in the Women and Girls in Science initiative in partnership with the DST. The girl learners were addressed by female scientists through inspirational stories on how to achieve greatness in the workplace and society.

Women and Girls in Science talk at Penreach.

VUWANI COMMUNITY LEARNERS TAKE KEEN INTEREST IN SCIENCE AMID CIVIL STRIFE

Throngs of learners descended on the Thohoyandou Multipurpose Centre in Vuwani village for three days in May to learn more about the impact of science on their lives and possible career opportunities in scientific fields. About 4 000 learners attended despite the civil unrest that had taken place in the village which had resulted in the burning of more than 20 schools.

The Science Tube Festival attracted learners from other villages around Thohoyandou and was a resounding success, according to Happy Vilakazi, Project Coordinator at the South African Agency for Science and Technology Advancement (SAASTA). SAASTA and the festival organiser, Science Tube, were the event hosts.

"Science Tube, with sponsorship from SAASTA, hosted a fruitful festival, which benefited learners and teachers from all over Thohoyandou," Vilakazi said.

Among the exhibitors were the South African National Space Agency, University of South Africa I-SET, Vaal University of Technology, Limpopo Police Department and the University of Limpopo. The exhibitions mainly aimed to inspire the young learners attending the festival to consider careers in science, engineering and technology.

"Teachers were awarded with medals for their outstanding work towards the future of our science society, with each teacher from the Vhembe District receiving a medal for exceptional facilitation skills," Vilakazi said.

"Science Tube also honoured schools with trophies for their participation."

The Manager of SAASTA's Science Awareness Platforms, Shadrack Mkansi, told the audience at the awards ceremony that science education was key in the advancement of societies. "We are encouraged by the teachers' commitment to addressing the challenges that are hampering children's science educational advancement," he said.

"Our investment in this science festival enables learners to realise their potential and to be equipped to contribute towards science development."

The main focus of the annual Science Tube Festival in Thohoyandou is to encourage learners, parents and teachers to take a more active interest in science.

Learners building their own telescopes during the Science Tube in Thohoyandou (Venda).

Teachers building telescopes during the Science Tube in Thohoyandou (Venda).

Learners putting their telescopes to use.

MINISTER PANDOR TURNS FIRST SOD AT EASTERN CAPE SCIENCE CENTRE

The Minister of Science and Technology, Naledi Pandor, presided over a sod-turning event to celebrate the first day of construction of a R30 million science centre in the Eastern Cape. The event, which took place on 18 June 2016, formed part of an imbizo in the Cofimvaba area to raise awareness about the importance of science and technology in society.

The science centre, once completed, will assist 26 high schools with science and technology teaching in the area. Currently, these schools rely on a mobile science unit donated by the Department of Science and Technology (DST) and Sasol. The Cofimvaba science centre is the first science centre in South Africa to be purpose-designed, with green science, technology and innovation used in the actual building.

The science centre has been designed to achieve beyond net-zero energy and water by selecting and combining technologies to maximise building performance. Similarly, the net-zero water design will see the building harvest more water than it uses – making it one of only a handful of buildings in South Africa where this can be achieved.

The Minister said the centre will be a "living lab", serving as a proof-of-concept in the building industry. She added that the centre would, apart from educational science programmes, also run ones designed for recreational and leisure purposes, showing that science can be enjoyed by all. Teachers and learners in the district and beyond will be supported in their lessons with a host of activities.

The centre will host a comprehensive science, engineering and technology career awareness programme to help guide the career choices of learners.

The Deputy Minister of Education, Enver Surty, welcomed the initiative to build the facility in the rural area, saying the Department of Basic Education had long been in partnership with the DST to improve the learning and teaching of science in the country.

At the imbizo the DST also hosted a two-day exhibition which was organise by SAASTA to expose young people and the community to careers in science, as well as practical demonstrations of how science is used in day-to-day life. The first day of the exhibition was held at the Cofimvaba Shopping Complex about four kilometres from the Cofimvaba High School.

Minister Pandor turning the first sod at the Cofimvaba Science Centre construction site.

Young people and the community exposed to careers in science.

SCIENCE CENTRE CAPACITY BUILDING

The Science centre capacity building project aims to empower individuals to implement activities, exhibitions, lectures and other interventions efficiently.

Highlights from the science centre capacity building project

- Three science centre staff members participated in the Job Shadowing Programme at Unizulu Science Centre between 20 and 24 June 2017.
- In collaboration with the South African Association of Science and Technology Centres (SAASTEC) and DST, NRF|SAASTA identified training needs for capacity building in science centres and devised strategies to support science centre staff for participation at the 18th Annual SAASTEC Conference that is scheduled to take place at the end of November.
- 38 science centre personnel attended the Conference Paper Writing and Presentation Workshop on 6 and 7 November 2017 in Gauteng. The aim of the workshop was to give presenters for both the Science Centre World Summit (SCWS) 2017, and annual SAASTA Conference, the opportunity to review their presentations and practice for the scheduled presentations.
- 16 interns attended the DST-NRF Centre of Excellence in Palaeoscience at Wits University fossil discovery media briefing as part of the Job Shadowing Programme. In addition, Unizulu Science Centre hosted the Palabora Foundation, National Zoological Gardens, Moipone Academy, and Cape Town Science Centre personnel from 7 to 12 May 2018. A total of five science centre personnel from four science centres were reached. Two interns from Gauteng attended the South African National Biodiversity Institute (SANBI), National Indaba on Ecological Infrastructure for Water Security from 29 to 31 May 2018. Two interns from Gauteng and one from the North West attended the launch of Hydrogen Fuel Cell system on 14 April in North West Province.
- Unizulu Science Centre hosted personnel from the Palabora Foundation, National Zoological Gardens, Moipone Academy, and Cape Town Science Centre in May to facilitate skills transfer and knowledge sharing. From 20 to 21 August 2018, the Japanese Overseas Cooperation Volunteers (JOCV) conducted a workshop for science centre personnel at the Garden Court OR Tambo Hotel. 42 delegates from different science centres attended. Personnel learned on the use of cost effective materials to conduct experiments.
- On 4 and 5 August 2018, the TechnoYouth™ programme, in collaboration with UNISA I-SET offered robotics training to 26 personnel from 11 science centres.

Urm Chippendale (Cape Town Science Centre) engaging learners during the Job Shadowing Programme at Unizulu Science Centre.

Armstrong engaging the public at a mall during the Job Shadowing Programme at Unizulu Science Centre.

Entrench Science Engagement

SCIENCE COMMUNICATION

FameLab®

She's no ordinary Gold Digger!

*Geologist, **Tshiamo Legoale** Wins the FameLab® South Africa Competition: Taking African Science to the World*

Tshiamo Legoale from Mintek, a global leader in mineral and metallurgical innovation, earned her spot as the national winner of the FameLab® South Africa Competition as she captivated the audience with her riveting three-minute talk on phytomining, or in simpler terms, how we can harvest gold from wheat crops grown on mine dumps. The bubbly and energetic Tshiamo and the first runner-up, Nanji Sheni, also a researcher at Mintek, are both breaking stereotypes of women in the mining industry. Tshiamo, who joined Mintek in 2012, is an MSc Environmental Management student at the University of Free State (UFS) and holds a BSc Degree in Geology (UFS) and a certificate in Mineral Resource Management from Wits University. She competed against nine other finalists, selected from over 200 young researchers who participated in FameLab® heats across the country. Tshiamo will now represent South Africa at the International FameLab® Competition at the Cheltenham Science Festival (UK) from 5 - 8 June.

Michael Ellis, Science Communication Manager at SAASTA commented that, "FameLab® South Africa is an effective channel for developing local science communication talent and SAASTA is proud to partner in making this possible. FameLab® is inspiring young scientists to talk about their science and to make their voices heard. Our hope is that these young scientists will continue to do so throughout their research careers."

At the semi-finals which were hosted by Wits University, Professor Adam Habib, Vice Chancellor and Principal of Wits University commented that it is important for Africans to participate in the global knowledge economy and to develop the high level research and scarce skills required to foster inclusive development on the continent. "More importantly,

we need to share our research stories in the public sphere and use our science-based evidence to influence policies that will ultimately benefit humanity."

> *"More importantly, we need to share our research stories in the public sphere and use our science-based evidence to influence policies that will ultimately benefit humanity."*

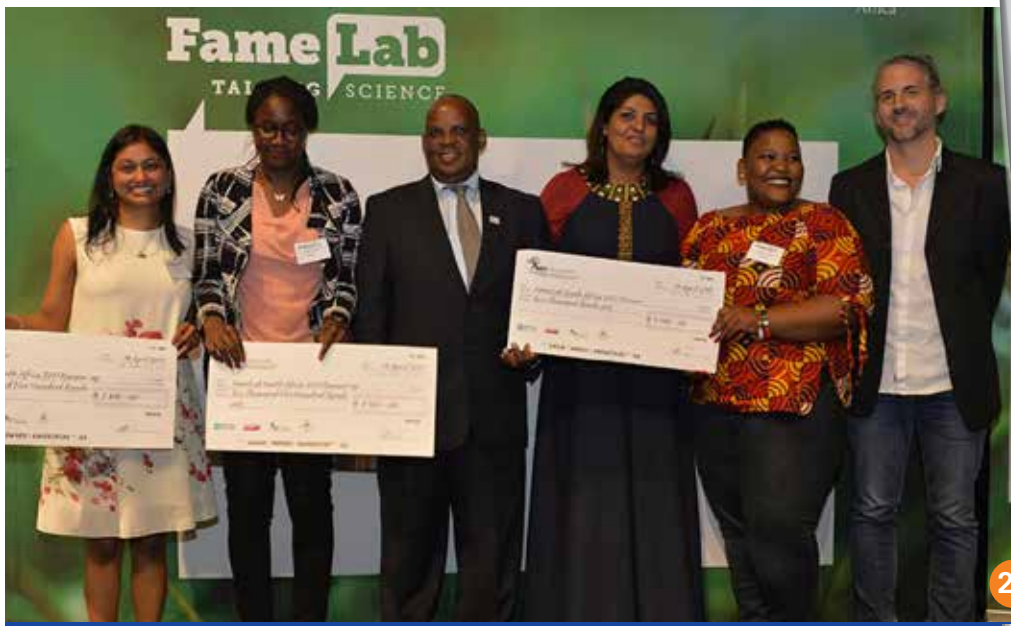
Although the judges' announcement of the winner came as no surprise to the audience, following the thunderous applause on conclusion of her talk, Tshiamo commented that, "I am very grateful for the opportunity that Famelab® has given me and am excited that I am going overseas. But most importantly I am very humbled that my science has been recognised as being entertaining, important and relevant to society today." She hopes her idea can assist impoverished communities with building a business case to beneficiate geological ore bodies, which are found in areas rich in natural mineral resources. "So this is one technological innovation that we plan to transfer to the communities that can use it. Hopefully in future this can help employ a few people – it will be fields of gold to harvest," she said.

Runners-up Nanji Sheni (an Engineer-in-training at Mintek) and Dr Sheetal Silal are both graduates of the University of Cape Town (UCT). Nanji holds an MSc from the UCT Centre for Minerals Research (CMR) of the Department of Chemical Engineering. Her FameLab® talk focused on mineral beneficiation or extending benefits from what would be regarded as mining waste, through the use of floatation in minerals processing. Nanji says, "I am passionate about positive change in Africa and especially our communities and I love the idea generation around creating African solutions to African problems." Anisa Khan, Newton Fund and Higher Education Programme Manager at the British Council commented that, "The British Council is committed to creating opportunities for youth worldwide and through our work in science we hope to provide a platform for taking African science to the world and to support the co-creation of knowledge through new science and research partnerships with the United Kingdom."

The 2nd runner up, Dr Sheetal Silal, is a senior lecturer and researcher in the Department of Statistical Sciences, Faculty of Science, at the University of Cape Town (UCT), where she completed both her MSc and PhD. Her FameLab® talk and primary research area is in the mathematical modeling of infectious diseases with a particular focus on malaria elimination efforts in South Africa, Southern Africa, and the Asia-Pacific region. Through her research, she aims to analyse malaria transmission dynamics for policy advice. She is the Head of the newly formed research group Modelling and Simulation Hub, Africa (MASHA) based at the University of Cape Town, a group aimed to connect and train African mathematical modellers working in tropical diseases.

Should your institution wish to get involved in FameLab® 2018, submit an Expression of Interest form available on the British Council, JiveMedia Africa or SAASTA websites, or contact Anisa Khan at the British Council famelab@britishcouncil.org.za

FameLab® in South Africa is made possible by a partnership between the British Council, the South African Agency for Science and Technology Advancement and Jive Media Africa.



FameLab® 2017 winner, Tshiamo Legoale and runners-up, Dr Sheetal Silal and Naji Sheni

Participating Institutions in the 2017 heats included:

- University of Witwatersrand (Wits)
- Wits DST-NRF Centres of Excellence (in Paleosciences; in Strong Materials; and Mathematical and Statistical Sciences)
- UNISA
- Tshwane University of Technology
- Mintek
- Council for Scientific and Industrial Research (CSIR)
- Central University of Technology (CUT)
- University of the Free State (UFS)
- University of Cape Town (UCT)
- The Academy of Sciences of South Africa (ASSAf)
- Square Kilometer Array (SKA)
- Nelson Mandela Metropolitan University (NMMU)
- University of Limpopo
- The Mail and Guardian newspaper
- Sci-Bono Discovery Centre
- The Department of Science and Technology

WINNERS

- 1ST PLACE TSHIAMO LEGOALE
- 2ND PLACE NANJI SHENI
- 3RD PLACE DR SHEETAL SILAL

LIST OF FINALISTS (EXCLUDING THE WINNERS)

- Tshepo Makgoba - CSIR
- Wynand van Lesenoord - Nelson Mandela Metropolitan University
- Michael Bodunrin - Wits University
- Saneliswa Magagula - UNISA
- Oluwasegun Kuloyo - University of the Free State
- Aviwe Matiwane - DST NRF Centre of Excellence in Palaeosciences
- Phylis Makurunje - DST NRF Centre of Excellence in Strong Materials

LIST OF SEMI-FINALISTS (EXCLUDING LIST OF FINALISTS AND WINNERS)

- Clarissa Van der Loo - University of Johannesburg (Academy of Sciences South Africa)
- Zanele Matsane - Central University of Technology (CUT)
- Otto Joseph - Rhodes University
- Vereese van Tonder - Square Kilometer Array (SKA) South Africa
- Mapula Razwinani and Ntombikazi Jojo - Tshwane University of Technology (TUT)
- Ursula Rohlwink - University of Cape Town (UCT)
- Mukundi Munyai - University of Limpopo
- Fulufhelo Mudau - University of South Africa (UNISA)
- Lungile Khambule - University of the Witwatersrand (Wits)

About FameLab®

FameLab® was started in 2005 in the UK by Cheltenham Science Festivals and is a successful model for identifying, training and mentoring scientists and engineers to share their enthusiasm for their subjects with the public. It is implemented by the British Council, together with local partners, in over 31 countries, including Mauritius, Uganda, the USA, Brazil, Thailand, Qatar and Kazakhstan to name a few. In SA, the competition is implemented in partnership between the British Council, the South African Agency for Science and Technology Advancement (a business unit of the National Research Foundation) and Jive Media Africa. The competition has a strong capacity-building element with a year-long training programme and heats hosted by various science, higher education and research institutions across the country. One semi-finalist is chosen from each of these heats.

The prizes include science communication Master-class training for the 20 semi-finalists as well as a R5000 cash prize for the winner and R2500 each for the runners up. A highlight for the participants this year was the Master-class conducted by renowned BBC science journalist, producer and communicator, Quentin Cooper.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TALKING
FameLab is the
competition that
talking science.
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FameLab® Hall of Fame

FameLab® has been running in South Africa since 2013 and has influenced hundreds of young scientists from various sciences and research institutions across the country. For some, FameLab® was their first experience in science communication. For others, it provided a platform to further develop and explore their passion for communication. In reflecting on the past 5 years, we chatted to some of the past winners and runners up to find out what they are doing now and to hear their thoughts about science communication and FameLab®.

2014

Raven Motsewabangwe

FameLab® SA 2014 Winner

How did your perceptions about science communication and public engagement with science change through participating in FameLab®?

For the longest time, science communication to me just meant having journalists and researchers talking about science. I have now come to learn that science communication also involves communicating science in such a way that it promotes better understanding and engagement by your audience. It also taught me that written media is not the only form of scientific communication. Verbal, physical and interactive communications play a major role in the relay of messages.

Gugulethu Mahuza-Hocquet

FameLab® SA 2014 Runner Up

How did your perceptions about science communication and public engagement with science change through participating in FameLab®?

It was one of the greatest experiences in my academic life. It reminded me why I was doing my project. Having the platform to share the project with other people helped me to value and understand the importance and the impact that science can bring in one's life. What stands out today is learning that I actually love talking about my work and getting the feeling that I am educating rather that boasting. I also found out that I love public speaking, working with other young, talented, upcoming scientists. With the training we received, I am very much in love with presenting. I have also improved in communicating anything and with anyone easily and getting the point across respectfully and humbly so.

2016

Nozipho Gumbi

FameLab® SA 2016 Winner and International finalist

How did your perceptions about science communication and public engagement with science change through participating in FameLab®?

Before participating in FameLab®, my understanding of science communication was very limited. What it meant for me was my peers or me presenting our research findings at a scientific conference or through written work, such as sending the work out for publication in a good/ high impact factor journal. This is because, as an academic, your career and promotion is entirely dependent on journal publication record. However, through FameLab®, I have since learned that academics can't operate in isolation from the world's very real problems. Science communication isn't just about you. It's about the future of science.

Claude Moshobane

FameLab® SA 2016 Runner up

How did your perceptions about science communication and public engagement with science change through participating in FameLab®?

I learned a lot, and based on the questions that the audience asked me at the national finals, I also realised that I can learn a lot about my science through public engagement. The questions challenged me to think beyond the confines of traditional scientific research.

FameLab® Hall of Fame

2016

Savannah Nuwagaba
FameLab® SA 2016 Runner Up

How did your perceptions about science communication and public engagement with science change through participating in FameLab®?

I learnt that science communication should not just be an option for a scientist, but a mandate. We often directly or indirectly use public funds to do research and so the public deserves to know what we use their funds for. Also, science is meant for the good of the society. Sharing our scientific process with the public is vital for clearing up any misconceptions, especially the ones that run around on social media. I also now know that being a science communicator doesn't make me just a comedian. It makes me a relevant scientist.

Sheetal Silal
FameLab® SA 2017 Runner Up

How did your perceptions about science communication and public engagement with science change through participating in FameLab®?

Participating in FameLab increased my awareness of the need for more and better science communication. Since FameLab I've personally participated in communication activities to bring my research into the public domain.

2017

Tshiamo Legoale
FameLab® SA 2017 Winner and FameLab International Winner

How did your perceptions about science communication and public engagement with science change through participating in FameLab®?

I used to think science communication was difficult and relating to non-scientists a challenge. Through Famelab® I have learnt that nothing explains science quite as simply and accurately as everyday examples, such as doing laundry, catching the train to work or even food preferences. We are literally surrounded by science and scientific concepts, and all it takes to have effective communication is to put those everyday concepts into perspective.

Nanje Sheni
FameLab® SA 2017 Runner Up

How did your perceptions about science communication and public engagement with science change through participating in FameLab®?

I learn a lot more about explaining what you do in simple terms and how we scientists and engineers often assume people know what we're talking about when actually they don't.

SCIENCE LENS

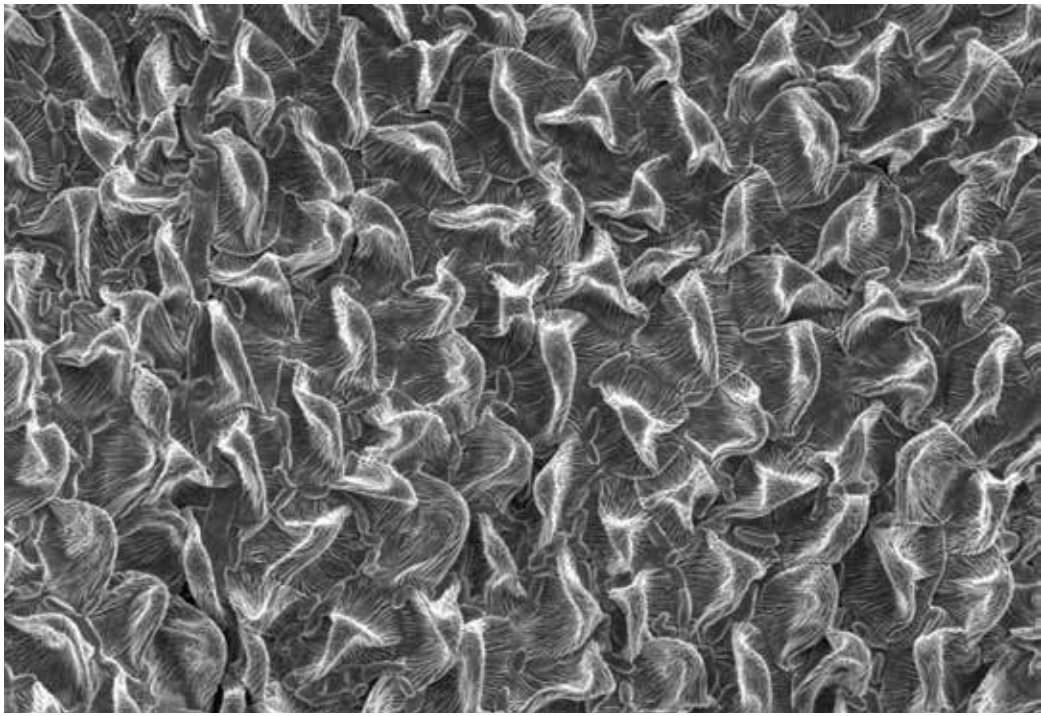
*A celebration of science **through photography***

Some of the best stories are those that have good pictures. Photos can sometimes tell a story on their own or they can make stories more interesting, easier to understand, and help us learn. That's why the South African Agency for Science and Technology Advancement (SAASTA) loves photos about science. They are part of great stories about the science and research taking place in South Africa. Every two years SAASTA runs the SA Science Lens™ competition, to use photographs to tell stories about science. The most recent round of the competition had four categories: Science as Art; Science Close-up, Science in Action and, the special category, Science of South Africa.

> *"A panel of judges of scientists and photographers choose the best photos and stories. It is interesting to read about some of the research happening in South Africa. See for yourself, have a look at this year's winners and read the stories about science."*

Some photos show science in our everyday lives around us, and some are sent in by scientists and show what the scientist studies or how they go about their work. A panel of judges of scientists and photographers choose the best photos and stories. It is interesting to read about some of the research happening in South Africa. See for yourself, have a look at this year's winners and read the stories about science.

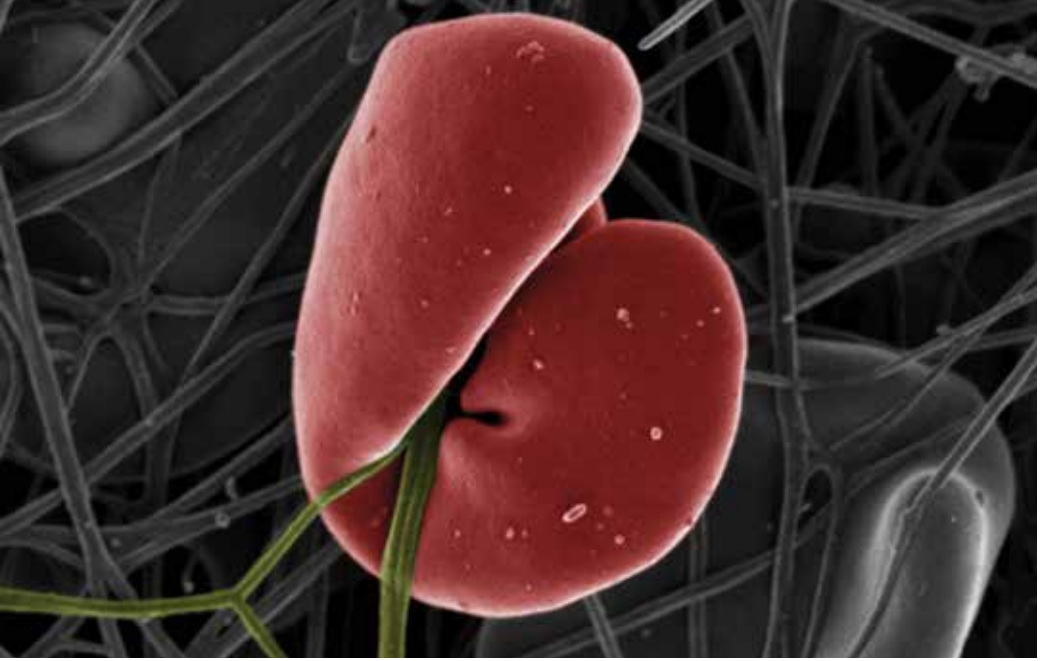
Science as Art awards photographs that show how beautiful science can be or show things in unusual and creative ways. This year's winning photo is an image is called "Microscopic Escher" and was taken by Dr Lydia-Marie Joubert. A special instrument called a scanning electron microscope was used to photograph a rose petal like you've never seen it before. It's magnified so much that if you look very closely, you can see the abundance of microscopic life on the surface of the petal.



"Microscopic Escher" by Lydia-Marie Joubert

Science Close-up photographs reveal details and aspects of science that we normally can't see with the naked eye and require macro lenses or microscopes. A photo by Chantelle Venter, also taken with a scanning electron microscope, entitled "Red blood cell hugging a fibrin fibre" captured the attention of the judges and was awarded first place. This image was taken as part of research that looked at the effects of heavy metals, cadmium and chromium, on the clotting of blood.

This rat's red blood cell is folded around a fibrin fibre in a blood clot, which tells us that the red blood cell's membrane easily deforms because of the heavy metals. That's not good for red blood cells and shows us heavy metals can have bad effects on health.



"Red blood cell hugging a fibrin fibre" by Chantelle Venter

Science in Action shows us science as it happens either in the natural world or in the workplace of scientists, doctors and researchers. Pieter Uys's photograph entitled "A technician observes the laser refurbishment of a generator rotor" shows laser cladding technology in action. A laser beam is used to deposit material on the surface of another material. It has the potential to make components and valuable machinery last longer, saving South African industry significant maintenance or replacement costs.

The special category for 2017, **Science of South Africa**, showcased world-class and unique South African science. Shivan Parusnath photographed a uniquely South African lizard, the Sungazer (Smaug giganteus), a species that is threatened by habitat loss and poaching and found only in the Highveld Grasslands of South Africa. He has been studying this lizard for six years through his masters and PhD research to learn more, with the aim to be able to protect it.

"A technician observes the laser refurbishment of a generator rotor" by Pieter Uys

"All South African Lizard" by Shivan Parusnath

YOUNG SCIENCE COMMUNICATORS COMPETITION

Did you think science is all about mixing chemicals or taking measurements? Did you think scientists all wear white coats while they peer at their specimens? Think again! While growing our knowledge of science through research involves experiments and observations, there is a lot more to the life of a scientist than that. Meet two young scientists, Dr Tlou Masehela and Carla Dodd, who are both passionate about discovering more about the world around us. They are also passionate about telling stories about science and sharing their knowledge with us. They entered the South African Agency for Science and Technology Advancement's Young Science Communicators competition, which encourages young scientists to write or tell stories about science.

Carla is a Masters student in Geology at Nelson Mandela University in Port Elizabeth, where she is studying special rock-like structures called stromatolites. Her studies and adventure travels have allowed her to explore untouched corners of South Africa. She hopes to continue a career in research and conservation, and share her knowledge about the unique ecosystems found on our doorstep.

She asks us to think about water and how the drought can affect whole ecosystems, including our sweetest helpers, the bees.

"Honey, ***please bee smart***"

It is no secret that South Africa is experiencing an extreme drought. Without a lot of tender loving care most gardens will have to be transformed into rock gardens, there are frequent fire warnings, and flyers are being distributed in a desperate attempt to drive home the message: "please use water sparingly."

Most people, however, aren't too concerned. As long as there is water running over their grubby little hands when they turn on the tap, all is well. Everything in society comes so easily that sometimes we forget where our resources come from and that they are limited. After one bout of rain the little guilt felt by society vanishes and the water restrictions are forgotten: swimming pools are filled, two showers a day becomes habit again and that leaking tap continues its dripping melody.

Ask any 10-year-old what the main constituent of the human body is and the answer would be "water". It is as Terry Pratchett said: "Human beings: little bags of thinking water held up briefly by fragile accumulations of calcium." It is concerning to realise how little respect humans have for water and, therefore, themselves.

Both 2016 and 2017 were within the top three driest years, in my 23 years of existence, in the Elands River Valley (hereafter ERV) where I grew up. 2016 marked the year with the lowest rainfall on our farm with a total precipitation of only 478 mm. This is 66 mm less than the runner up (2005) and 253 mm less than the average rainfall over the 23 years. 2017 came in third place with a mere 562 mm total measured rainfall. The prospects of 2018 don't seem much better with the quarterly precipitation thus far even lower than that of 2016.

Despite only being an hour drive from Port Elizabeth, ERV is not a well-known area of the Eastern Cape. Except for a few mountain biking and 4 x 4 enthusiasts, locals and tourists passing through to the Baviaanskloof, few people would be able to pinpoint it on a map. This farming community has many treasures to offer, of which the sweetest is honey. The bees work on a mixture of our indigenous fynbos and thicket and the alien vegetation

Eucalyptus and Acacia mearnsii to produce tons of honey annually. In some instances apiculture is the main source of income to farmers, whereas others rely on pollination for their fruit farming.

The dominant bee species in this area is the African honey bee, Apis mellifera adansonii, also known as Apis mellifera scutellata. It is not only essential for the improvement in agricultural yields but also in the pollination of uncultivated plant species. Recent global declines in various honey bee species have driven dependent plant species to a similar decrease. In 2008/2009 the price of honey skyrocketed due to a widespread virus killing bees. ERV was one of the few unaffected areas. The agricultural use of pesticides, loss of habitat, environmental pollution, the occurrence of pests and diseases such as the Varroa destructor mite, and of course, climate change are all contributors to the decline in bee species.

However, in the case of national drought, all are equal and many South African bee populations, caught in a vicious cycle, are experiencing extreme stress. Drought not only affects just about every plant process but is usually also correlated with plant diseases. The compromised health and inhibition of flowering of plants during a drought has severe effects on pollinators such as bees. Decreased pollination leads to a further decrease in vegetation growth and so it goes on.

As the ambassadors of the most intelligent species on Earth, humans need to accept responsibility for their actions. We need to realise that in the cosmos it is "one for all and all for one". We are part of a much bigger picture, composed of small details, such as the health of bees. We are integrated in a large ecosystem and a simple act of thinking twice before you open a tap and showering only once a day can help alleviate the effects of drought. The next time a bee circles your head if you are trying to drink a can of Fanta, do not swat it but rather appreciate all it is doing for the human race. And please: "use water sparingly."

Tlou is a scientist at the South African National Biodiversity Institute and leads a programme of work that focuses on monitoring and reporting the impacts of Genetically Modified Organisms on the environment. He holds a PhD in Entomology from Stellenbosch University. He is also the current chairman of the Western Cape Bee Industry Association. He is passionate about educational outreach programmes and his talks are based on the subject of insect pollinators such as honey bees.

For the Young Science Communicators competition, he also showed his talent as a poet, with his submission "As Tiny As I Am".

As tiny as I am...

I am as old as the Pyramids of Egypt
Yet my tiny body defies my age
I am a vibrant soul that glows with the golden sunshine
And my hairs are interweaved with a shadow of darkness
I am loved by a few and ignored by many
The Melissa's of this world bare my name
But to many I am a killer
All are drawn to the sweet honey of my labour
But hate my sting which can also heal them
...as tiny as I am,
Adorn me with credit for the beauty of your landscape
Clothe me with gratitude for the blossoming sunflower fields
Canola oil overflows from my toiling
Pollination that feeds a nation
The sound of my buzz is music to many farmers
The buzz of income to many beekeepers
Call me nature's economic builder
Even though I may seem to work less hard than you
...as tiny as I am,
You not only starve me, but blind me
You destroy my home and pollute my playground
You claim to echo my importance to your well-being
Yet your actions undermine my significance in your "precious" environment
Or am I as good as what I can do you for?
...as tiny as I am,
I hear the threat to my fading existence rattles you, human
Natural systems might go off balance
Economies may collapse with my disappearance
Experts say you will cease to exist without me
Is your value for me as tiny as I am?

NATIONAL SCHOOLS DEBATES

SJ Van Der Merwe Technical High School crowned ***National Schools Debates champions***

SJ Van Der Merwe Technical High School from Limpopo Province beat eight schools to be awarded the title of the 2017 South African Agency for Science and Technology Advancement National Schools Debates champions on Friday evening at a glittering award function, at the Southern Sun Hotel in Pretoria. SJ Van Der Merwe Technical High School went head-to-head against eight other competing high schools from around the country for the coveted prize, all of whom are the respective provincial winners out of 90 schools that competed in all provincial finals.

The panel of adjudicators including nanoscientists and debating experts, judged the team from SJ Van Der Merwe Technical High School learners to be the most well-rounded debaters, presenting well-balanced content and persuasive arguments.

All nine schools debated the question: Should South Africa increase its investment in the development of medical nanotechnology and will this benefit everyone in South Africa?

The topic was on nanotechnology in the field of medicine and how it could transform the way we detect and treat damage to the human body and disease. Nanotechnology is being applied in the development of more effective drug delivery systems and "smart drugs" are now able to target particular areas in the human body. Introduction of nanoparticles into the human body comes with associated risks and not all of these risks are known.

Competing schools were tasked to argue this question and the topic from four different perspectives, these being: Application and Benefit, Economic, Socio-Cultural and Political. The contestants are only allowed to pre-prepare their opening statements but subsequent responses and closing speeches must be prepared during the competition.

In addition to increasing their knowledge on nanotechnology and gaining experience in the debating arena, the Square Kilometre Array (SKA) is awarding the team and their educator an all-expenses-paid science tour to the East Coast of the USA. The tour will include, amongst others, a site visit to the Greenbank Radio Astronomy Observatory in West Virginia; guided tours of the NASA Goddard Space Flight Centre and Smithsonian Museums, including the Air and Space Museum, in Washington, DC; and an internship at the American Museum of Natural History in New York.

Front row from left to right: *Mahlodi Lekoana and Tshegofatso Motlatla.*
Back row from left to right: *SKA SA representative, Ms Anja Fourie, Kabelo Maifadi, Morakoane Madiba, Itumeleng Katjedi and Ms Onicca Lekgothoane, a teacher at SJ Van Der Merwe Technical High School*

It is quite easy to be ignorant and have an opinion. It is much more difficult to be informed, well read and educated on a topic and to be able to distil this information into an argument and to then deliver this argument in a manner that everyone understands. One also then needs to be open, wise and humble enough to hear other people arguments and possibly even adjust one's own perspective based on these arguments," said Michael Ellis, Manager of Science Communication for SAASTA. "Debate is a lively and valuable platform that makes scientific information relevant to learners; it's the spark that can light the fire which fuels a lifelong quest for innovation," added Ellis.

The SAASTA National Schools Debates Competition is an annual programme that aims to encourage young people to address key issues around science and technology that are faced by their communities. Conceived and hosted by SAASTA, a business unit of the National Research Foundation, the programme seeks to foster the confidence to speak about science in high school students from Grades 9 to 11. It also gives participants the opportunity to develop research, critical thinking and information literacy skills, as well as the ability to work as a team to present logical, clear arguments.

The National Schools Debates Competition is supported by the Department of Science and Technology-funded public engagement programmes – HySA Public Awareness, Demonstration and Education Platform and the Nanotechnology Public Engagement Programme - and the Square Kilometre Array.

EXPERIENCING NANO BEHIND THE SCENES

Members of the public had the opportunity to see nanotechnology in action during a tour of the facilities of two top-class South African research groups in this field of science. The tour's aim was to bring nanotechnology closer to society, was arranged by the Nanotechnology Public Engagement Programme and SAASTA in collaboration with the University of the Free State (UFS), and Mintek's Nanotechnology Innovation Centre (NIC).

Learners, researchers, scientists, policy makers, industry representatives, science communication practitioners and members of the media attended interesting tours of the nanotechnology research facilities at the UFS and Mintek on 20 and 29 September 2017 respectively. The tours created awareness of nanotechnology, while educating and enhancing the understanding of nanotechnology and nanoscience. The tours also gave participants the platform to interact, discuss and establish network with the researchers and their research work.

The participants in the UFS tour were welcomed by Professor Danie Vermeulen, Dean of the Faculty of Natural and Agricultural Sciences, who shared his pride in the contribution of the university to nanotechnology research in South Africa. Professor Hendrik Swart, Senior Professor in the Physics Department at UFS, shared information about the facility's background and its equipment. He emphasised that teamwork had led to the major developments of the science facilities and he expressed gratitude to entities such as the NRF, the DST and Sasol for assisting with sponsorship in the Faculty of Science.

Xolani Makhoba, Deputy Director: Emerging Research Areas at the DST gave a keynote address about the development of nanotechnology in the country. In his concluding

remarks, he said it is envisaged that, through focused innovation interventions, at least two South African developed nanotechnology products will hit the markets by 2025/26.

At Mintek, Dr Jones Papo, Manager of the Advanced Materials Division, gave warm welcoming remarks. The Mintek NIC Director, Dr Lucky Sikhwivhilu, shared the work the centre does in health, water and sensors. He also stated that the NIC is committed to transferring fundamental research to usable technology.

Mmboneni Muofhe, Deputy Director-General at DST gave a keynote address on technology innovation and emphasised that "Effective communication of science is the key to the economic growth of our economy."

SAASTA's Science Communication Manager, Michael Ellis, spoke on both occasions about the purpose of the tours. He quoted Christopher Coons, a United States senator, who said, "Scientists simply can't be silent, or else science truly will be silenced," to inspire science researchers to publicise their work and share their endeavours with the public.

At the end of the talks, the participants watched an audio visual presentation of the facilities. They were then divided into groups for the tour and were guided to different laboratories to learn about the nano research conducted at each facility. At each point of the tour, the researchers also explained to the participants how experiments were conducted and the purpose of equipment in the laboratories.

The participants learned about the synthesis and characterisation of various nanostructures for use in different applications. At Mintek, participants visited the peptide synthesis laboratory, which focuses on making nanomaterials for targeted drug delivery applications. The participants were also taken to the bio labels lab where portable and user-friendly diagnostic kits that can be used for health-related applications are being made. The participants also visited the water laboratory where research is conducted on chemicals that will be added to products used to purify water.

The participants were introduced to a variety of equipment at the UFS laboratories. These included the X-ray Photoelectron Spectrometer, which is used for the study of

Mr Michael Ellis (SAASTA), Prof. Koos Terblans (UFS), Mr Xolani Makhoba (DST), Prof. Hendrik Swart (UFS) and Dr Mthuthuzeli Zamxaka (SAASTA).

atoms; the Scanning Auger Microscope; as well as the Ion Time-of-Flight Secondary Ion Mass Spectrometer, which is used to reveal the chemical bonds in a sample and to draw maps of the positions of atoms.

Ogugua Simon, a PhD student at UFS said, "It was a wonderful experience taking students to different labs and explaining to them about the experiments we conduct. Although at first they did not understand and did not even ask questions, as they were going through different labs they started to be free and participated actively."

Vuyiswa Moyikwa (16) from Vulamasango High school, a participant in the UFS tour said, "I am very excited to be here and I learned a lot. I wish this programme can be developed in rural areas so we can learn about different science careers and research that the researchers are doing."

2ND ANNUAL YOUTH IN SCIENCE, TECHNOLOGY AND INNOVATION INDABA

The 2nd Annual Youth in Science, Technology and Innovation Indaba, organised by the DST and Department of Labour (DoL), was held at Nasrec Expo Centre in Johannesburg on 15 June 2018.

NRF|SAASTA Divisions together with other DST entities such as the Technology Innovation Agency, Academy of Science of South Africa and South African National Space Agency participated. The exhibitors had a chance to engage the youth on DST's initiatives such as the National Youth Service (NYS) volunteer programme and the DST|NRF Internship programmes as the Department's interventions addressing unemployment and skills development amongst the youth. The HySA PADEP further organised the participation of HySA Centres of Competencies from Mintek, North West University and University of Western Cape at this event, with the HySA CoCs exhibiting alongside with the DST entities.

NRF|SAASTA and various other stakeholders launched the 2.5 KW Renewable Hydrogen and Fuel Cell Demonstration Project at Poelano High School in Ventersdorp, North West, on 13 April 2018. The project provided an opportunity to demonstrate to the learners, educators and the community that science can be used to solve socio-economic challenges that South Africa is facing, particularly rural electrification. The three Centres of Competence (CoCs), which are supported through one of DST's initiatives, Hydrogen South Africa (HySA), implemented the project.

The Department of Mineral Resources (DMR) organised and facilitated the 2018 edition of Learners Focus Week in Mineral Resources from 1 to 4 July 2018 at Nelson Mandela University in Port Elizabeth. NRF|SAASTAwas part of the organising committee for this event and responsible for the facilitation of science experiments and science shows. In partnership with the Saldanna-based Arcelomittal Science Centre, NRF|SAASTA offered science shows for the duration of the event. Curriculum-focused science experiments aimed at supplementing the theoretical concepts in chemistry taught in the classroom were also offered.

Science Ubuntu, in partnership with Mams Radio and Ms Lesego Masethe (DST's Youth Journalism Intern), organised the first-ever science fair and expo in the community of Mamelodi on 30 June 2018 titled "Loxion Science Fair and Expo". NRF|SAASTA offered career awareness in the DST-priority areas of biotechnology, nanotechnology, and hydrogen and fuel cell technology. Promotional materials focusing on career opportunities were also distributed to learners attending the event. About 33 learners also displayed their science projects. These projects identified solutions, through data analysis, based on a problem within their respective communities. The event, which was aired live on Mams Radio through Outside Broadcasting, was a huge success as it received the acknowledgement and positive response from Minister Mmamoloko Kubayi-Ngubane.

SCIENCE AND TECHNOLOGY YOUTH JOURNALISM PROGRAMME

BACKGROUND

The Department of Science and Technology, in support of the Comprehensive Rural Development Programme, has tasked the South African Agency for Science and Technology Advancement with the responsibility to implement the Innovation Partnership for Rural Development Programme (IPRDP) Science and Technology Journalism Programme. The IPRDP is intended to gather knowledge, evidence, and learning for integrating innovative technologies in improving access and quality of public service delivery.

> *"The scope of the IPRDP business plan is not limited to demonstration only but have aspects of skills transfers to municipalities and communities; promotion of science and technology amongst youth; and capacity building on the management of innovative technologies."*

The IPRDP is a two-year programme that will demonstrate innovative technology solutions in district municipalities that form part of the prioritised 26 district municipalities. The programme demonstrates technologies in various sectors ranging from water, sanitation, energy, and ICT. The scope of the IPRDP business plan is not limited to demonstration only but have aspects of skills transfers to municipalities and communities; promotion of science and technology amongst youth; and capacity building on the management of innovative technologies.

Beyond demonstration of innovative technologies, the IPRDP intends to promote interest in science and technology amongst the disadvantaged youth through a Science and Technology Youth Journalism Programme.

In line with the Science Engagement Framework Strategy 1, the IPRDP aims to popularise science, technology, and innovation, and thus contribute to improving public understanding and awareness of science and technology. SAASTA aims to be the leading science advancement agency in the country by promoting and communicating the value and impact of science, technology, and innovation in a dynamic knowledge economy. It also intends to contribute significantly towards building a science, engineering, and technology (SET) human resource base.

The Science and Technology Youth Journalist Programme is being implemented within district municipalities where IPRDP technologies are demonstrated. The programme is primarily aimed at young adults between the ages of 18 and 35 years, residing within these communities; specifically unemployed individuals with undergraduate qualifications in science and engineering, communications, and journalism studies.

SCIENCE JOURNALISM INTERNSHIP HIGHLIGHTS

The majority of the interns that completed their internship at the end of July, volunteered to working at the community media while still while looking for permanent employment. Some of them are being paid stipends from the community media and some continue to report on science and technology stories.

Mbalenhle Shandu received an acknowledgment at the Liberty Radio Awards as one of the Bright Stars in the radio industry in April 2017. This event has replaced the MTN Radio Awards and has shown substantial growth since its inception in 2010. Currently, it is one of the most prestigious awards in radio and Shandu was acknowledged as deserving, when she scooped the coveted award.

> *"These events also provided a platform where the interns could network with young scientists to promote both the communication of research by the scientist and the subsequent reporting by the interns."*

Several opportunities were afforded to the interns to cover some major events during the quarter, including the Youth in Science and Innovation Indaba, the Pre-Lindau Nobel Laureate Meeting, and Alumni Networking Meeting.

All these initiatives are aimed to expose the interns to scientists and high level events that are related to science, technology, and innovation to contribute to science reporting through community media stations. These events also provided a platform where the interns could network with young scientists to promote both the communication of research by the scientist and the subsequent reporting by the interns.

The programme is currently focused on increasing the number of engaged journalism interns and expanding the national footprint to include Gauteng and the Northern Cape. This should contribute significantly to the success of the programme since Gauteng is the most densely populated province and the Northern Cape is host province of a variety of exciting and news worthy projects such as the Square Kilometre Array and the Bloodhound Super Sonic Car.

SOUTH AFRICAN BIOTECHNOLOGY PERCEPTIONS SURVEY SHOWS IMPROVED AWARENESS

The Minister of Science and Technology, Ms Naledi Pandor, launched the results of the Public Perceptions of Biotechnology survey in South Africa on 1 November 2016 at the Government Communication and Information Systems, Press Room Tshedimosetso in Pretoria. The study was conducted by the Human Sciences Research Council, commissioned by the Department of Science and Technology's Public Understanding of Biotechnology programme, housed at the South African Agency for Science and Technology Advancement.

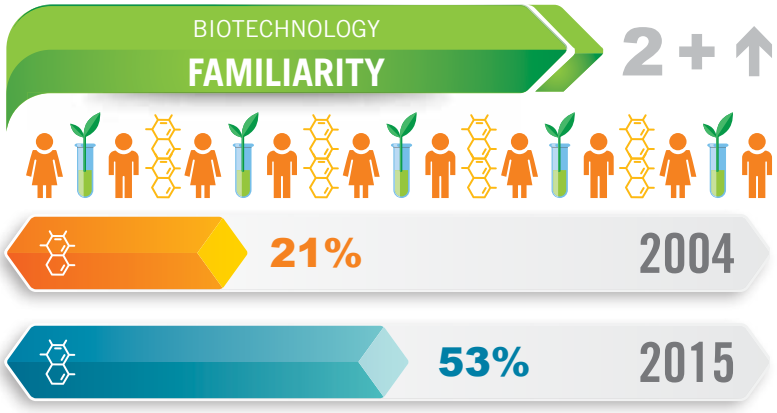
The South African Public's Perceptions of Biotechnology survey focused on perceptions around biotechnology broadly as well as on more specific areas such as agricultural biotechnology, medical biotechnology and indigenous biotechnology knowledge. The analysis will provide key information that may be used to inform policy and debate in the South African biotechnology sector.

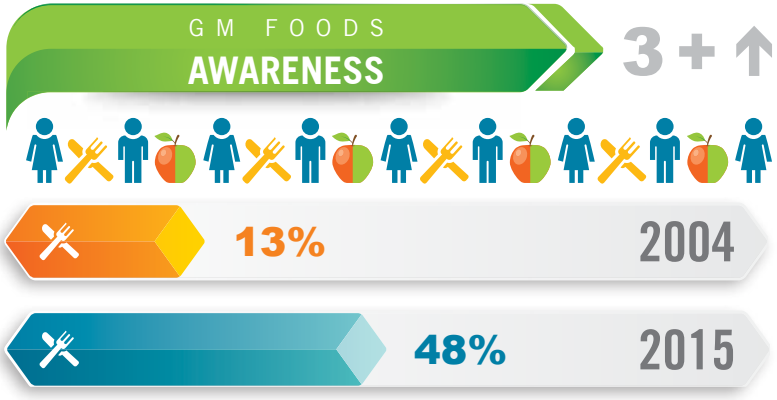
The study was administered through the South African Social Attitudes Survey in November 2015. Interviews were conducted at 500 sites in all provinces in South Africa, in both urban and rural areas. As many as 2940 adult South Africans were interviewed and the results provide representative data for the South African adult population.

The study looked at changes over time in instances where there is comparability to the previous national survey of Public Perceptions of Biotechnology of 2004. These changes signify a significant shift in public awareness of aspects of biotechnology between 2004 and 2015.

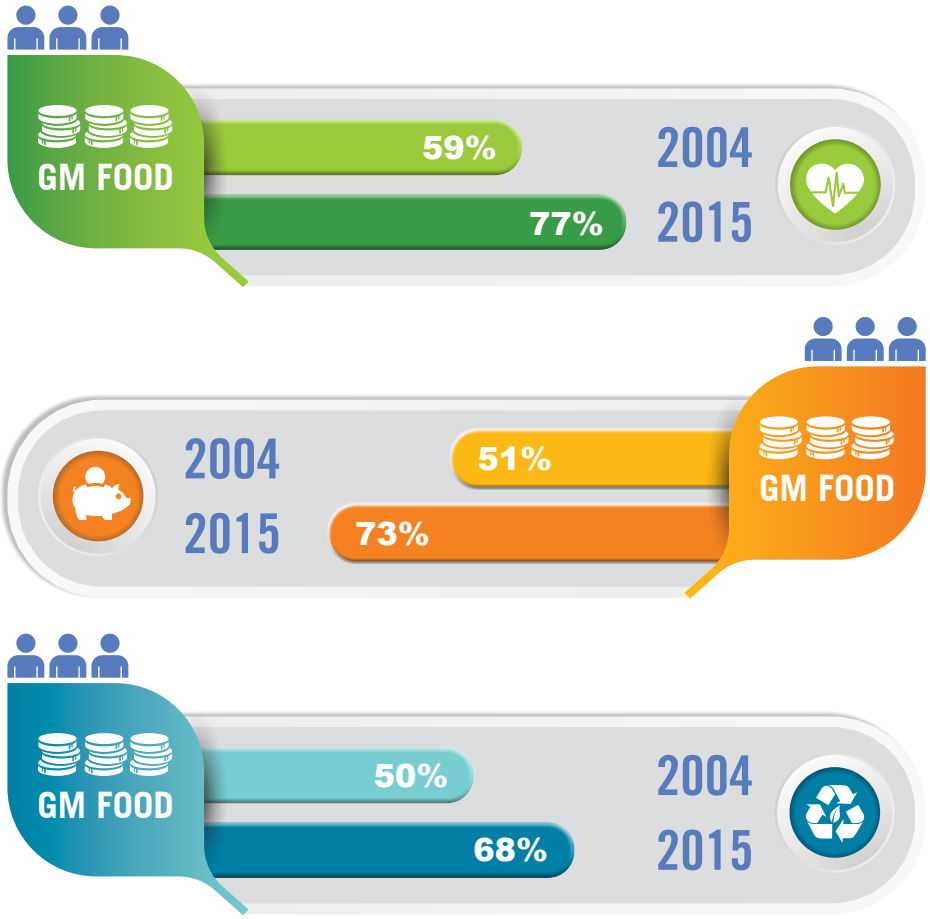
The results of this study provide indications of what the public know about biotechnology, how the public feels about a range of biotechnology-related issues, how the public accesses information about biotechnology, and the manner in which the public perceives biotechnology-related products.

According to the study since 2004 public familiarity with the term 'biotechnology' has more than doubled, from 21% in 2004 to 53% in 2015. Awareness that genetically modified (GM) foods form a part of the South African diet has more than tripled from 13% to 48%.





The study also reveals that there has been a major increase in attitudes that favour the purchasing of GM food. The proportion of the public that would purchase GM food on the basis of health considerations has increased from 59% to 77%, while attitudes to purchases on the basis of cost considerations and environmental considerations have increased from 51% to 73% and 50% to 68%, respectively.



When it comes to knowledge about biotechnology, the study reveals that most South Africans (73%) report having little or no knowledge about biotechnology. A younger and more privileged group report considerably greater knowledge than older and less privileged groups. Almost half of the public feel that biotechnology is too specialised for them to understand.

The study further reveals that South Africans have used biotechnology in the context of indigenous knowledge systems (IKS) and practices. Groups with low incomes and low levels of education may find it difficult to engage with concepts of mainstream biotechnology, but harbour rich traditions of knowledge and practice of IKS that may be successfully leveraged to build greater awareness of biotechnology. When it comes to the perceptions of medical biotechnology the overall knowledge about medical applications of biotechnology is similar to that of GM foods, suggesting that attitudes among the public cut across specific applications of biotechnology. The risks and benefits of biotechnology are central to public debates and meaningful engagement in these debates requires knowledge about biotechnology concepts and applications.

Only about half of the South African public engaged with the question of a general risk/benefits analysis of biotechnology, while the other half registered indifference or 'don't know' response. White and Indian South Africans were more likely to see biotechnology as an overall risk to society compared to Black African and Coloured groups. Higher levels of education and living standard are associated with an increased likelihood to view biotechnology as a risk. Increased educational attainment was associated with a more positive risk/benefit assessment.

Those living on rural farms and urban informal areas were substantially more positive in their assessment than those in other areas. An individual with no ethical or religious objections to GM is much more likely to believe that biotechnology is a benefit rather than a risk. If an individual thinks that government effectively regulates GM food, then he or she will be less likely to view biotechnology with uncertainty and more likely to rate it as a benefit than a risk.

South Africa is a highly stratified society, characterised by divisions along lines of economic inequality, educational inequality, ethnicity, race and geographical locations. The perceptions of the South African public can be delineated by key demographic indicators such as age, education, income and geographical location.

The report recommended that policy interventions need to include a strategic approach towards addressing these different publics in different ways, drawing on the evidence related to their levels of knowledge, attitudes, and preferred sources of information. The policy needs to assess which 'publics' require engagement in terms of specific issues as identified in the key themes emerging from the survey.

SOCIAL INVESTMENT PROGRAMMES

Majority of the formal programmes that NRF|SAASTA implement contributes to the social development of peri-urban, rural, and deep rural communities.

2016/17:

For the reporting period under review, SAASTA actioned the following social investment initiatives:

- As part of the SAASTA Youth Day Celebrations and to commemorate the struggles of South Africa and its learners, the divisional managers delivered educational resource material to seven schools on 15 June 2017; two schools in Pretoria, Johannesburg, and Soweto, and one school in Atteridgeville.

2017/18:

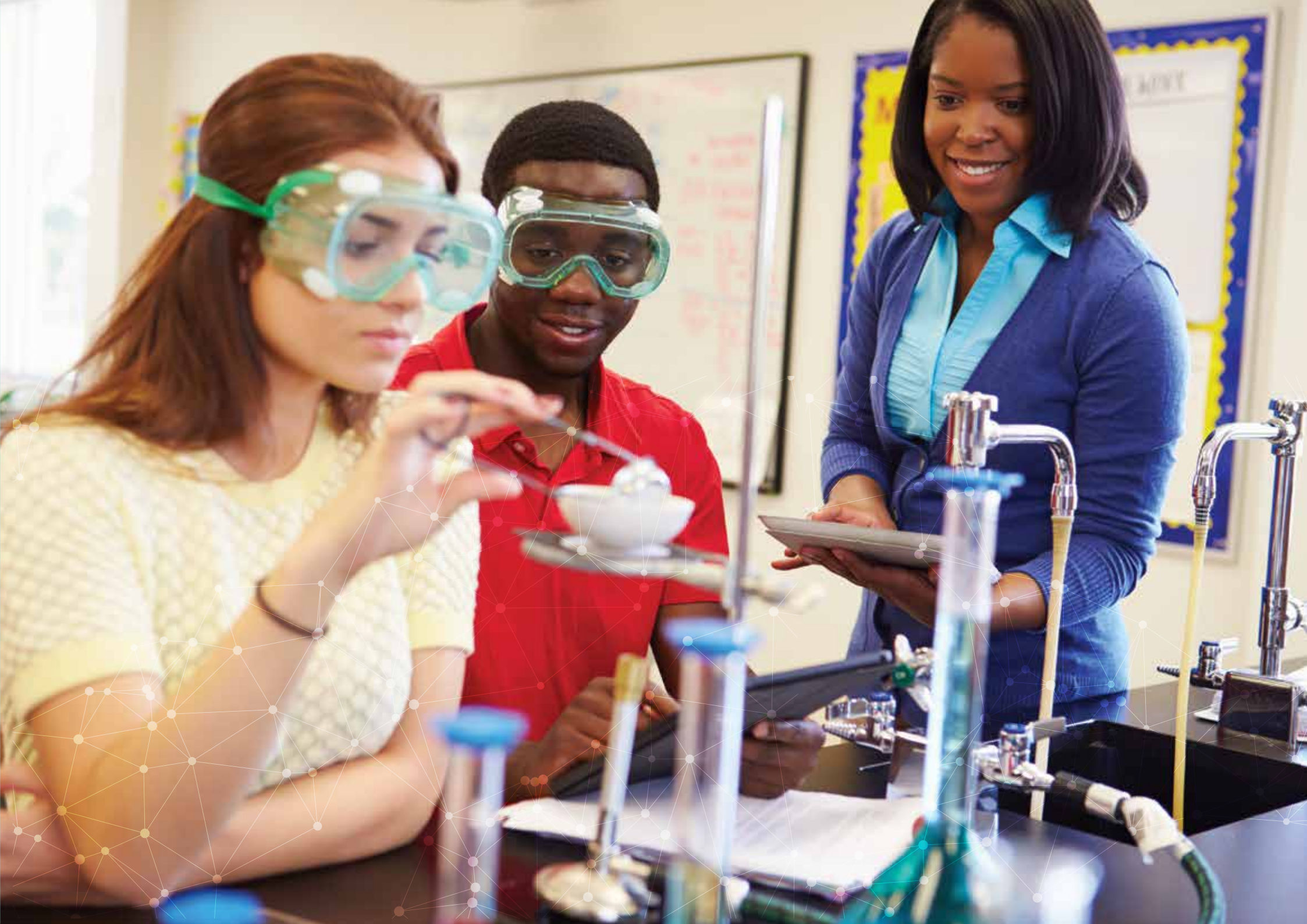
- For this year's Mandela Day, NRF|SAASTA visited two places of safety in Pretoria namely, Holy Cross Home and Leamogetswe Safety Home in Atteridgeville. With a budget of R2500 per home, NRF|SAASTA sponsored foodstuff including rice, mealie meal, sugar, and cooking oil, as well as some toiletries and cleaning products.

- Sanitary pads were handed over to 1 200 girl learners from approximately 8 schools in the rural areas outside Tzaneen during August 2018 in celebration of Women's Month. In collaboration with Letaba Hospital. Nkowankowa Circuit and Black Women in Science, SAASTA organized a role model campaign for the girl learners focusing on STEMI Careers and life skills.

Michael Ellis, Science communication manager delivering educational material.

Dr Jabulani Nukeri, SAASTA's Managing Director, at Leamogetswe Safety Home in Atteridgeville for the SAASTA Mandela Day initiative.

AASTA staff members giving back to Leamogetwe Safety Home during Mandela Day.



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SCIENCE COMMUNICATION

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Manager: Science Communication

Joanne Riley
Science Editor

Kedibone Monyebodi
Project Officer

Lithakazi Masilela
Project Officer

Martha Mokgoko
Project Administrator

Refilwe Mogami
Unit Administrator

Sipho Dhlamini
ICT Coordinator

Sizwe Khoza
Project Coordinator

Zamuxolo Matiwana
Media Coordinator

SCIENCE EDUCATION

Moloko Matlala
Manager

Chrisna Van Staden
Senior Administrator

Erna Taljaard
Project Coordinator

James Tlhabane
Project Coordinator

Makhanana Nkhwashu
Project Assistant

Ramoloi Jacob Maxalaba
Project Officer

Simon Rametse
Assistant Project Administrator

Tebalo Tsatsi
Project Coordinator

Vhutshilo Nekhwalivha
Project Officer

Zinzi Madiope
Project Officer

SCIENCE AWARENESS

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Manager

Vanessa Naidoo
Administration

Bafedile Kgwadi
Project Coordinator

Brenda Edwards
Administrative Officer

Edwin Ramonnye
Maintenance

Happy Vilakazi
Project Coordinator

Mandla Shivuri
General Maintenance Assistant

Mavis Mohumotjie
General Assistant / Receptionist

Msizi Khathide
Project Coordinator

Njabulo Duma
Project Officer

Nomathemba Mdlalose
Project Officer

Thandamanzi Mtsweni
Project Coordinator

FINANCE & ADMINISTRATION

Nonhlanhla Gumede
Finance and Admin Manager

Elda Tshidi Seboni
Financial Officer

Jacob Manchidi
Registry

Jolien Martins
Financial Officer

Lucas Sandleni
SCM Administrator

Malesela Madiba
Financial Officer

Maphefo Chauke
Grants Officer

Marlize Delport
Financial Controller

Medupe Moeng
Administrative Controller

Michael Machete
General Maintenance Assistant

Michael Monametsi
Driver / Messenger

Rirhandzu Mabasa
SCM Administrator

Tshepo Matheane
Supply Chain Coordinator

Tsietsi Machaa
Financial Officer

HUMAN RESOURCES

Sophie Ramaboya
HR Practitioner

Kgomotso Louw
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Viwe Njikelana
Payroll Administrator

Macdonald Kapu
HR Project Officer

Deborah Mokone
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Gugulethu Mtsweni
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Lindie Muller
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VOLUNTEERS & INTERNS

Babalwa Njomi Science Education Volunteer	**Dakalo Sigidi** Science Education Volunteer	**Lufuno Mudzihigi** Science Education Volunteer	**Yonela Makhanda** Science Education Volunteer	**Boitumelo Makgabutlane** Science Communication Volunteer
Tshegofatso Mudau Science Communication ICT Volunteer	**Brian Vukosi Makondo** Science Awareness Volunteer	**Gerald Maluleke** Science Awareness Intern	**Goodwill Tshabalala** Science Awareness Volunteer	**Kgomotso Lamola** Science Awareness Volunteer
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