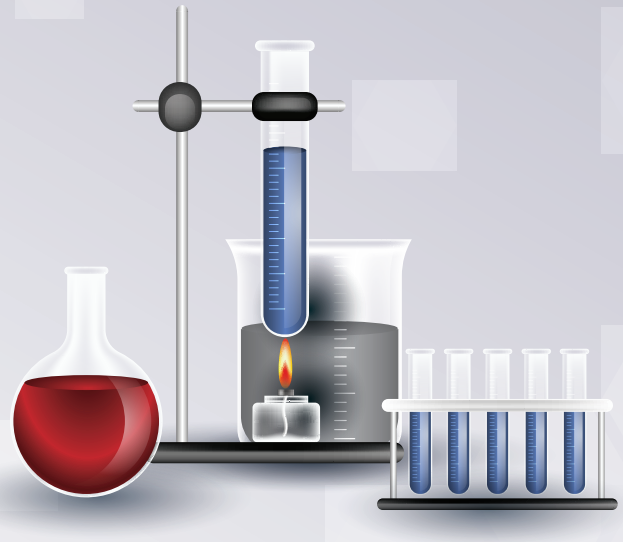
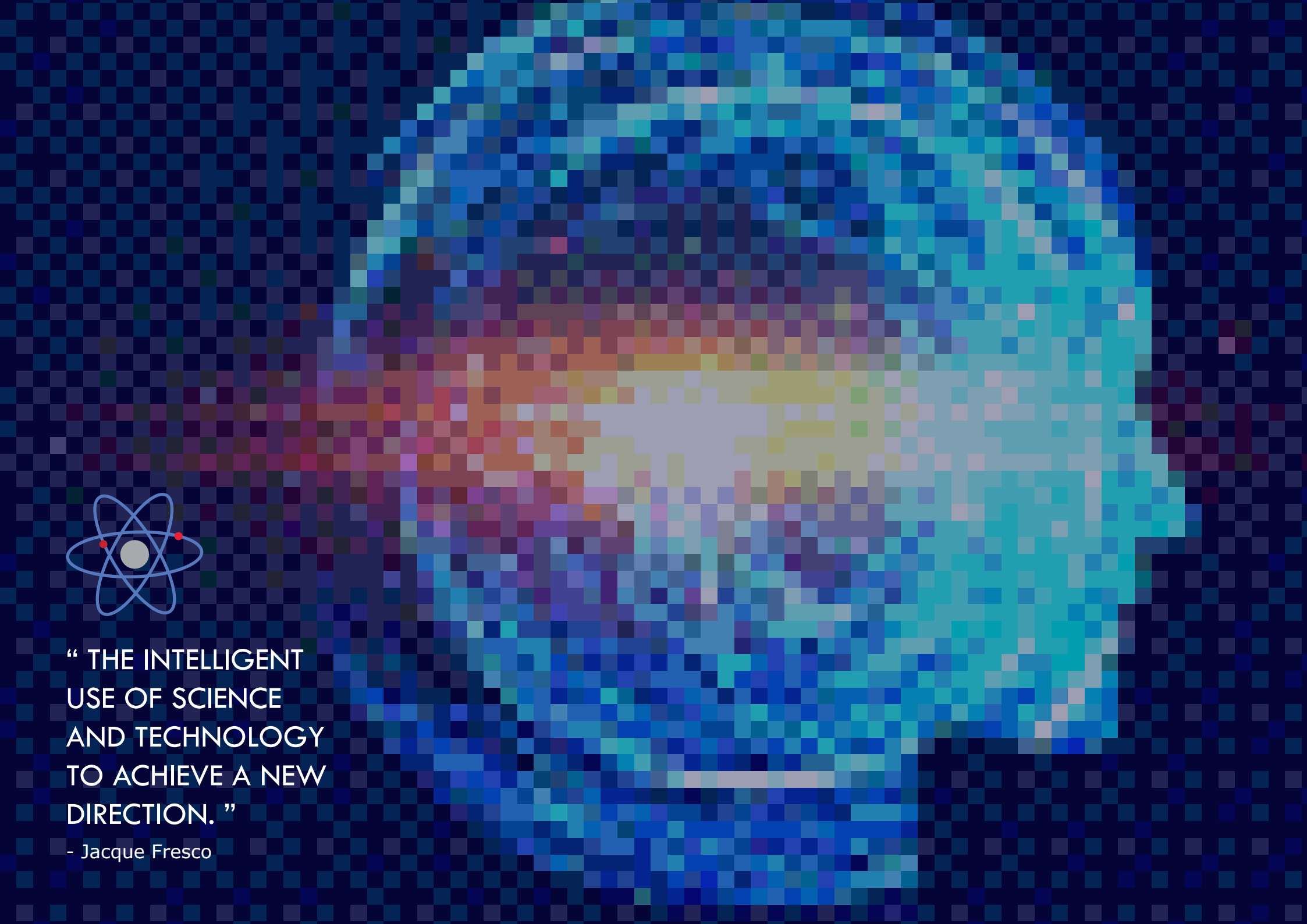
NRF-SAASTA 2019-21

SCIENCE ENGAGEMENT HIGHLIGHTS REPORT



science & innovation
Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA

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


“ THE INTELLIGENT USE OF SCIENCE AND TECHNOLOGY TO ACHIEVE A NEW DIRECTION. ”
- Jacque Fresco

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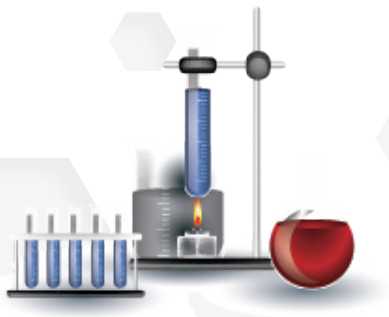


ABOUT NRF-SAASTA

The National Research Foundation's business unit of South African Agency for Science and Technology Advancement (NRF-SAASTA) has a mandate to advance public awareness, appreciation and engagement of science, engineering, innovation and technology in South Africa.

Science, through research, has a crucial role to play in the growth of South Africa's economy. Active dialogue and engagement between science and society ensures that scientific research findings are easily translated into relevant, appropriate and beneficial innovation and entrepreneurial opportunities. Research findings should also have an impact on policy and social conditions in a country. This can only be achieved when science becomes a daily dialogue and discourse.

The fundamental principles of NRF-SAASTA's success in advancing a culture of engagement with science in South Africa lies in its synergistic approach. NRF-SAASTA initiatives fall under three key strategic areas:

Science Education, through which we build up the supply of tomorrow's scientists and innovators.

Science Awareness, through which we engage the public with the phenomena of science, engineering and technology.

Science Communication, through which we share science and technology achievements with the public, building up their appreciation of benefits of science).

The three areas are interdependent, each enhancing the effectiveness of the other, while accommodating different target audiences and creating opportunities for joint initiatives across several government departments, higher education institutions, science councils, science centres and other science agencies.

Science advancement is integrated in every level of the business of the NRF. NRF-SAASTA, the National Research Facilities (that focus on the fields of astronomy, biodiversity and conservation, and nuclear sciences) and the Research, Innovation Support and Advancement office (that supports research, researchers and the provision of world-class research infrastructure through a grant-making programme) are implementing a cross-cutting science engagement plan.

Our mission

To advance public awareness, appreciation of and engagement with science, technology, engineering, mathematics and innovation in South Africa.

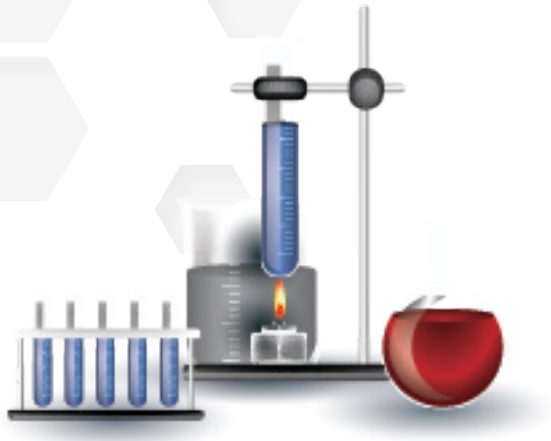
Our vision

NRF-SAASTA aims to be the leading science advancement agency communicating the value and impact of science and technology in a dynamic knowledge economy, and simultaneously building the science engineering technology human resource based in South Africa.

Our values

- World-class service
- Passion for excellence
- Integrity and ethics
- People-centred
- Respect
- Accountability

NRF-SAASTA's contribution to the NRF's vision is to grow the pool of quality learners today who will become scientist and innovators of tomorrow. By growing the awareness of science through exploration, exhibits and actual experience, we instill in people an enthusiasm about the subject and encourage greater public engagement in SET issues.



MESSAGE FROM THE MANAGING DIRECTOR

Since the establishment of the NRF-SAASTA, our mandate to "advance public awareness, appreciation of and engagement with science, technology, engineering, mathematics and innovation (STEMI) in South Africa we have strived to continue to communicate the advances of science and technology to the public and steer young minds towards careers in STEMI.

Looking forward, we are committed to achieving our vision of communicating the value and impact of science and technology in a dynamic knowledge economy and simultaneously build the science engineering technology human resource based in South Africa.

Our advances in science, science literacy and science engagement are becoming more valuable with increased participation numbers and impact in our activities such as National Science Olympiad, Natural Science Olympiad, National School Debate competition and Astro Quiz increasing yearly.

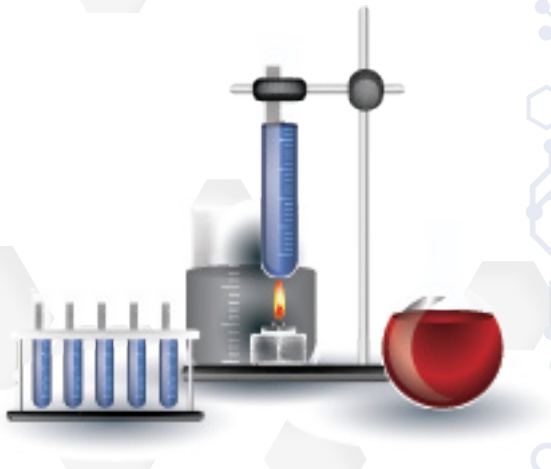
Incorporating science awareness platforms in our directive has enabled us to deliver widely on our strategic areas by growing the awareness of science through explorations, exhibitions and actual experiences and thus creating an interface between science and society. For NRF-SAASTA to continuously improve public understanding of science and science engagement, it is necessary for us to provide credible and accurate information that is accessible to all South African communities.

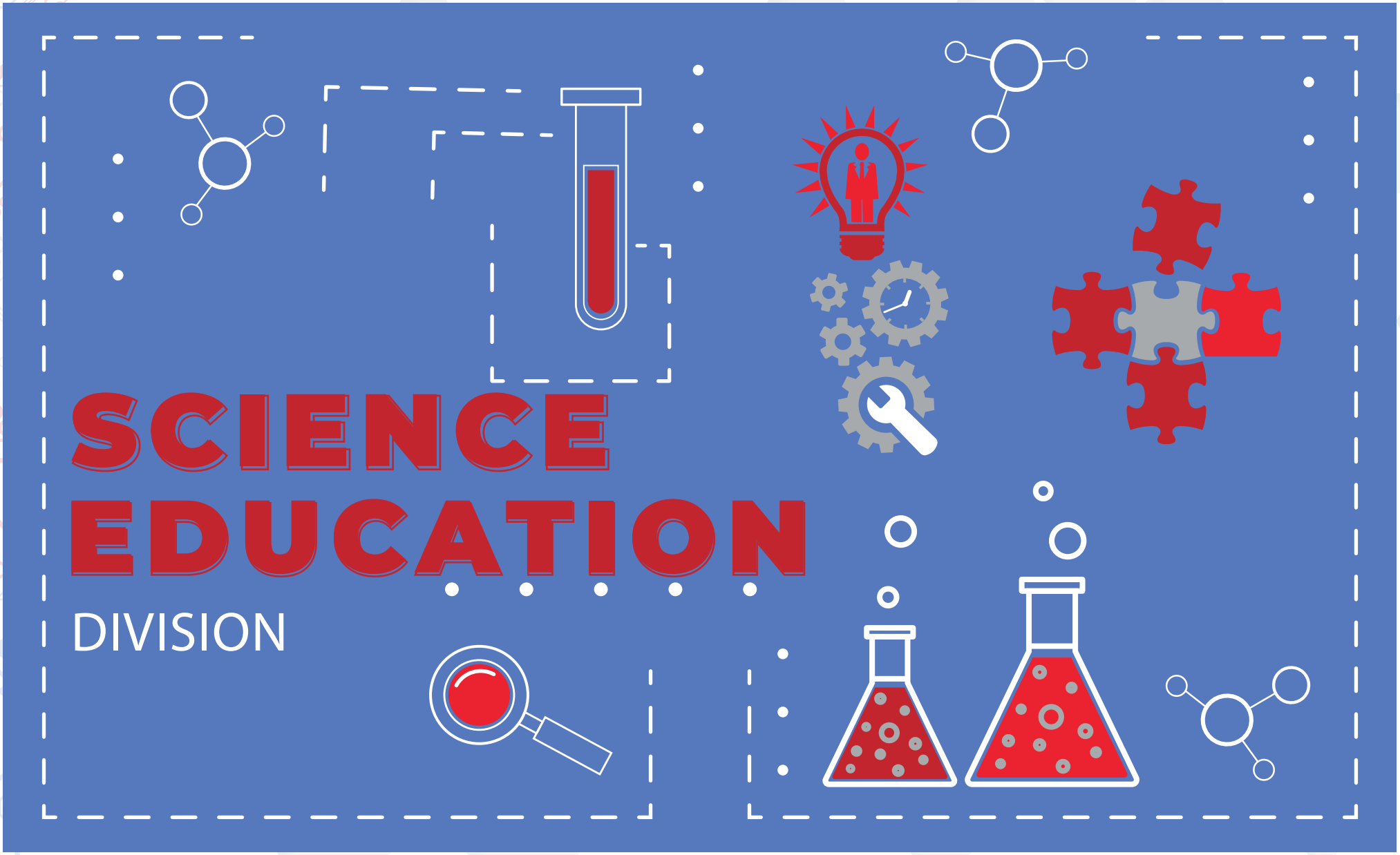
We have enhanced excellent capabilities to ensure that audiences are targeted and reached using efficient communication methods. This is achieved through our efforts in scientific information management and packaging by using various mediums to communicate science, e.g. print, broadcast, online, social media and mobile telephony.

We believe that by faithfully continuing on endeavours such as involving the science sector in communication science, e.g. working with science journalists to ensure optimal access to scientific content, scientists and research facilities; collaborating with media partners; and encouraging scientists to communicate their work, NRF-SAASTA can continually create innovative science engagement solutions for unmet science needs that exist in large numbers within our society.

In the future, too, NRF-SAASTA aims to stand on the forefront of science engagement, turning science and scientific literacy into value for the society and we will continually strive to fulfil our strategic objectives in line with our Science engagement Strategy by:

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




SCIENCE
EDUCATION
DIVISION

ONLINE ROLE MODELLING / EDUCATOR WORKSHOPS

In the midst of uncertainty and on the advent dawn lockdowns and intermittent school engagements, 2020/2021 provided the Science Education Division [SED] of NRF-SAASTA with an opportunity to explore and use online platforms to engage with both learners and educators.

"IT and the Internet can transform processes and institutions, transforming, in consequence, the ways of teaching and learning and opening the door to innovation and new pedagogical theories."

Letseka, Letseka and Pitsoe (2018) described the advantages of e-learning. Among many IT tools (the use of online softwares such as zoom), the internet of things became an invaluable resource and an integral part of SED's approach which aids the division to provide extra-curricular activities for schools. Projects such as career development services and educator development workshops gained a lot of interest as educators and learners could access the content online remotely.

The Science Education Division embraced the winds of change by working together with various stakeholders in the science engagement landscape to maintain continuity of various engagements offered to both learners and educators.

The division exploited the benefits of "asynchronous learning" by creating 22 online video content in the form of interviews. Each week the division would interview young and as well as seasoned scientists to profile their respective careers, and share some of their experiences of being involved in the science related industry. The division created a number of videos which are available on social media platforms for learner to stream, share and revisit as when they require information about a particular career. By simply utilising a combination social media platforms, learners across the country were engaged and got to learn about various science careers and the opportunities of each of the fields. Among the popular interviews is the series with Dr Nompumelelo Obokoh, a plant molecular biologist who shared interesting facts about being a biologist:

Watch the video here: https://fb.watch/7Sgki3pFqp/

"It is the long history of humankind (and animal kind, too) that those who learned to collaborate and improvise most effectively have prevailed."

– Charles Darwin

Stakeholder management is one of the vital aspects that enables the SED to fulfil its mandate and to contribute to the broader science engagement.

In 2020 SED focused its attention on strengthening ties with its stakeholders. The division managed to engage with third party organisations by supporting schools. The division with its alias ensured that schools were supported throughout the academic year. Through collaborations the division was able to adapt to the abnormal and the challenging academic period of modern times. The division was therefore able to safely visit schools to distribute resources and expose schools (learners in particular) to offline learning platforms such as the NMU developed MobiTutor app.

2020/2021 was also the first year of service for the newly appointed ASTEMI board in office. In a rather peculiar year and myriads of unfavourable conditions ASTEMI grew in its membership attracting new Olympiad and competition organisers. SED as the supporting pillar of ASTEMI along with DSI worked closely in drafting a framework for Olympiads and Competitions in South Africa. Through constructive engagements with ASTEMI great insight was gathered and progress made. ASTEMI continued to work together with NRF-SAASTA to host build-up webinars ahead of the STEMI Community of Practice Conference in July 2021 themed "strengthening the impact of Olympiads and competitions through collaborations, partnerships and cooperative opportunities".

NRF-SAASTA WOMEN IN SCIENCE CAMPAIGN

During the month of August NRF-SAASTA hosted a series of webinars to celebrate Women's Month and mainly to put a spotlight on women in science.

From the earliest times women have made significant contributions to science. We at NRF-SAASTA take pride and acknowledge women that strive and make a difference in science engagement. This campaign is aimed at celebrating all women that are holding the front and making it happen – we call them our SCIENCE MBOKODOS.

Our webinars' intention was to recognise the achievements of women scientist and encourage young girls to think of venturing into science, technology, engineering, mathematics and innovation (STEMI) careers.

Below are the amazing women that we featured throughout the month of August and the recordings can be accessed via our Facebook page for the full talks https://www.facebook.com/NRFNRF-SAASTA

- **Plant Molecular Biologist**

Dr Nompumelelo Obokoh (nee Masubelele) hails from one of the historic townships in South Africa, Mamelodi in Tshwane. She is a Plant Molecular Biologist with a PhD degree from the University of Cambridge, Magdalene College UK, and is currently the Chairperson of the NRF Board and a Commissioner in the Presidential Commission on the 4th Industrial Revolution. Before joining the Companies & Intellectual Property Commission (CIPC) as the head of the Innovation Support and Protection Division, she was the Chief Executive Officer of AfricaBio, a Biotechnology stakeholder association.

Furthermore, Dr Obokoh has worked in West Africa heading the 1st satellite office (in Abuja, Nigeria) of the African Agricultural Technology Foundation (AATF), a non-profit international organization, with headquarters in Nairobi, Kenya. She oversaw and managed innovative public-private partnership programmes, involving access to and the development of proprietary and regulated agricultural technologies for small-scale farmers in sub-Saharan Africa.

Dr Obokoh has also worked as a Post-Doctoral Research Associate at the Institute of Biotechnology, University of Cambridge where she deployed novel and high throughput technologies to decode the molecular mechanisms controlling plant growth in order to enhance agricultural productivity.

Dr Obokoh has more than 15 years local and international experience in Biotech research & development, management and advocacy. She has led a number of strategic agricultural biotech initiatives addressing food security, climate change & poverty reduction in sub-Saharan Africa, focusing on small-scale farmer (especially women and youth farmers) empowerment.

Dr Obokoh has received a number of awards and accolades, including the GDARD's Biotech communicator Award, Topco Media - Top 1000 Woman in Business and Government, the Mandela Cambridge Scholarship, Mandela Magdalene College Award, Fellow of the Cambridge Commonwealth Society. She has also received competitive research grants from the National Research Foundation (NRF) and the NRF/Royal Society (UK) for the South Africa-UK Science Networks to establish and extend collaboration with UK partners. She also offered the Rothamstead International - African Fellowship that enabled her to foster mission-oriented research with world-renowned scientists in Aberystwyth, Wales.

- **Nanotechnology**

Boitumelo Makgabutlane is a PhD Chemistry candidate at the University of the Witwatersrand (Wits). Currently working on the development of reinforcement nanocomposites from waste for application in the building and construction industry. She is passionate about beneficiating waste to useful products in order to move from linear to a circular economy; and has published some of her research work in peer-reviewed journals. Boitumelo has co-founded an NPO called RockAtScience Foundation with the aim of demystifying science by making it

accessible and relatable to lay persons and learners especially those from disadvantaged backgrounds. Her drive is in giving back to the community, unearthing talents in order to alleviate poverty and improve the standard of living. She believes that everyone can reach their ultimate potential if someone has faith in them, and she is willing to be that someone who invests their time, resources and knowledge.

- **Chemistry**

Mamohlomi Mtshisi is a Consulting Chemist. She is a STEM advocate and volunteers in various organisation such as Outlook Foundation as a Role Model and a Mentor. She holds an MSc (Chemical Engineering) form UCT and BSc (Hons) in Chemistry from UP. She has worked as a chemist and research scientist in the mining industry for over 10 years. She is a registered Profession Chemist (PrChem) with SACI, ISO/IEC 17025 technical assessor and a SAATCA QMS (ISO 9001) Provisional Auditor.

- **Metallurgical Engineering**

Tsholofelo Koadibane is a top achieving and dynamic metallurgist. She specializes in minerals research. She has a unique privilege to work with extraction of different commodities including PGMs, Gold, Coal, Copper, Iron etc. She worked at Impala Platinum, Anglo Platinum refineries and currently working at Mintek. She studied NDip and BTech metallurgical Engineering at TUT, BSc. Hons Metallurgy at UP and completed MSc. Project Management at UP.

- **Medical Science**

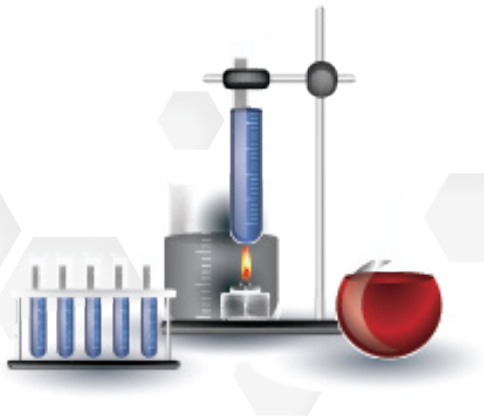
Palesa Mpeqa, born and bred in Thaba Nchu in the Free State. In 2012 started her studies in Cuba and came back home in 2018 for the 18 month integration program at Stellenbosch University. She completed her medical degree in 2019 and currently working as a junior Dr at Nelson Mandela academic hospital.

- **Mathematical statistics**

Boiketlo Mphahlele is a banker who is passionate about promoting careers in STEM to young people. Currently, she works in structured sales of financial derivatives. Her favourite colour is blue and she thinks maths is cooler than physics. She holds a Masters in Risk Management of Financial Markets and an Honours in Financial Management and Portfolio Management, both from the University of Cape Town. She obtained her undergraduate degree from the University of Pretoria and specialised in Mathematical Statistics.

- **Human Anatomy**

Kentse Mpolokeng is an Anatomy Lecturer at UCT and part of the new Generation of Academics programme (nGAP). Kentse began her tertiary studies with the University of the Free State on 2008 where she had enrolled for a Bachelors in Science (Human Biology) degree, where her love of the discipline in Anatomy began and continued to develop through her honours degree in Medical Sciences. Kentse continued with her Master's degree in Medical Sciences: Anatomy and Cell Morphology which she obtained cum laude in 2017.



NRF-SAASTA TO CELEBRATE EXCELLENCE IN SCIENCE

In 2019 the National Olympiad is celebrating a ten-year relationship with Harmony Gold Mine Company Limited and the National Research Foundation's 20th anniversary. Our ten-year partnership with Harmony Gold Mining Company Limited enables NRF-SAASTA to empower young learners across the country.

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.

The awards ceremony is a special day for the South African Agency for Science and Technology Advancement (NRF-SAASTA) and the learners across the country. It is a day where NRF-SAASTA celebrates excellence amongst young people and future scientists.

The National Science Olympiad is one of the flagship projects of the South African Agency for Science and Technology Advancement. Since 2005, the 55-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) country such as Zimbabwe.

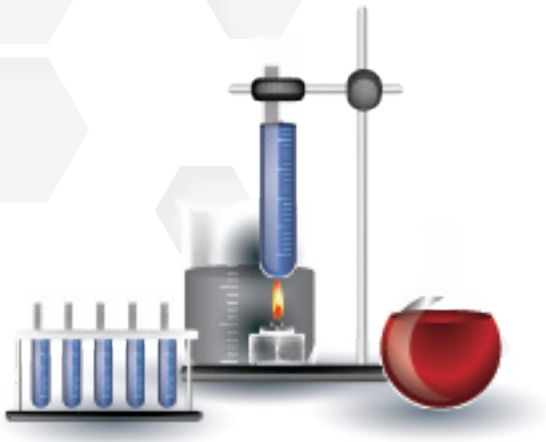
Learners from all nine provinces and one SADC country participated, including learners from Harmony Gold Mining areas in Gauteng, North West and Free State provinces. The Olympiad contributes toward excellence in science and has great potential to improve participation levels of previously excluded groups and make science and maths an attractive career choice for learners.

The annual competition comprises an examination, and top learners and schools stand a chance to win exciting prizes. The Olympiad comprises two streams: Physical Science (Physics and Chemistry) and Life Science. Learners can choose to write either the Physical Science or the Life Science papers.

Top schools in AstroQuiz and National Schools Debates were honored on the day. Top schools from all the nine provinces competed for top prizes on the 24 of September and the winners will be announced during the awards ceremony. AstroQuiz is a competition aimed at grade 7 learners based on themes around astronomy. The competition aims to improve teaching and learning of basic astronomy in primary schools. The main objectives include contributing to the improvement of awareness, interest, understanding and insight into basic astronomy and to build appreciation of and pride in South Africa's history of astronomical activity and achievements, and current projects.

The NRF-SAASTA National Schools Debates Competition provides learners with an opportunity to develop their research, critical thinking, and information literacy skills, as well as their ability to work as a team to present logical arguments.

Amongst the objectives of the competition is to build science communication ambassadors out of learners through researching and debating of high-level scientific topics. The competition, established in 2008 in three provinces, has since expanded to include all nine provinces.



ROBOTICS INSPIRES LEARNERS TO PURSUE STEM CAREERS

Images: *Teams focussing on the Not So Nano quiz game*

The South African Agency for Science and Technology Advancement (NRF-SAASTA), in collaboration with the Inspired towards Science Engineering and Technology (I-SET), a community engagement flagship project of UNISA college of Science, Engineering and Technology hosted the final round of the first techno youth robotics national competition on the 09 – 11 December 2019 at UNISA Science Campus in Florida, Johannesburg.

The competition is a community engagement project that aims to make science accessible to all learners in South Africa. It introduces learners to robotics, stimulate interest in the sciences and encourage excellence. Moreover, it intends to expose young learners to robotics and inspire them to pursue Science, Technology, Engineering and Mathematics (STEM) related careers.

Dr Patricia Gouws, Project Leader for I-SET said the Techno Youth Project was established five years ago and she is proud of the growth and impact of the project.

"When we started, we only had workshops in science centres but now we have grown it to become a national competition with some of the provinces represented," she added. "We want to grow robotics in this country and we also hope to grow the competition even more with all provinces represented in our future competitions," said Dr Gouws.

"The learners that we target are learners at GET phase because research has suggested that imparting skills in learners at a young age has a positive impact on future learning and intellectual ability," said Mr Tebalo Tsatsi, Science Education Project Coordinator at NRF-SAASTA. "There is a need to explore ways that encourage access to education and, specifically, STEM in disadvantaged schools and this competition intends to do just that," he added.

The final round had eight teams consisting of four learners a team from Science Centres across the country competing for the prize. Science Centres are hubs, which assist NRF-SAASTA and I-SET to motivate learners to participate in the competition and motivate science clubs. .

The challenge for the teams was to build a robot, programme it and use it to perform tasks such as picking up something.

Image 4: *Teams competing during the final robot round From the Back : The winning team from Greater Tzaneen Community foundation. Front seated: Dr Gouws (left), Mr Felix Spies (middle) and Mr Tebalo Tsatsi (right).*

Mr Felix Spies, the founder of split second science a foundation from the Northern Cape explained that he is happy that the competition is making strides in promoting robotics amongst South African learners. He noted that he is quite happy with all the teams participating because all the learners were able to code and complete tasks.

"This just shows that programmes that they are engaged in their respective science Centres are actually making a difference," he said.

Mr Spies runs six robotics clubs in villages in the Northern Cape Province. He believes that events like these are important, because it allows learners to engage and learn.

Competition results

The team from Kwazulu-Natal Science Centre came in third place, taking home backpacks and scientific calculators' prize. Second place went to the team from North West Science Centre. The team won a robotics kit and backpacks.

The top prize went to the Greater Tzaneen Community foundation team based in Limpopo. The team won backpacks, robotics kit and expansion set for the science centre. The team will use this kit to prepare for the first ever LEGO League Competition.

"We are so happy to have won the competition. It means a lot to the learners," said Mosa Lekoloane, from the winning Science Centre. "I am particularly happy because it motivate other learners in our community to get involved in sciences. It's important that we continue working hard to developing rural areas so that they take part in science related competitions," added Lekoloane.

Image 5: *A team mentored by North West University Science Centre.*

ROBOTICS CAN ENHANCE CREATIVITY AND IMPROVE PRODUCTIVITY AMONGST CHILDREN

Libby: UP Robotic Librarian

Robotics are here and are going to be for quite some time. So get into it now. This is according to Peter Maleta, the Management Team Leader at Greater Tzaneen Community Foundation. Mr Maleta who has been involved in robotics since 1992 believes that robotics have a huge role to play in the development of young people in South Africa.

Robotics knowledge will enhance creativity and improve productivity of those with skills to exploit its capabilities.

"For example robotics can help learners to learn measurements, calculations, shapes and resolve other mathematical problems without the need to memorization, "Said Mr Maleta.

On the other hand, the youth can use robotics to skills themselves in the development and design of products and applications used in smart construction, precision farming, game development and security among other things.

The Greater Tzaneen Community Foundation has forged working relations with a variety of national and international organisations in order to bridge the gap between South Africa and the rest of world in the field of robotics development.

At the beginning of 2019, the organisation forged partnership with QUAD X 6299, a robotics team from Texas, United States of America.

"This resulted in us hosting the FIRST TECH CHALLENGE (FTC) camp for about thirty of our robotics learners financed and facilitated by QUAD X6299. The USA organisation also donated a full FTC Kit, accessories and the field, "says Mr Maleta.

The GTCF further went on to establish FTC teams and three of those teams have registered to participate in the 2020 FTC competition. The GTCF has been selected to pilot the first Discovery Robotics kit and this makes South Africa to be the only African country and third in the world selected to pilot-run the first Discovery Robotics kits. Discovery Robotics, an American company based in Pittsburgh develops the kits.

"The program is aimed at children between the ages 4-6 and currently we are piloting with more than forty learners from Mopani District Municipality in Limpopo province," says Mr Maleta.

Mr Maleta believes that robotics can expose young people to the capabilities of technology, research skills and address real life solutions.

"People living with disabilities, women, the elderly and children can benefit from robotic technology as the robots are able to perform routine tasks and carry out instructions in support of those target groups, " says Mr Maleta.

Mr Maleta's wish is for South African children to universal access to robotics and other educational and technological resources.

"Unfortunately, South Africa is represented in the field of robotics by mostly urban based participation with more participants coming from other races other than black African community, "says, Mr Maleta.

Mr Maleta concluded by indicating that Science Centres should be prioritised to roll out robotics in rural communities.

In addition, "The Department of Basic Education should work closely with the science centres, NRF-SAASTA and other role players to fast-track the roll-out of robotics in South Africa. It would be useful to consider including coding as an official language in South African schools, "concluded Mr Maleta.

2019 STEMI CONFERENCE

Delegates from the STEMI Olympiads and Competitions community gathered at the fourth Community of Practice conference held at the CSIR International Convention Centre in Pretoria. The Community of Practice conference was launched by the former Minister of Science & Technology, Honourable Naledi Pandor in 2016. This year, the main objective of the conference was to unpack and establish common understanding of inclusivity and promote the contribution of extra-curricular STEMI activities in the development of STEMI human capital.

Dr Jabu Nukeri, Managing Director for the South African Agency for Science and Technology Advancement, officially opened the conference. In his welcome note, Dr Nukeri emphasised the importance of STEMI Olympiads and Competitions Community of Practice conference in displaying the awareness on the critical role of Science, Engineering and Technology to the country's economic development goals.

"It is through events like this that we are showing our commitment in moving towards the forth industrial revolution and the economic development of our country, especially in STEM", said Dr Nukeri.

Mr Isaac Ramovha, the Department of Science and Technology; Science Promotion Director presented the objectives of the 2019 STEMI Conference. Amongst others, the conference aims to focus on issues relating to determination of the current and the future landscape of the STEMI Olympiads, with more emphasis in the next three years. Mr Ramovha further indicated that the focus would also be on the role of extra-curricular STEMI activities in enhancing participation in STEM subjects and shaping STEM career directions among young people.

"We need to look into how volunteerism, coaching and mentoring can enhance inclusivity and excellence in STEMI Olympiads and competitions", said Mr Ramovha.

"We also need to assess the effect of the changing technological environment on inclusivity and excellence within the context of improved access to information", he added.

Mr Moloko Matlala, Science Education Division Manager at NRF-SAASTA provided an update on the STEMI Olympiads and Competitions. Mr Matlala provided the delegates with progress since the 14 March 2016 inaugural conference. He highlighted that there has been progress is most of the issues raised during the 2019 Conference.

"The mass participation of learners is increasing on an annual basis. We have also improved involvement. The importance of professional bodies and educators in STEMI Olympiads and Competitions is acknowledged", said Mr Matala. "However, there is still a need to improve on tracking and nurturing of learners", he emphasised

Mr Daniel Maubane, the Chairperson of ASTEMI provided an update on the STEMI Olympiads and Competitions. The twenty-member organisation, which increased from seventeen in 2017, was established with the aim of bringing the organisers of STEMI Olympiads & Competitions together to expand Olympiads & Competitions to a broader base of learners and educators.

Mr Maubane said, "ASTEMI aims to become an integral part of the robotic pilot programme that was announced by the Minister of Basic Educations Mrs Angie Motshekga earlier in 2019."

Mr Maubane indicated that there is a need increase the country's participation in global competitions, and to include township and rural schools in the STEMI Olympiads and Competitions.

"I would like to encourage science centres and universities to continue making a meaning contribution to expose learners to the STEMI Olympiads and Competitions. This can be achieved by ensuring that there is transformation equity and redress", said Maubane..

The former South African Statistician-General Dr Pali Lehohla delivered the keynote address. The big question raised by Dr Lehohla during his presentation was where are we and where should we be with regard to STEMI? To respond to this, Dr Lehohla's presentation focuses mainly on issues relating to what needs to bedone about bringing in STEMI, and reflections on the South African political landscape, especially the parliament.

During his presentation, Dr Lehohla indicated that the fourth industrial revolution is a reality.

"The fourth industrial revolution is here and will rig havoc in South Africa," he said.

Dr Lehohla emphasised. "We should implement credible forward looking systems of planning. Everything we do must be based on facts, logic and common good," he added.

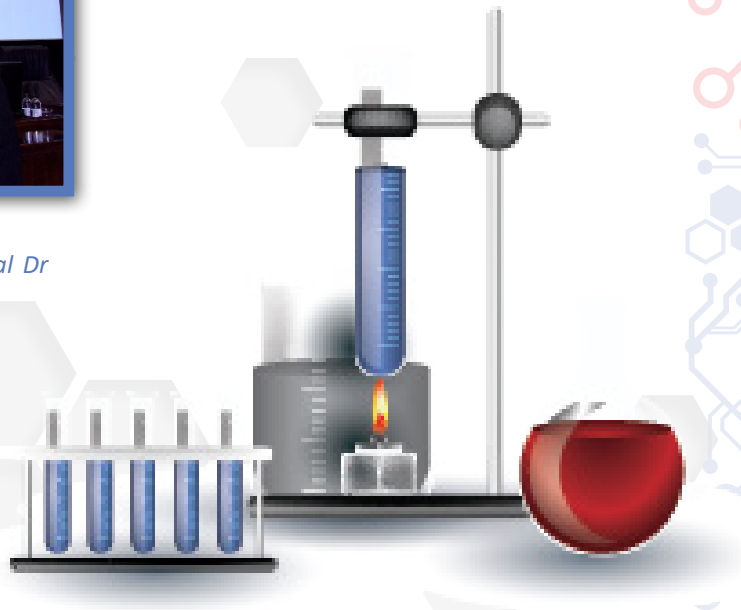
Dr Lehohla touched on the need for free access to internet to all centres of learning in the country.

"[We] need to replicate and scale up to the likes of Mbilwi High School as a model," he emphasised.

Image: *Dr Jabulani Nukeri, NRF-SAASTA managing Director addressing the audience.*

Image: *STEMI conference 2019*

Image: *The former South African Statistician-General Dr Pali Lehohla was the keynote speaker.*



OUR SCIENCE JOURNALIST REPORTING ON STEMI 2019

Moving Forward

The annual STEMI Conference took place from 19 February to 23rd, at the CSIR ICC in Pretoria.

A number of talks and presentations by representatives of various STEM stakeholders with a range of topics from scientific demonstrations to robotics. Despite having different representatives from different scientific and mathematical fields, they all addressed a similar message, to get more learners involve in science competition in South Africa.

One of the major talks was on how learners from disadvantaged schools in rural areas participate in science and mathematics Olympiads and competitions. This was met with much vigour as only a fraction of children from disadvantaged areas including township schools enters STEM competitions.

The 2019 STEMI conference aimed on getting more educators involved, promoting and giving STEM subjects the recognition that they deserve.

Inclusivity and excellence

The four-day conference was filled with exciting talks, presentations and strategizing that was meant to improve the way science and maths Olympiads and competitions are conducted in the country.

One major talk presented was on the introduction of science competitions to schools in the township and in rural areas. To teach and motivate learners from these disadvantaged areas of what science can do and how it can change one's life for the better.

An academic brainstorming session explored on how to run science competitions. it was suggested to implement a model similar to the teaching style at universities when learners prepare for competitions. the suggestion will expose them to difficult Olympiads questions. This model will assist them on getting used to doing practical work that challenges their thinking capabilities.

Image: *STEMI conference 2019*

Image: *STEMI conference 2019*

GAMIFICATION AS A TOOL TO DRIVE SCIENCE EDUCATION

Gamification has become a popular method of learning and productive behaviour, driven by both intrinsic and extrinsic motivation. For many years, psychology researchers such as Edward Deci and Richard M Ryan have highlighted that self-determination is an essential trait for personal development and a great stimulus of creativity. Since the dawn of virtual gaming and the commercialisation of computer games from the early 1970s to the current era of cloud gaming, scientists all over the world have observed what can be described as a psychosocial shift.

"gamification is a powerful tool for catalysing attention, focus and investment."
- Brain J Arnold.

Gaming has become an intricate part of modern civilization and, according the 2016 report of Interactive Entertainment South Africa [IESA], the video gaming industry in South Africa has been growing year on year. In recent years many businesses, practitioners and, most importantly, educational institutions have gravitated to the unconventional yet excellence driven gamification model.

Research suggests that gamification in relation to science education may play a vital role in:

- Encouraging and/or supporting inquiry-based learning;
- promoting the development of skills, attitudes, and values that are useful for scientific thinking or practice; and
- skills transfer to the gamer, through simulation of scientific processes and argumentation, as in some games such skills may be embedded in specific challenges of the game.

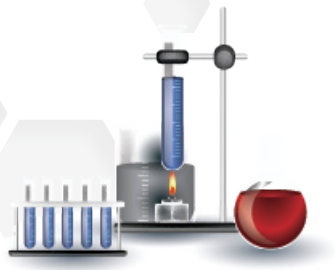
Although some perceive gamification as an ineffective tool for teaching, it can be strategically utilised to support learning environments.

During the recent 2019 STEMI Olympiads and Competitions Community of Practice Conference, Professor Werner Olivier from the Gavin Mbeki Mathematics Development Centre of Nelson Mandela University, highlighted the fundamental aspects, which have to be incorporated in STEM education including "incentivized gamification for constructivist self-directed learning". The increase in the use of smartphones and application-based resources are evolving support mechanisms for STEM education, where gamification interestingly has a positive impact. In the context of STEMI Olympiads and Competitions, gamification (whether digital or manual) is an enabler to influence learners' interest in science.

"games are cultural and educational tools for science education and games have unique strengths that can be used to augment science education." - Gaming science: the "Gamification" of scientific thinking.

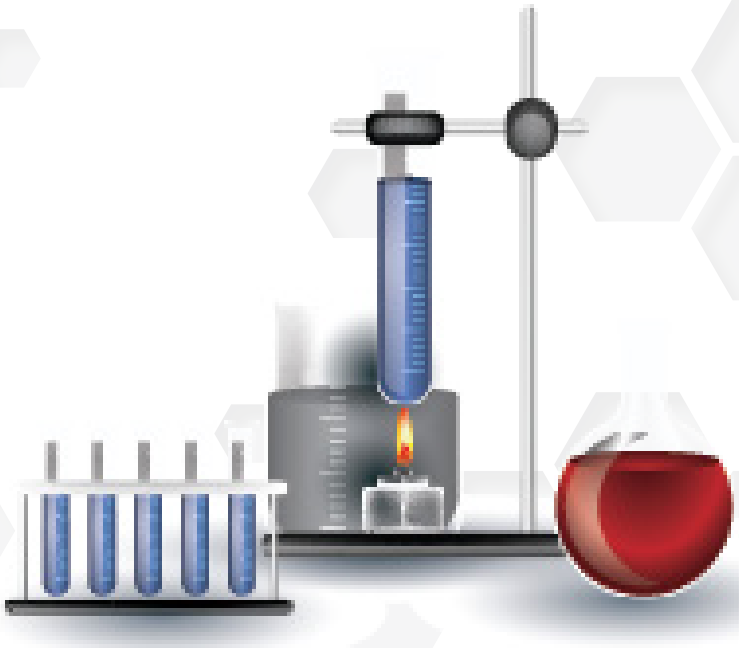
According to a study conducted by Kriek and Stols, published in the South African Journal of Education, technology is deemed as an essential tool, which can be utilised to strengthen student learning and enhance pedagogy that can be used effectively as a cognitive tool for teaching and learning in the classroom. In a country, which has a high-cost and low performance educational system the introduction technology as well as gamified based learning in the classroom can possibly revolutionise the learning environments to a low-cost STEM orientated landscape. App-based learning platforms such as TouchTutor® are slowly influencing the learners' performance through offline technology for day-to-day use, including preparing for Competitions and Olympiads, while in some cases manual gamification has played a vital role to aid the "learning in doing" approach, which is employed by Lego games and competitions such as the Aqualibrium competition. It is through such examples that gamified-based-learning enhances cognitive problem solving skills.

Motivation is critical to enable learning. Therefore, it is important for our learning environments to encourage self-determination. Gamification is a good tool to enrich the learning experience and it is a good trigger of both intrinsic and extrinsic motivation. In conclusion, an alternative educational approach such as gamification has the potential to yield a positive result in science education in South Africa.

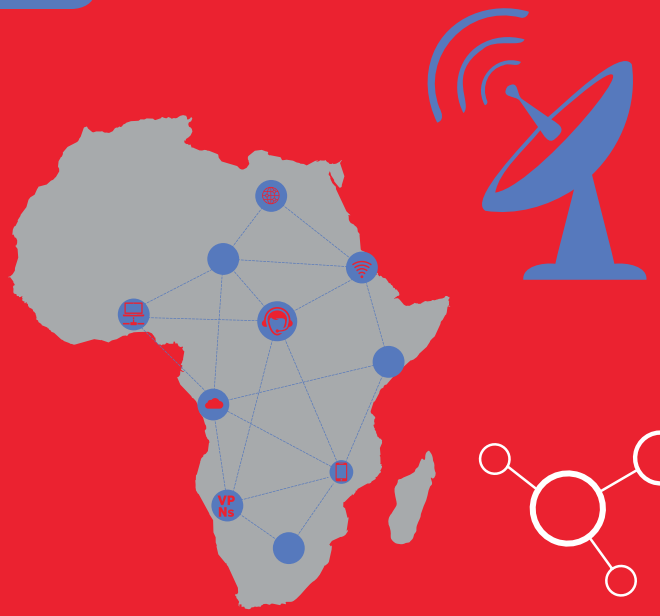


References:

- http://www.scielo.org.za/pdf/sajie/v28n3/10.pdf
- https://www.frontiersin.org/articles/10.3389/fpsyg.2013.00607/full#B137
- https://pdfs.semanticscholar.org/aa11/538a914a54369e48410ea0889e04ddf4588b.pdf
- https://repository.up.ac.za/bitstream/handle/2263/15384/Kriek_Teachers(2010).pdf;sequence=1
- http://seriousaboutgames.co.za/wp-content/uploads/2017/03/CITI_sag-report_20170307_web-1.pdf



SCIENCE COMMUNICATION DIVISION



SCIENCE COMMUNICATION WORKSHOP – SARAO AND NRF | CENTRE OF EXCELLENCE IN PALAEOSCIENCE

NRF-SAASTA in partnership with Jive Media Africa facilitated science communication workshops in March 2021, with a purpose to build capacity to communicate science amongst researchers and students at these institutions. The workshop, conducted with the South African Radio Astronomy Observatory (SARAO) and NRF-Centre of Excellence in Palaeoscience, attempted to equip participants with the expertise to effective communicate and build their brand as researchers. The workshops are a drive by NRF-SAASTA to ensure effectively science communication and focused mainly on developing digital science content and building a research brand.

The workshop was attended mostly by Masters and PhD students and came from universities across the country. The co-facilitators, Robert Inglis and Kimberleigh Tommy shared useful tips and techniques around developing and creating engaging content for digital media, which included attractive social media posts. Kimberleigh, a passionate paleoanthropologist and a science communicator, further shared easily accessible web resources (e.g. canva website) that the students could use to provide quality infographics, amongst other public engagement materials. As part of the workshop output, the participants were tasked with using the techniques and resources shared to produce an infographic on any of the radio astronomy fields funded by SARAO.

The workshop with the NRF-CoE in Palaeoscience had a lively start with facility Director, Dr Christine Steiniger, giving a warm welcome to NRF-SAASTA, Jive Media Africa, as well as researchers and students from the centre and other related institutions in the network e.g. Iziko Museum in Cape Town. The welcome address was followed by guest speaker, Ms Aviwe Matiwane (a lecturer, PhD candidate and better known as the "plant detective") from Rhodes University who shared her amazing journey as a science communicator. Facilitator, Robert Inglis, led the discussions on what is a research brand, developing a research brand and ways in which researchers could expand their influence, all with a purpose to build a positive research brand. Lastly, the facilitator encouraged researchers and the students (PhD with their supervisors) encouraged to pitch scientific related stories to The Conversation Africa as a way to share their research with the publics and increase opportunities to further collaborate with other scientists within the academia sphere.

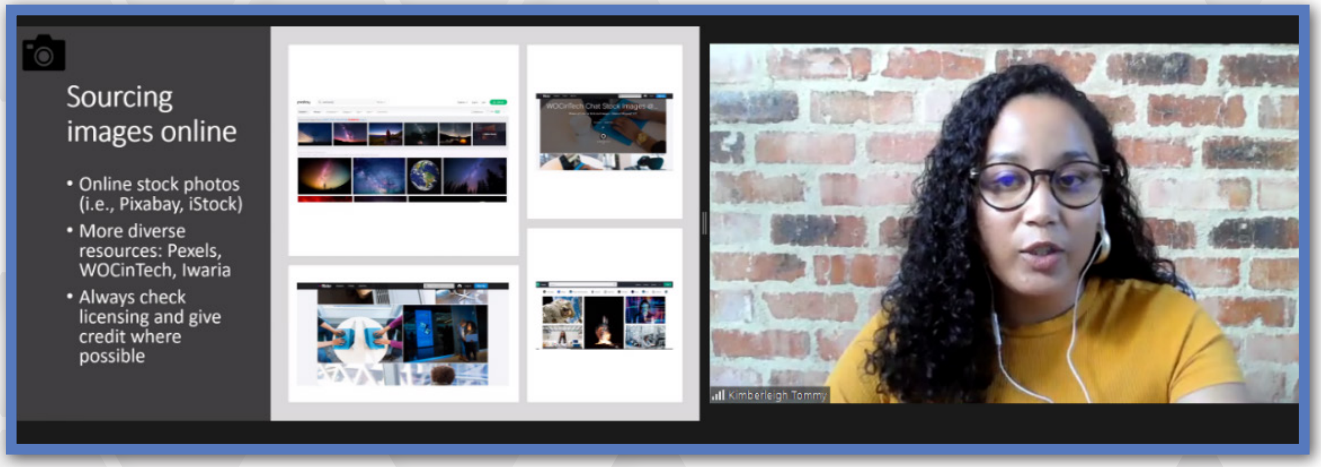


Image 1: *Kimberleigh Tommy giving a presentation to participants on where to source images online*

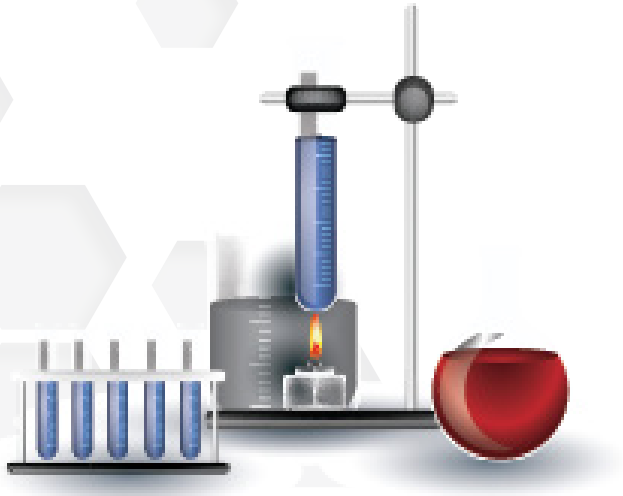


Image 2: *Participants at the SARAO science communication workshops*

Image 3: *Presentation from Aviwe Matiwane highlighting her science communication journey.*

WEBINAR: THE POTENTIAL IMPACT OF THE STI PRIORITIES ON NATIONAL DEVELOPMENT

In March 2021, NRF-SAASTA hosted a webinar titled "The potential impact of the Science, Technology and Innovation (STI) on the National Development Goals", which shed light into the future STI priorities of the country and their envisaged societal impact. Moderated by i-Themba LABS Dr Gillian Arendse, the three experts included Prof John Mugabe from the University of Pretoria, Dr Pulane Molokwane, Commissioner for Science and Technology from National Planning Commission and Dr Mlungisi Cele, Acting Head for the NACI.

The discussions, led by these three experts in the field of STI policy making and implementation, focused mainly on STI policy development in African countries and the impact that STI priorities have had in the past as envisaged as contained in the 1996 White Paper in STI, National Research and Development Strategy (NRDS) and Ten Year Innovation Plan (TYIP). Furthermore, the forward-looking approach of the webinar unpacked the 2019 Synthesis Report by the National Advisory Council on Innovation (NACI), which identified nine STI domains as potential future priorities.

Prof John Mugabe gave a keynote address unpacking the STI policy on a national and international level. He stated that the National system of innovations must be seen as a social system built on social virtues and emphasised the need for bottom up policy processes. Prof Mugabe also highlighted the need for policy accountability and the need for establishing connections between the various aspects of STI. Prof Mugabe explored the STI policy from African countries such as Kenya, Tanzania and Namibia and showed that in some cases, there is no policy or coherent policy driving STI's contribution. He advocated for the need for the high-level priorities of the STI policy to be grounded on local context.

In an eye-opening presentation, Dr Molokwane briefly reviewed the National Development Plan 2030, the contributions of science and technology to national development and that based on the review of the STI policies and their implementation, South Africa had made good strides especially in research output and infrastructure development. She highlighted that the science and technology system still faces challenges especially the tendency for institutions to operate in isolation. There is also a continued need for economic, race and gender equity and redress within the NSI. Dr Molokwane argued that South Africa should take lessons from countries such as China that have taken advantage of STI policy and are reaping the rewards especially for economic development.

Dr Cele focused on unpacking the 2019 Synthesis Report, discussing nine domains as candidates for the STI priorities. Dr Cele detailed the foresight processes used to conduct the study, from initiation, intelligence, imagination to integration, including the rigorous STI domain selection criteria, which looked at the key aspects of potential for new impact, socio-economic development and global and local STI trends, and the emergence of the crosscutting domains or thrust. Dr Cele indicated that the synthesis report has been essential in engaging the South African government on the contribution of STI and the priorities that could contribute to national development. Moreover, there is a realisation within the system that the implementation of STI policy going forward cannot merely be the responsibility of a single department alone but must be coordinated across government departments and also private sector.

The webinar came at the backdrop of the 2020/21 budget vote speech by the Department of Science and Innovation (DSI), Dr Blade Nzimande on the DSI's intentions to draft and finalise the Decadal Plan 2021-2031, which will identify the country's STI priorities. The NRDS articulates the science, technology and innovation (STI) priorities of the country under the technology missions and science missions. The technology missions are intended to meet key national and social objectives, such as poverty reduction, new and emerging technologies and innovation. The science missions, on the other hand, emphasise the importance of making an impact on the global stage in specific fields (e.g. astronomy, indigenous knowledge systems) where the country could contribute to leading-edge global knowledge. Furthermore, the priorities of the country were captured in the TYIP (2008-2018), which identified grand challenges such as the energy security challenge. The webinar is available on NRF-SAASTA's YouTube channel on the following link: https://www.youtube.com/watch?v=SGqi-oEa19M&t=5535s

NRF-SAASTA CELEBRATES WORLD POETRY DAY PUBLISHING OF A COLLECTION OF POEMS BY YOUNG SCIENTISTS

The South African Agency for Science and Technology Advancement (NRF-SAASTA), in celebration of World Poetry Day and honouring South Africa's Human Rights Day on 21 March 2021, has published a collection of poems written by young scientists from South African research institutions. The collection of poems highlights the value of poetry in connecting people and ideas, and, thereby, creating a way for people engage with science.

Through poetry, young South African scientists are finding innovative and creative ways to express themselves and share the importance of their work in solving some of the challenges we face as society.

"We can address issues we face in life through poetry. Word play can evoke more emotion in people and get them more involved and willing to address problems," says Pamela Akuku, one of the poets contributing to the collection. Poetry can also help us connect with people we might not normally engage with. Julia Davies, another contributing author, says, "It is essential to find creative ways to share important information so that it is meaningful and memorable to people who might not typically read or engage with science."

World Poetry Day celebrates poetry as a form cultural and linguistic expression and identity, and its role as a catalyst for dialogue and peace. Communicating science and engaging society in research is essential in South Africa's democracy. Scientists need to find meaningful ways to connect with people and involve society in science. Although science and poetry are very different disciplines, both aim to make sense of the world in different ways and, together, they can create impactful messages and connect science and society.

"Our hope is that by bringing science and poetry together, we will stimulate conversations that bring life, emotion and colour to our scientific understanding of the world around us", says Michael Ellis, the science communication manager at NRF-SAASTA.

The collection of 17 poems were entries to various rounds of NRF-SAASTA's Young Science Communicator's competition. The competition aims to encourage young scientists under the age of 35 to communicate their science and research in creative ways, awarding various modes of the communication in the competition.

"The Young Science Communicators competition is one of various programmes run by NRF-SAASTA's Science Communication Division that aims to encourage young scientists to explore their creativity in communicating science and develop science communication skills," says Michael Ellis.

The poetry can be viewed online at: http://www.saasta.ac.za/young-science-communicators-competition/celebrating-poetry-in-science-communication/.

To request a printed copy of the booklet or for any further information about the competition, please contact Joanne Riley, Science Editor at NRF-SAASTA, at joanne@saasta.ac.za.

FAMELAB SOUTH AFRICA: TSHWANE UNIVERSITY OF TECHNOLOGY'S PINKY MOKWENA WINS

The British Council – the UK's international organisation for cultural relations and educational opportunities – is pleased to announce the success of Pinky Mokwena, a participant and winner of FameLab South Africa 2020:

Fifteen South Africa researchers gathered online to compete for the chance to represent South Africa in the international FameLab competition. Congratulations to this year's winner Pinky Mokwena and the runner-up's Lerato Ndlovu and Dr Brenda De Gama.

"FameLab is an initiative of Cheltenham Science festivals in the UK, delivered in over 30 counties through a partnership with the British Council. FameLab has been running in South Africa since 2013 so this is the 8th edition of the National Final, but the very first national final to be delivered virtually," said British Council South Africa Country Director, Susana Galvan.

The 2020 winner Pinky Mokwena, is a MSc student from the Tshwane University of Technology, majoring in the Environmental Sciences: Water Chemistry space.

Her advocacy as a researcher in water treatment was launched during her reign as Miss Earth South Africa (Water ambassador) in 2018-2019, which was later solidified by her partnership with Professor Okonkwo of TUT in her current study supported by the prestigious Mandela Rhodes Foundation Scholarship.

Additionally, Pinky looks to find a cost effective, efficient and sustainable method for extracting persistent organic pollutants known as Perfluoroalkyl Substances in water, using organic biomass known as Maize (corn) tassels.

When ground to powder under optimized conditions in an adsorption filter, maize tassel can remove more than 90% of these pollutants from water systems, curbing the significant health and environmental implications of these compounds before they can affect society.

"If scientists can get better at communicating their science, then science will no longer be aloof to the people and we can all work together towards furthering science. I was excited about the national competition and meeting other like-minded scientists to further engage in conversations surrounding our different fields of study." – Pinky Mokwena

1st Runners-up: Lerato Ndlovu, a PhD candidate with Medical School at the University of KwaZulu Natal. Lerato's research focuses on Tuberculosis (TB) treatment response.

"My research is important because it aims to shorten TB therapy to less than six months in order to aid adherence, improve TB cure rates and aid patient management. Science communication excites me because it's very important for scientists to convey their work to the general community, whom their work usually affects and to give them this information first-hand instead of them relying on myths." Lerato Ndlovu

Second runner up: Dr Brenda De Gama, a senior lecturer in the Discipline of Clinical Anatomy and the academic leader of research in the School of Laboratory Medicine and Medical Sciences, UKZN. Brenda is a fellow in the DRILL-UKZN programme under the Health Research Ethics area.

"My research aims to bring awareness about body donation as it is a topic that is not often spoken of. I am excited about science communication because we get to share with the public details about our research area and it will enable me to do my body donations campaign better." Dr Brenda De Gama

When the lock down was announced, we saw this as a huge challenge as we are used to bringing participants together from all over the country for a few days, but I am glad that we have been able to adapt to our current circumstances and also attract a wider international audience for the first time.

"Thank you to the following people who have been involved in the journey to the 2020 National final. Our local strategic partners the National Research Foundation, NRF-SAASTA and Jive Media Africa. Our higher education partners- the universities and research organisations that supported FameLab this year by hosting a total of 10 regional trainings and heats. The judges that have participated in the semi-final and final, making tough decisions to select the winners, thank you for offering your time and sharing your expertise with us. To all the participants, there would not be a FameLab season without you so thank you for participating." Susana Galvan.

THE IMPACT OF SCIENCE ENGAGEMENT

What makes science engagement impactful and how can we strategically plan to achieve impactful engagement? These questions were unpacked during the NRF-SAASTA's virtual workshop on science communication strategy on Thursday, 28 May 2020. Still under COVID lockdown, 59 participants from across the country, as well as from other parts of the continent, came together in the virtual space to focus on how to approach developing a science communication strategy.

Robert Inglis from Jive Media Africa facilitated the programme and introduced the participants to his concept on the 6M's of planning for impactful engagement, namely Measure, Mission, Market, Media, Magic and Message. "In developing a strategy, one needs to consider the context to research and the context of the science engagement, and what one wants to achieve through the communication and engagement," he explained From there, one can think about whom one should be engaging to achieve those objectives, what channel or mode of communication will best achieve the objectives, what "magic" can be added to how one communicates and, last but not least, what the key information is that one would like to get across. By systematically thinking through each of these elements, one can more likely achieve impactful engagement.

In addressing the element of "Media" and choosing the channel of communication, participants also heard from Pfungwa Nyamukachi, who spoke about The Conversation Africa as a platform to share research findings with a broader public readership. The articles published on The Conversation Africa are picked up and republished under a Creative Commons license by various news agencies around the world. Zamuxolo Matiwana, NRF-SAASTA's Media Coordinator, also spoke about the partnership NRF-SAASTA has with various community media stations. He also elaborated on NRF-SAASTA's Youth Science Journalism interns, and the importance of the community media in communicating science in indigenous South African languages.

NRF-SAASTA aims to play a key role in the development of science communication skills in scientists, in line with the Department of Science and Innovation's Science Engagement Strategy objective of promoting and developing science communication to enhance science engagement in South Africa. In addition hosting science communication workshops focusing on various skills, NRF-SAASTA is also involved in or hosts various science communication development programmes such as FameLab, the Young Science Communicators competition and the SA Science Lens competition. For more information about workshops visit: https://www.saasta.ac.za/scientists/workshops-and-training/

NRF-SAASTA HOSTS THE FIRST NANOTECHNOLOGY SYMPOSIUM ON HEALTH, SAFETY AND ENVIRONMENT

The South African Agency for Science and Technology Advancement (NRF-SAASTA) and the Nanotechnology Public Engagement Programme (NPEP), in-collaboration with the Department of Science and Innovation (DSI), hosted the first Nanotechnology Symposium on Health, Safety and Environment on 10 February 2020 at the NRF-SAASTA Auditorium in Pretoria.

The Nanotechnology Symposium on Health, Safety and Environment aimed to promote and encourage responsible development of nanotechnology in South Africa. The symposium provided a platform for policy or decision makers, regulators, industry, scientists, researchers, experts and science communication practitioners discussed the sustainable development of nanotechnology in the country.

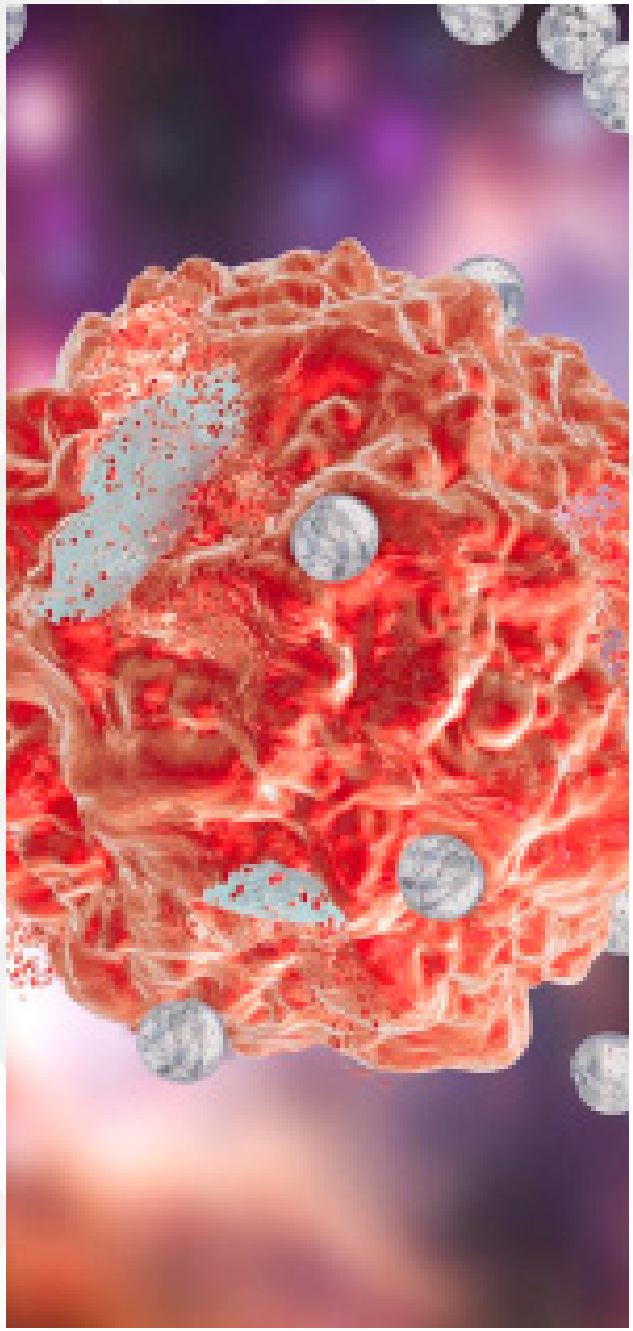
South Africa is one of the few countries that have adopted Nanotechnology with the intention of improving global competitiveness and sustainable economic growth. According to a review of the National Nanotechnology Strategy, even though the adoption of Nanotechnology in South Africa is still in the initial stage, it has made considerable strides in the past years.

This has led to the manufacturing of engineered nanomaterials on varying scales for research, development and industrial purposes aimed at contributing solutions to South Africa's development challenges.

NPEP is mandated by the DSI to recognise the importance of an informed public in making decisions on nanotechnology innovations and to improve the quality of life. Moreover, they emphasise the importance of identifying and discussing the potential risks associated with nanotechnology, and mitigating those risks.

The one-day event included participants from industry and academia, with local nanotechnology experts who addressed the event. The objectives of the discussions were as follows:

- To discuss HSE policy and the regulatory environment conducive for the sustainable development of nanotechnology and the role of the Nano code of conduct.
- To discuss the latest research relating to the potential risks of nanomaterials to occupational health, safety and the environment.
- To discuss the role of science communicators in promoting balanced and fact-based understanding of nanotechnology, especially in a 'post-truth' era.
- To explore responsible research and innovation or 'upstream public engagement' as a broad policy to better align science and society, as integral to innovation in nanotechnology.



UNIVERSITY OF VENDA JOINS THE FAMELAB

FameLab welcomed the University of Venda as a partner for the first time in 2019 as they hosted their first workshop and heat on 21 and 22 November 2019 in Thohoyandou. The event was made possible by the commitment to science engagement of Prof Peter Taylor, the South African Research Chair on Biodiversity Value & Change from the School of Mathematical and Natural Sciences at the University of Venda, who incorporated FameLab into the Zoology Annual Research Day.

Research stories shared included the wonders of Mayflies and how water temperature is a major factor in determining their population size. Pangolins, genetics and slave trade were also features of the talks.

Maadna Ndou was selected as the winner of the heat and will join winners of other heats from across the countries in April 2020 at the FameLab Masterclass, hosted by the British Council and run facilitated by an international FameLab trainer from the UK.

FameLab in South Africa is made possible by a partnership between NRF-SAASTA, the British Council and Jive Media Africa. Jive Media Africa facilitated the workshop and heat at Univen. This initiative at NRF-SAASTA is an international competition designed to engage and entertain by challenging young scientists to communicate their science to a public audience in under 3 minutes. If you would like to enter, Entrants must be 21 to 35 years of age and currently registered, studying or working in science, technology, engineering or mathematics in South Africa. For more information visit www.saasta.ac.za

Some of the faces from the University of Venda who "talked the talk" and shared their science at the University of Venda's FameLab heat on 22 November 2019

YOUNG PEOPLE ARE BREAKING DOWN BARRIERS BETWEEN SCIENCE AND SOCIETY

Encouraging young scientists to share their work and engage with society is part of the South African Agency for Science and Technology Advancement (NRF-SAASTA)'s drive to connect science and society, to lead toward its vision of a critically engaged and scientifically literate society.

In line with this objective, NRF-SAASTA's Young Science Communicators competition provides a platform for young people studying science to share stories about their work and to develop their communication skills. At the end of 2018, over 200 passionate, young scientists put together their thoughts and stories, in the form of videos, articles, audio clips and other creative modes of communication such as poetry and cartoons, to enter the competition.

The art of sharing complex scientific ideas using accessible language and tools is key to breaking down the barriers between science and the broader public.

The most recent round of the competition acknowledged the importance of communicating science in indigenous languages, and talking to and engaging with people in their mother tongue. The United Nation's 2019 celebration of the International Year of Indigenous Languages raises awareness of the importance of language as a tool for communication, education, social integration and development.

Communication of science in indigenous South African languages is critical for science to be inclusive to all of South African society. Entries in isiXhosa, isiZulu, Tshivenda, Xitshonga, Sepedi and Sesotho highlighted the appetite for young scientists to be sharing their work in their own languages.

Geologist Humbelani Muofhe, who was awarded second place for her Tshivenda entry in the Indigenous Language category said, "Writing [my] Tshivenda entry was not easy because some scientific words do not exist in my home language, but I found a way to explain them better."

Sharing stories about the impact and relevance of science and research to the broader society can help better connect science with society. Michél Strauss, a PhD candidate in Physiology student from North West University, was awarded first place in the Writing category. She is passionate about her work and says, "It is amazing to know how our findings could positively impact the lives of others". She hopes by writing about her work she can bring more attention to the harmful role that a high salt diet plays in cardiovascular disease development, and encourage readers to make conscious decisions when it comes to their daily salt intake.

The adjudication of the competition has been concluded and the results are:

Article category:

First place:
Michél Strauss - Spilling the "salt" on a shaky situation

Second place:
Yashini Naidoo - Superbugs: The end of an antibiotic era?

Commended:
Mpho Mosia - A diary entry by cell-free DNA

Jonathan Botha - Growing money on trees: Cellulose and its role in the bioeconomy

Karla Alujevic - Not too hot, not too cold: A lizard's struggle to find that "just right" in the face of climate change

Carri-Ann Bloom - Indigenous Knowledge Systems: Why Local is Lekker.

Open Category:

First place:
Molly Czachur - Finding Fish

Second place:
Julia Davies - The Streets Beneath

Commended:
Amica Muller-Nedebock - DNA. Why does it matter anyway?

Nomawethu Hlazo - The Fossil Chronicles Comics

Audio category:

First place:
Marike Louw - Rainbow Nation on a Sub-Antarctic Island

Second place:
Ntanganedzeni Ramugondo - Are Drones the Future for Africa?

Video Category:

First Place:
Darryl Herron - Imagine South Africa without trees

Second place:
Marike Louw - Denizens of Marion Island

Indigenous Language Category:

First Place:
Chwayita Ncedana - Ubukrelekrele be ndalo-akulahlwa mbeleko ngakufelwa (isiXhosa)

Second place:
Humbelani Muofhe - Oh, No gudela zwa matombo? (Tshivenda)

Commended:
Molly Czachur - Finding Fish (Afrikaans)

Nkululeko Khanye - Umhlaba Oguqukayo (isiZulu)

Top entries are available to view on NRF-SAASTA's website at www.saasta.ac.za/competitions/young-science-communicators/

Image: *Michél Strauss, a PhD candidate in Physiology student from North West University, was awarded first place in the Writing category.*

30TH INTERNATIONAL PARTNERSHIPS FOR HYDROGEN AND FUEL CELLS IN THE ECONOMY (IPHE)

South Africa's Hydrogen South Africa (HySA) flagship initiative is set to transition to a manufacturing capability, as the country looks to grow the local hydrogen fuel cell (HFC) market and become a significant player in a global HFC sector, which is projected to generate trillions of dollars in revenue. This was revealed during the 30th International Partnerships for Hydrogen and Fuel Cells in the Economy (IPHE) Steering Committee Meetings hosted by the Department of Science and Technology (DST) and the South African Agency for Science and Technology Advancement (NRF-SAASTA) from the 4 to 7 December 2018 at the University of Pretoria and The Capital Menlyn Maine in Pretoria.

Globally, the fuel cell market is growing and is estimated to be a multi-billion industry, with research indicating that the global fuel cell industry reached $2, 2 billion in revenue in 2014 and $3,6 billion in 2016, with countries such as Japan, China and the USA at the forefront of innovation in this industry. This is in line with the DST's Ten-year Innovation Plan prediction of this market reaching a multi-billion dollar international industry.

Comprising of 18 member countries and the European Commission, the IPHE serves as a mechanism to organise and implement effective and focused international research and development, demonstration and deployment activities related to HFC technologies. It also provides a forum for sharing best practices on initiatives, policies, regulations and standards, to accelerate the widespread deployment of HFCs in the economy and enable energy, economic and environmental security worldwide.

This was a rare opportunity for South Africa, the second time in the history of the IPHE, and prioritised the strengthening of South Africa's inter-governmental collaborations, research and development (R&D) education and outreach related to HFC technologies and increasing the role of HFC in the local economy. DST, Energy, Trade and Industry, Transport and Mineral Resources are key governmental departments in promoting HFC technologies and the Inter-Governmental Roundtable provided an opportunity for senior officials from these ministries to engage IPHE delegates on specific issues relevant to South Africa (e.g., policies, programmes, initiatives, demonstration projects, research focus) in a closed meeting environment allowing for detailed discussions. Besides its role in the beneficiation strategy, the HySA programme is further likely to contribute to a range of solutions in the energy mix solutions as part of a long-term energy solution to the energy challenge and the recently launched Green Transport through fuel cell vehicles.

Welcoming the delegates at the IPHE R&D Education and Outreach meeting, Dr Rebecca Maserumule, Chief Director for DSTs Hydrogen and Energy, highlighted the progress that the HySA project has made in the past decade.

"About 10 years ago, the cabinet of South Africa approved a fuel cell strategy for research development and innovation, what this means is that, first, we have 75% of the platinum group metal resource in South Africa, and we wanted to beneficiate those for the sake of those who live here. Part of that is a strategy around ensuring that we have local content in terms of competitive hydrogen technologies. Secondly, we want to have 25% global supply FCH cabins by 2020, but also, we understand that these aspirations have to be backed up by human capital development, as well as ensuring that everyone in this country, no matter who you are, benefits from the economic benefit of beneficiation," she added.

Addressing the delegates on behalf of IPHE, Dr. Sunita Satyapal, and the Chairperson of the IPHE from the United States gave a detailed scope of work and recent activities of the partnership, focusing the progress being made by many countries involved.

With this growing shift towards HFC technologies amongst the IPHE countries, partnerships between the public and private partnerships are seen as a mechanism to catalyse the increasing role of HFC in most of these economies. This was a topic of interest at the IPHE Industry Forum, which saw local and international private company representatives addressing the delegates. Addressing private partners and IPHE delegates, Dr Mjwara said, public-private partnerships support is envisaged to increase and cover gaps in technology commercialisation funding.

"A sovereign innovation fund that is going to be created to leverage co-investment by the public and private sectors will be relevant to the fuel cell sector uptake of locally developed technologies in both the local and global markets," concluded Dr Mjwara.

Providing a global context, Dr Sunita Satyapal, said their objective was to foster global collaborations, accelerate progress and enable widespread deployment of HFC technologies across sectors. IPHE focuses on energy security, resilience, emissions reduction (carbon and air pollutants) and economic prosperity. "IPHE members collectively invest nearly $1 billion a year in HFCs. There are 10 000 commercial fuel cells cars and over a quarter of a billion HFC stationary systems that can operate directly with natural gas," affirmed Dr Satyapal. According to Dr Satyapal, the industry projected the potential of two and half trillion dollars in revenues just for hydrogen fuel cells, creating 30 million jobs worldwide. Representing industry at forum were Anglo-American, Impala Platinum Limited and ENGIE, a global energy provider that operates in 70 countries with 155 000 employees, committed to a long-term innovation solution.

The forum was concluded with DST Minister Mmamoloko Kubayi-Ngubane's meeting with a select group of IPHE delegates before they embarked on site visits to Mintek, Chamber of Mines, Impala Platinum Refineries, Poelano High School, HySA Infrastructure Centre of Competence – North West University and Mponeng Mine. Minister Kubayi-Ngubane assured the IPHE members that South Africa had made a commitment to reduce green emissions by 34% in 2020 and 42% by 2025. The Minister indicated that South Africa should be working towards developing a hydrogen and fuel cell technology plant.

Image 1: *HySA programme exhibitions at the 30TH IPHE Steering Committee Meetings in Pretoria, South Africa.*

Image 3: *IPHE_PTA_HySA (72) - Ms Stephanie Byham from USA interacts with Mr Samuel Modise from HySA Infrastructure at North West University.*

Image 2: *DST's Minister Ms Mmamoloko Kubayi-Ngubane with a selected group of international delegates at the Ministerial-IPHE Meeting.*

SCIENCE STORYTELLING IN THE SPOTLIGHT AHEAD OF SCIENCE FORUM SA

The art of storytelling, telling a science, technology, engineering and mathematics (STEM) story in a manner that ordinary citizens will understand came to the fore when journalists from across Africa discussed science journalism in the fourth industrial revolution.

It was the innovative storytelling of two journalism interns; Realeboga Makganya from Moutse Community Radio in Siyabuswa, Mpumalanga and Lihle Dlova, who has a science and technology slot at Kumkani FM in East London in the Eastern Cape that captivated the awe of all in attendance.

Both the interns who are part of the South African Agency for Science and Technology Advancement took a decision to cover science news for their respective community radio stations in their indigenous languages and in the process – sparking a lot of interest from their listeners.

Ms Dlova and Ms Makganya were among several media practitioners who participated in a media workshop on the sidelines of the Science Forum South Africa (SFSA).

The forum attracted 3 000 researchers, scientists, policymakers and students from all over the world to discuss issues such as opportunities that could be exploited to advance communities marginalised by previous revolutions, preparing young people to participate in the fourth industrial revolution and the role of government in this regard.

"I started my reporting in English and boy was I ignored. I would go in my English accent and ask callers to dial in and nobody would call. That is when I understood why it was important for me to report in IsiXhosa. As soon as I started [reporting in an indigenous language], that's when they started participating," said Ms Dlova

Ms Makganya said convincing her station manager to cover the science beat took some persuasion and eventual interest from listeners.

"When I started this year with [the community radio station I work for], they did not have a science slot at all. When I joined and spoke to them about having a science slot, they said we can give you about 15 or 20 minutes," she explained.

As a counter proposal, she asked the station manager to give her brief slots in different shows;breakfast show and afternoon drive to be able to reach out to a wider audience during peak hours.

Though in different area codes, Ms Makganya and Ms Dlova said they have come to discover that communities have interest in science and that they were not clueless. The topics they cover range from genetically modified foods, health, and modern science versus traditional practices, innovation and technology, among others. In a panel discussion, Professor George Claassen, the Director of the Centre for Science and Technology Mass Communication at Stellenbosch University, said what Ms Makganya and Ms Dlova have managed to do as interns is innovative and impressive.

"You can't use ivory tower language to talk science to common people," he said.

"Science reporting requires journalists to possess certain attributes such as being avid readers and being explorers and discoverers of new knowledge, as well as being analytical thinking skills,"says Mr Claasen

Citing veteran science writer, editor and author Boyce Rensberger, Mr Claassen said producing a balanced story was not necessarily about given an equal weight to both sides of an argument. It meant appropriating weight according to the balance of evidence. – SAnews.gov.za

Image: *Science forum 2019 (image from:* https://www.sfsa.co.za/gallery-2018/*)*

THE SOUTH AFRICAN SCIENCE LENS® COMPETITION USES PHOTOGRAPHY TO BRING TOGETHER ART AND SCIENCE

The South African Science Lens® competition celebrates the wonder of science through photography, and shows how science and art can be seamless allies in communicating about the world around us. The South African Agency for Science and Technology Advancement (NRF-SAASTA), a business unit of the National Research Foundation, and its partner in the 11th round of the SA Science Lens® competition, the Human Sciences Research Council (HSRC), are pleased to announce the winners of the latest round of the competition.

Mr Kervin Prayag, with his photo entitled "Meowy Muse", further brought science and art together to take first place in the Science as Art category. An autopsy of a deceased caracal at the University of Cape Town was the muse for an artist, Sujay Sanan, putting together an exhibition called "A Place I Know". The paintings at his exhibit diarised the landscapes, flora, and fauna of the Western Cape, in a unique way. In the artist's own words, "while these works document what I fear might be lost, they are also filled with optimism", and give a positive account of the current state of wildlife conservation.

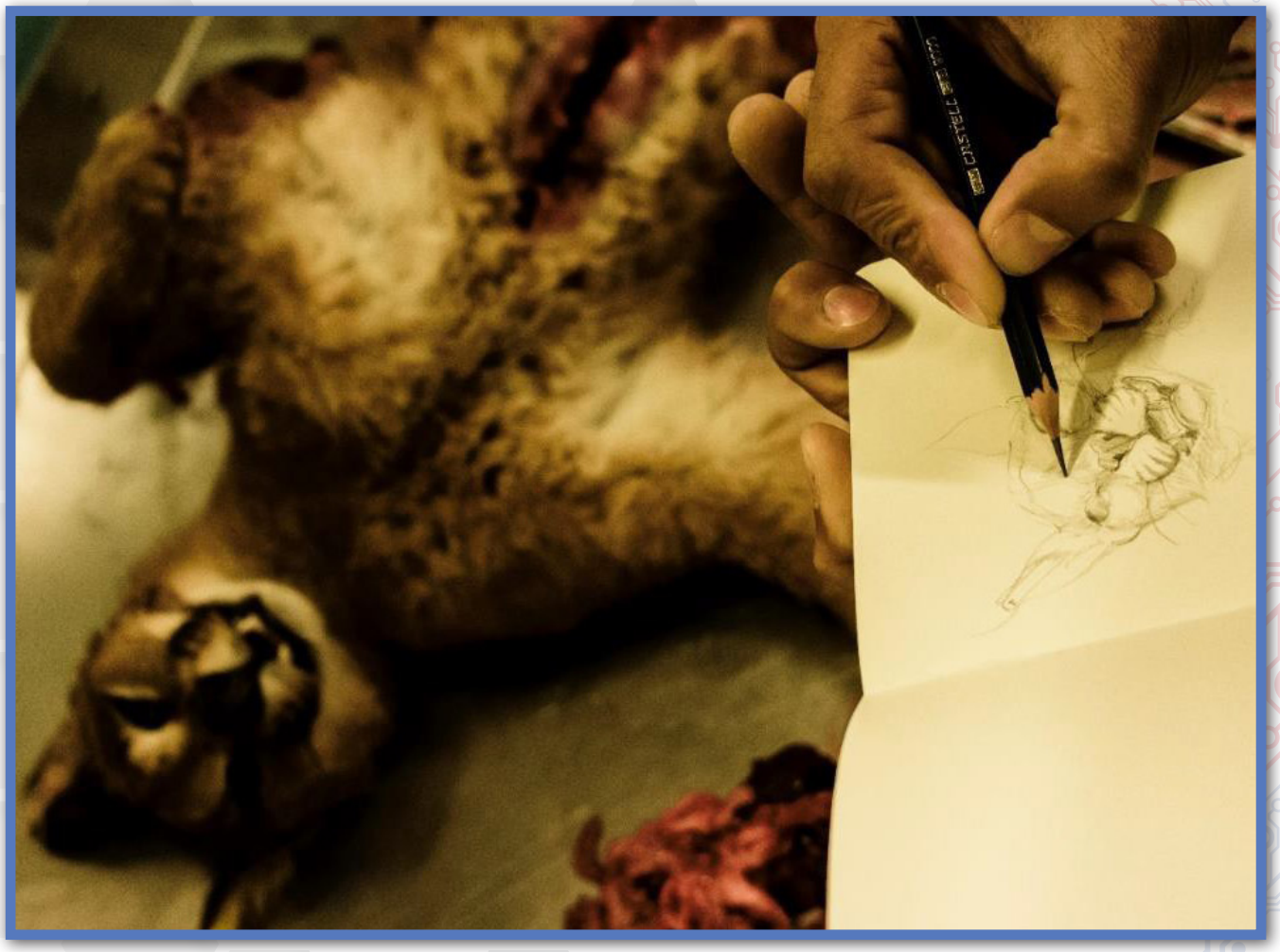


Image: *Mr Kervin Prayag's "Meowy Muse" took first place in Science as Art*

Prof Bruce Cairncross, from the University of Johannesburg, saw theatrical flare in his winning ***Science Close-Up*** photo entitled "Happy Faces". The smiling face that looks like a theatrical mask is actually a picture of different inorganic geological minerals. The white and purple crusts that look like a mask are tiny crystals of fluorite, a calcium fluoride species. The brown background is the mineral goethite, an iron-hydroxide, which is typically dark-brown. This sample of minerals comes from a fluorite mine in the Gauteng.

Image: *Prof Bruce Cairncross's "Happy Faces" wins the Science Close-Up category*

Science in Action focuses on capturing science as it happens. The winning photo was Thilo Beck's "Small scale surgery", giving us a glimpse into the great efforts of science to help us understand ecosystems. Here a tiny white-browed sparrow weaver (Plocepasser mahali) in the Kalahari is undergoing surgery to implant a miniature data logger. To make the procedure easier and less stressful for the birds, scientists catch them in their roosting chambers at night, and anaesthetise them, make a tiny incision, place the data logger in the bird and stich them closed all within a few minutes. It has only been possible in the last few years to build small enough data loggers to fit them into small birds without constraining them and inhibiting their flight. This study will give valuable information to help to understand a small piece of the Kalahari ecosystem.

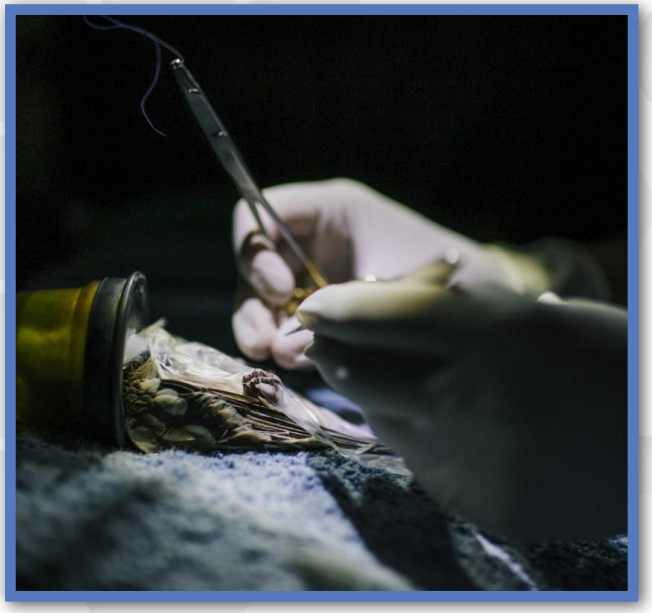


Image: *hilo Beck's "Small scale surgery" wins the Science in Action category*

The winning entry of the special category for the 2020 competition, The Dignity of All South Africans, showed us that practical science doesn't need to be high tech. Morgan Trimble won with her photo called "Newlands Spring's Community Spirit". Emphasising how important water is to human dignity, she showed us how, in the face of Cape Town's water crisis that threatened dignified access to clean water, a community member created a solution that allowed more users to collect water from Newlands Spring in an efficient manner. The simple pipe system made out of PVC pipe, string, wire, and corks transformed one awkward, muddy access point to 26 points under which to fill water collection jugs. People from different communities came together to cooperate in a shared communal space.

Image: *Morgan Trimble's "Newlands Spring's Community Spirit"*

In celebration of its 50-year anniversary, the HSRC also selected a special social science photo award, choosing Dhurti Dheda's "Connecting Worlds". The photo shows a street in the inner-city suburb of Doornfontein in Johannesburg, decorated by giant metallic "flowers" or satellite dishes. This is an impoverished area of immigrants and students, and the multitude of satellite dishes shows the extent of how many people are occupying small apartment spaces. As satellite television generally includes programmes from around the globe, it allows many immigrants to receive entertainment from their home countries, connecting them to their people in a foreign country.

Image: *Dhruti Dheda's "Connecting Worlds" wins the pick of the social science photos*

This year was the first time NRF-SAASTA and the HSRC teamed up to present the photographic competition, celebrating all natural and social sciences in the 20-year anniversary of the NRF and the 50-year anniversary of the HSRC. Through the SA Science Lens® competition, NRF-SAASTA and the HSRC aim to encourage researchers and scientists to invite the public into their world through inspiring curiosity in beautiful, dramatic or interesting photographs of their research. The competition also aims to encourage the public to appreciate and find science in their everyday lives, showing how they can view the world around them from a scientific perspective.

The full results of the competition can be found at www.saasta.ac.za/competitions/sa-science- lens.

TRANSIT OF MERCURY

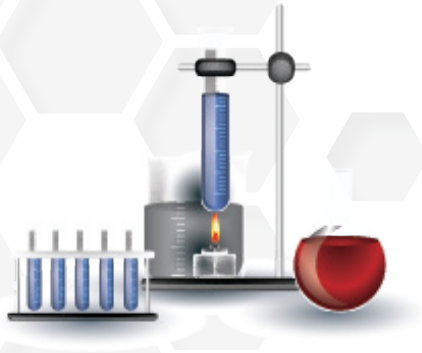
The South African Agency for Science and Technology Advancement is joining other organisations to enable South African citizens to witness the transit of Mercury on Monday, 11 November 2019 from 15:30 to 18:00 at the Johannesburg Observatory.

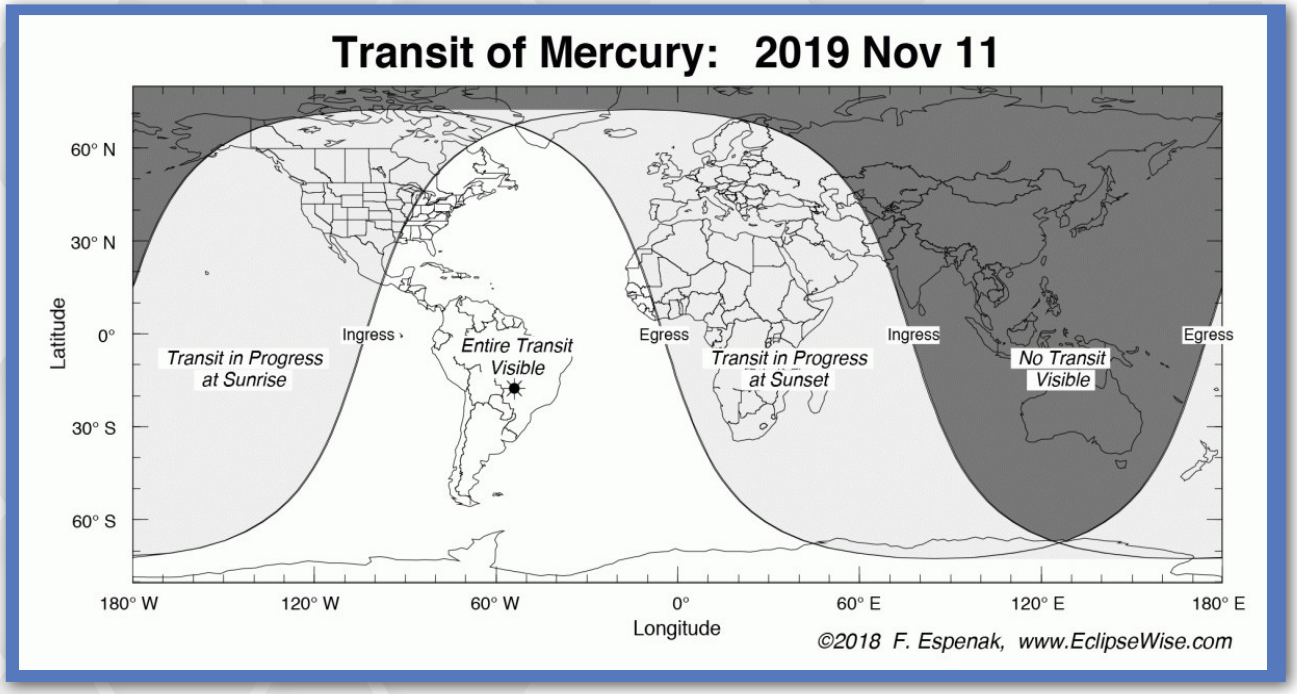
On the afternoon of 11 November, the position of planet Mercury will be directly between the Sun and Earth. Observers all over Africa will be able to see a tiny black dot making its way across the solar disk. The last time Mercury transited the Sun was in May 2016 and it will not happen for another 13 years.

The South African Agency for Science and Technology Advancement, Science Communications Manager Mr Michael Ellis, says it does not happen every day.

"In fact, it will only happen again in 2032. So get ready to view the planet Mercury as it transits across the Sun - passing directly between the Sun and the Earth. It's almost like a bird or an aeroplane flying across the sky and directly between you and the Sun, it's only that Mercury is much further away." He added that "scientists are excited about the transit of Mercury because there are various experiments they can do and observations they can make as Mercury makes its journey across the path of the Sun. Previously, scientists have made some interesting observations about the atmospheric composition of planets as the Sun's light shines brightly through their atmosphere. Scientists have also made observations of the long term changes in the size of the Sun, by measuring what is known as the solar radius."

As Mercury and Venus lie within the orbit of the Earth, they sometimes come exactly between the earth and the Sun, and can be seen crossing the face of the Sun for the duration of a few hours. These planets are much farther away from the earth than the Moon, and appear to be smaller in the sky than the Moon.

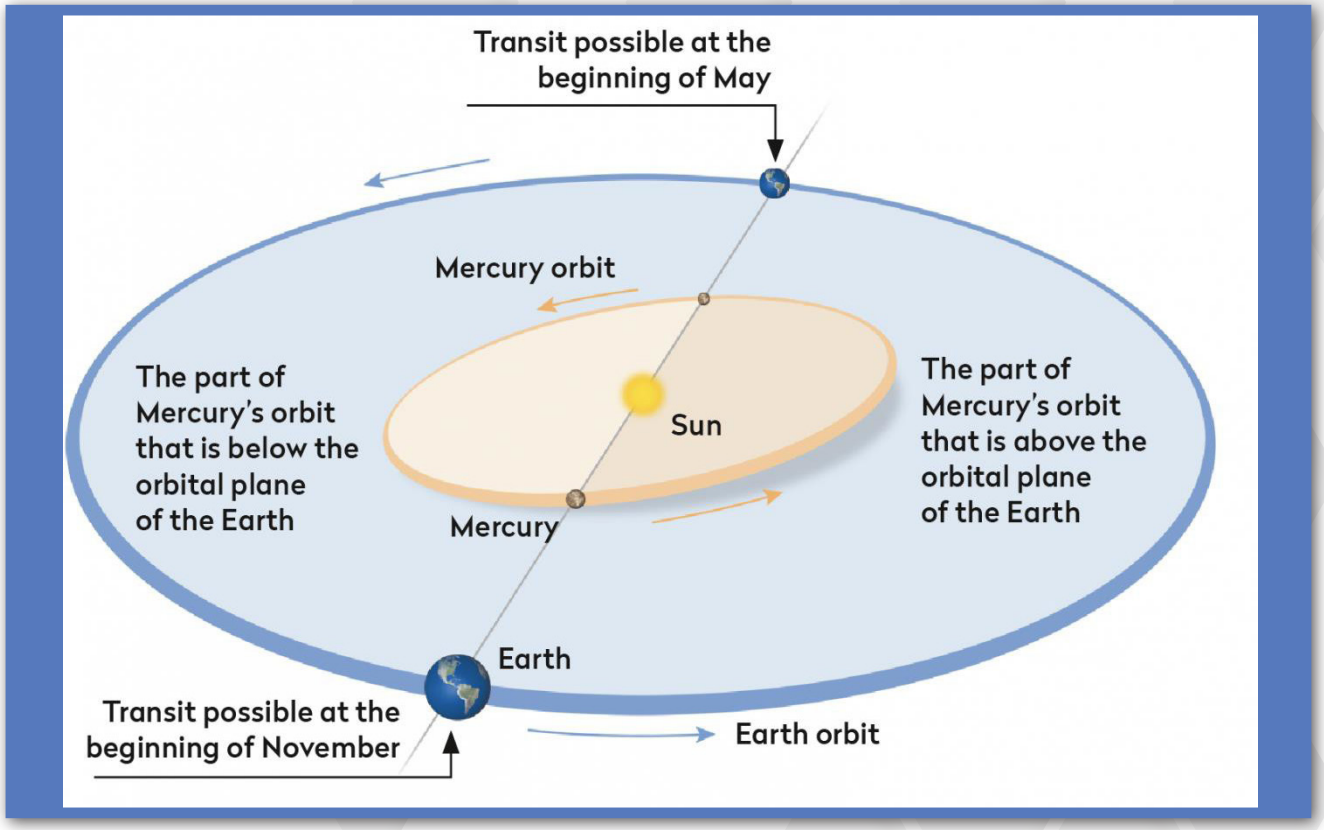




Global Visibility of the Transit of Mercury on 2019 Nov 11. Credit: Fred Espenek & www.eclipsewise.com

When it comes between the Sun and the Earth on Monday, the planet Mercury will appear as a small black dot moving across the face of the Sun. Since of these planets' size relative to the Sun, a transit can only be seen by means of a telescope.

According to a statement by the African Astronomical Society (AfAS) the transit will be visible across the African continent and may be observed by projecting the image of the Sun through a small telescope. However, South Africans will be able to watch Mercury transit the Sun on Monday, 11 November at 14:35 Central Africa Time (CAT).



The mechanics of the Mercury transit. Credit: *BBC Sky at Night Magazine*

According to SAAO the transit will take the planet 5.5 hours to move completely across the disc of the Sun, starting at 14:35 (2:35 pm). The Sun will have already started to set by the time Mercury reaches the mid-point of its transit, depending on your location. (Sunset in Johannesburg will be at 18:31 (6:31 pm) and Cape Town at 19:23 (7:23 pm)

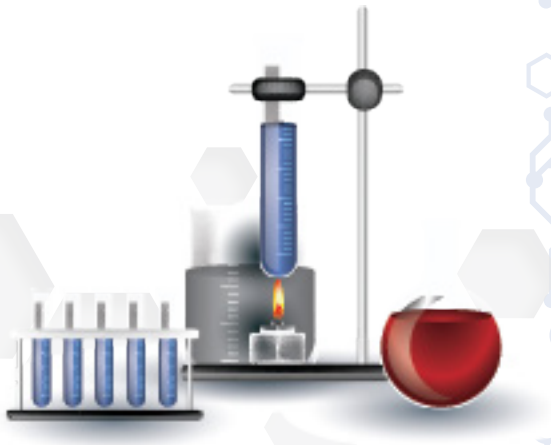
The last four transits occurred on November 15, 1999; May 7, 2003; November 8, 2006; and May 9, 2016. People with access to telescopes are encouraged to take the opportunity to view this rare event.

Do's

- It is safe to look at the projected image, observers can project the image of the Sun onto a piece of paper. This method also makes it possible to show the transit to many people simultaneously.

Don'ts

- Do not look directly at the Sun without a proper solar viewer.
- Do not use sunglasses or tinted shades to look at the Sun.
- Do not use solar eclipse viewers with binoculars or telescopes as the lenses act like magnifying glasses, amplifying the sunlight and making the eclipse viewers ineffective.



NRF-SAASTA CELEBRATES INTERNATIONAL MOTHER LANGUAGE DAY

The South African Agency for Science and Technology Advancement (NRF-SAASTA) is joining the world to celebrate International Mother Language Day on 21 February by profiling science in all South African official languages on various platforms, including social media.

The International Mother Language Day is a worldwide annual celebration intended to encourage nations to give importance to their mother language and cultural diversity, along with different dialects that preserve the diverse cultures found around the world.

This year marks the 19th anniversary of the International Mother Language Day, which is an initiative that originated in Bangladesh. The initiative was approved in 1999 by The United Nations Educational, Scientific and Cultural Organization (UNESCO) at its General Conference and has been celebrated throughout the world ever since.

UNESCO, a key player in trying to preserve indigenous heritage around the world, seeks to build peace through international cooperation in Education, the Sciences and Culture.

NRF-SAASTA, a business unit of the National Research Foundation, with the mandate to advance public awareness, appreciation and engagement of science, engineering and technology in South Africa, recognises the importance of promoting science communication and awareness in all nine official languages, through various science competitions and its Youth Science and Technology Journalism (YSTJ) programme. In 2019, it celebrated the International Year of Indigenous Language through its Young Science Communicators Competition's inclusion of a category for indigenous languages.

In its efforts to ensure that previously disadvantaged communities are included in the overall mandate to advance awareness, appreciation and engagement of science, NRF-SAASTA has established the YSTJ Programme. The programme was established in 2016 to facilitate the communication of sciences and technology in indigenous languages through community media.

Since its inception, the YSTJ programme has grown in leaps and bounds and has been impactful in celebrating the importance of the diverse indigenous languages in science communication. It covers all nine provinces in South Africa and has made inroads into underrepresented rural areas across the country.

Through its collaboration with the Media Development and Diversity Agency (MDDA) and community media across the country, the programme has played a crucial role in producing content and communicating science in various indigenous languages. The media coverage generated by the programme was produced in 11 South African official languages.

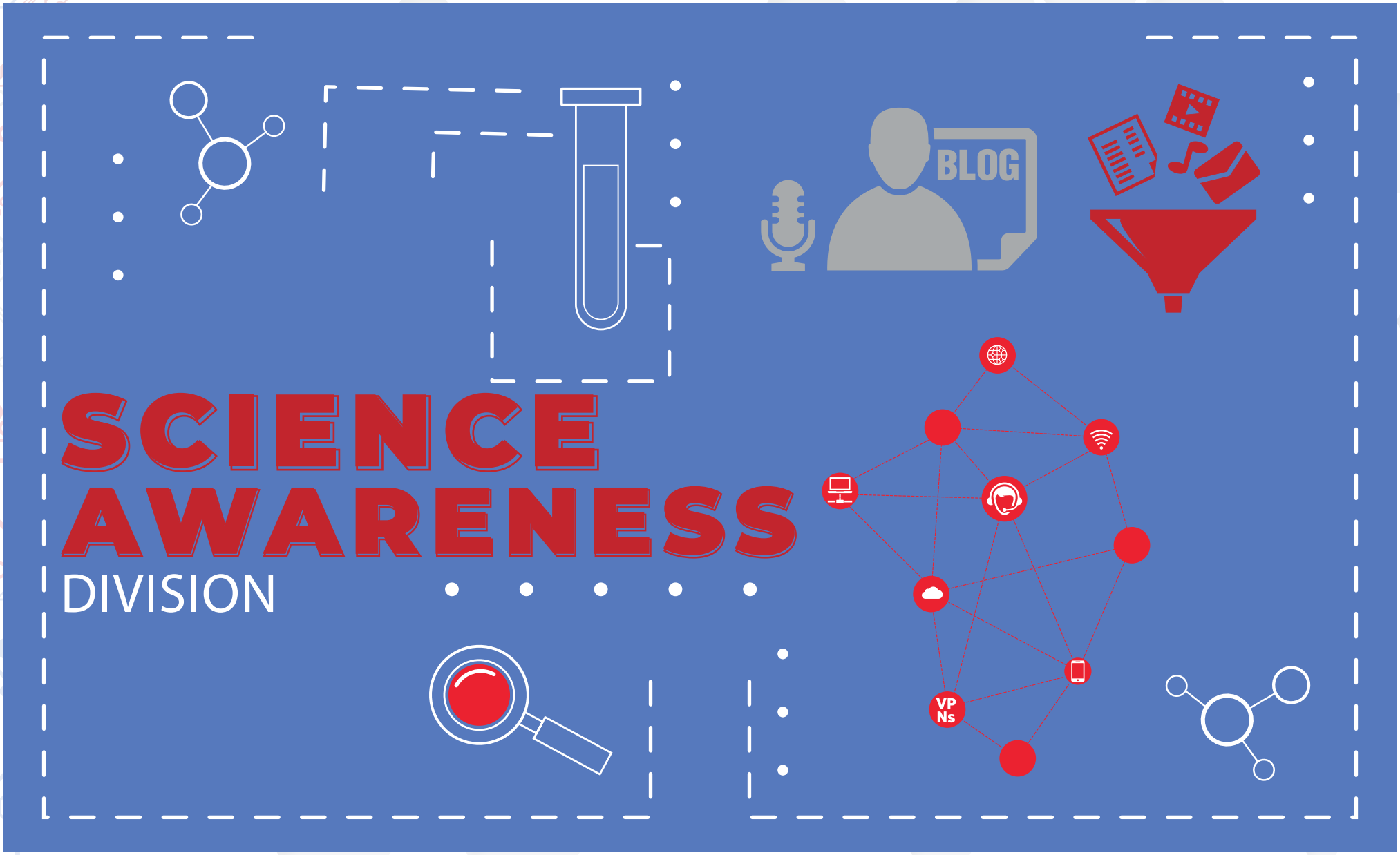
Mr Zamuxolo Matiwana, Media Coordinator at NRF-SAASTA and responsible for managing the programme, said the YSTJ programme has been successful in science communication in indigenous languages in South Africa, despite challenges of limited scientific vocabulary in indigenous languages. He sees a great opportunity for the development of indigenous languages to prevent them from dying out in the future.

Mr Matiwana, who is a keen advocate for the democratisation of science through communicating it in indigenous languages, believes that indigenous languages should be celebrated and used as a tool to make science and technology more inclusive.

Mr Matiwana believes that in a developing country like South Africa, where about 25% of our population is illiterate, it is important to transform science communication and make it inclusive.

Last year the programme produced 1 171 media items including 830 science and technology focused stories, 340 general stories with 93% of them in indigenous languages and 7% in English and Afrikaans.

INTERNATIONAL MOTHER LANGUAGE DAY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RESPONSIBLE RESEARCH INNOVATION NETWORKED GLOBALLY (RRING) PROJECT

RRING Objectives and RRING Achievements Summary

- One of the RRING objectives was to promote a linked up global world of RRI by creating the global RRING community network, thereby enabling mutual learning and collaboration and mobilisation of RRI concepts. Through collaboration with partners within the project the objective was achieved as follows:
  - RRING Community was successfully established
  - Six hundred and fifty (650) members registered at present. These members are both Global and multi-stakeholder
  - Two free trial workshops were offered to members who joined the network
  - RRING Executive Committee was also established

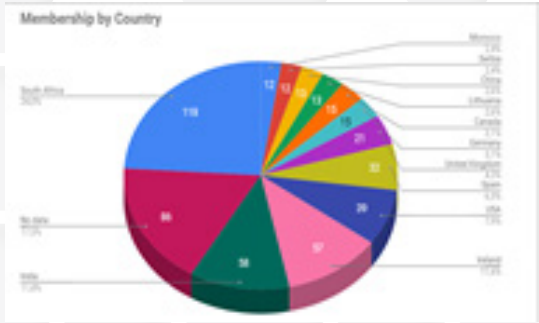
Goals of the RRING network

The following are goals that the network is looking at achieving:

- mobilise, promote and disseminate" mutual learning of RRI
- collaboration in RRI and RSSR
- advance SDGs globally

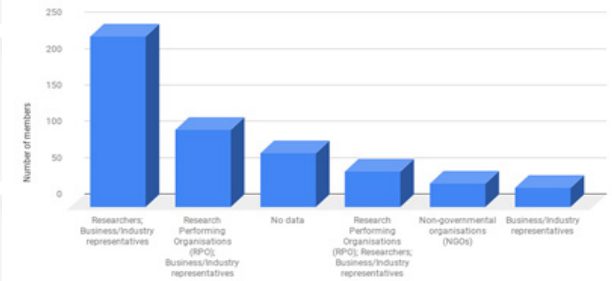
Members by Country

The following diagram indicates the number of members by country – SA is highest due to NRF-SAASTA's contribution:



Members by Profile type:

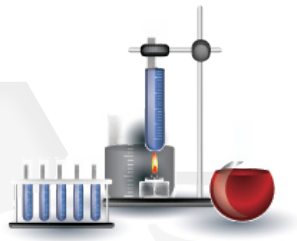
Below is the categories of institutions members belong to:

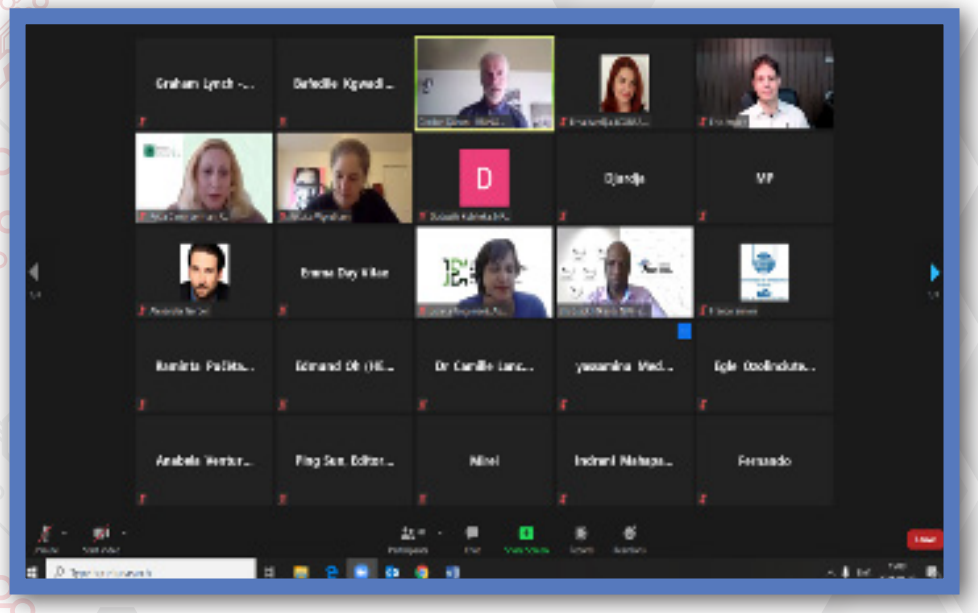


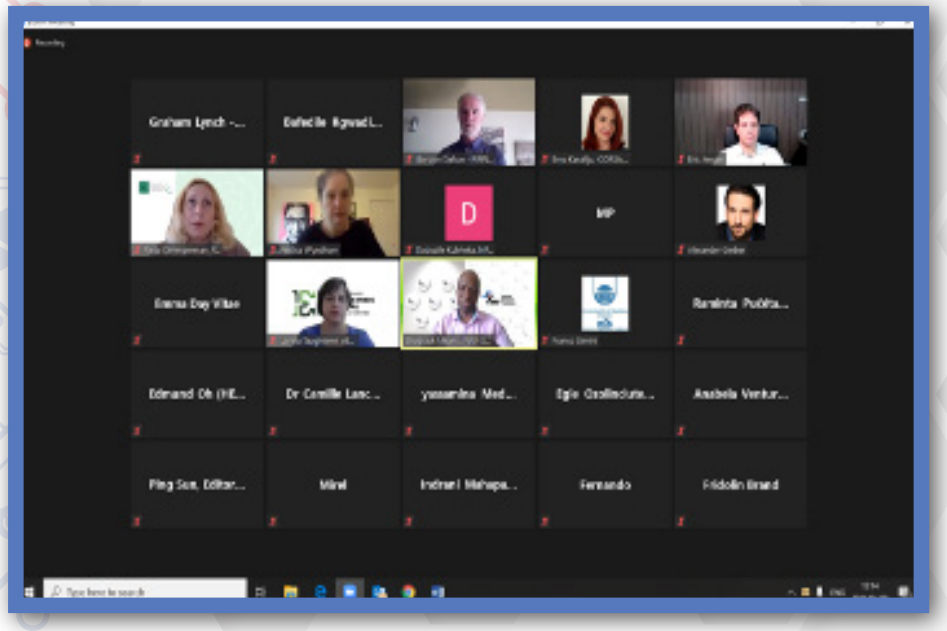
- **RRING closing summit**

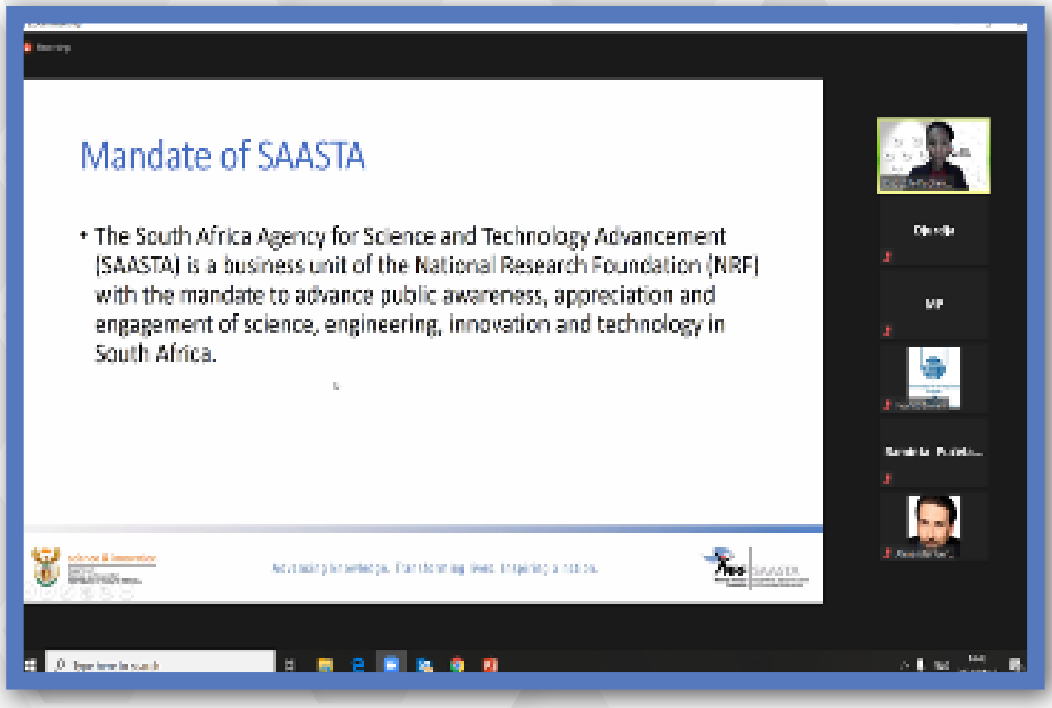
RRING held its summit on 19 & 20 April 2021

- NRF-SAASTA was represented by 3 staff members and contributed by :
  - presenting about the SA Case studies and
  - being part of the panel members discussing fit for purpose of RRING in governments agreement on RSSRs
- Through our collaboration, we also had one representative from SACNASP being part of the discussions on RSSR as a Global Framework.








Mandate of SAASTA
• The South Africa Agency for Science and Technology Advancement (SAASTA) is a business unit of the National Research Foundation (NRF) with the mandate to advance public awareness, appreciation and engagement of science, engineering, innovation and technology in South Africa.

NATIONAL SCIENCE WEEK

The theme of the 2019 National Science Week (NSW2019) was “Facing the harsh realities of climate change”.

Collectively, this intervention was implemented in nine provinces and 52 district municipalities.The province with the largest number of engaged members of the public recorded is KwaZulu-Natal (105 131), followed by Limpopo (86 228). The overall reach of 450 824 members of the public for the 2019 National Science Week is made up of 345 561 learners, 9 454 educators, and 95 809 general public.

NRF-SAASTA in collaboration with Sol Plaajtje University and the Kimberley Athletics Club implemented a 5 km Fun Run as part of the pre-launch activities on 20 July and 70 members of the public participated. Both the male and female winners of the 5 km Fun Run were awarded trophies whiles the rest of the participants received medals.

A total of 105 grant holders assisted in spreading the STEMI message, with more emphasis on climate change. The activities included facility tours, climate change seminars, workshops, exhibitions, and science shows, amongst others.

Some interventions included a fashion show that was titled as a “Trashion Show” hosted the by Olwazini Discovery Centre based in KwaZulu Natal province. Learners modelled clothing that was made from recyclable materials. The event was a collaboration with the KZN Department of Economic Development, Tourism and Environmental Affairs’ Schools Environmental Education Programme. The pictures below are from some of the models during the show:

Image: *Fashion show with recyclable materials at Olwazini Discovery Centre in Kwa-Zulu Natal*

In collaboration with the Pietermaritzburg Climate Change Coalition, Jive Media hosted a peaceful march through the streets of Pietermaritzburg to raise awareness on Climate Change. During the march, members of the public stopped to read some of the climate change message placards. This culminated in a performance of songs on climate change and interviews with some of the attendees.

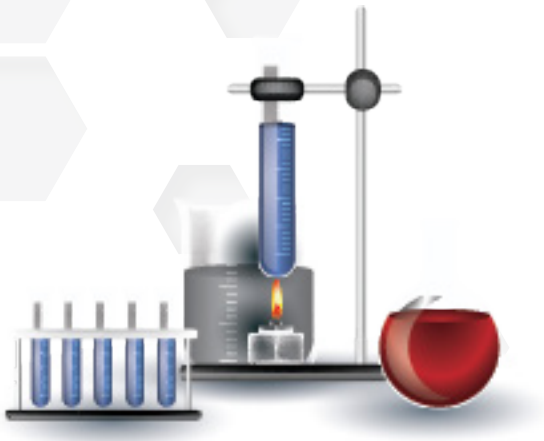
Image: *Young activists with a message on climate change*

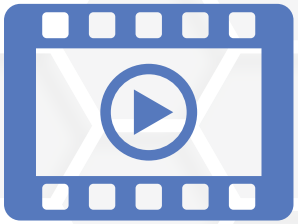
SAEON escorted a group of learners from Lebeko and Ntshuxeko Secondary schools for a tour at the Lepelle Northern Water Purification Plant in Limpopo to learn about the process and importance of water and its impact on climate change.

Image: *Learners engaging on the importance of water and water purification*

One of the interventions by a Higher Education Institution included a sustainable activity; the University of Pretoria's Science Centre, SciEnza, planted trees with its youngest visitors to combat climate change.

Image: *The youth working towards a sustainable future by planting trees*





SCIENCE FESTIVALS

Science festivals are public events aimed at exciting people about SET and its relevance for the development of human capital in STEMI. These serves to highlight science and technology with innovation and flair. The festivals links learners, educators, and all other publics with exhibitors from the science sector by allowing them to browse and interact with exhibitions to generate knowledge or awareness of different science topics; obtain information about current careers in science, technology, engineering, and innovation, as well as the qualifications required for these careers. For the more adventurous, there are spectacular science shows or sky viewing events to excite both young and old.

In Mpumalanga, Tess Technology hosted their annual festival at the Mbombela Stadium in collaboration with the Department of Basic Education. NRF-SAASTA participated and exhibited at the 2019 Zululand Science Festival at Unizulu Science Centre in Richards Bay, KwaZulu Natal.

The 6th Annual Rural Education Festival (Redfest) was hosted in two Limpopo rural towns namely Giyani and Tzaneen in collaboration with the Cornet Mamabolo Foundation during July. The theme of the festival was “Improved rural prosperity and sustainable production systems”, and focused on the eradication of poverty through science, whilst also protecting and preserving indigenous knowledge.

Learners were treated to presentations, workshops, an open exhibition, and a planetarium show. The event was attended by various exhibitors including Limpopo based science centres, Mintek, Department of Public Works, South African National Space Agency (SANSA), NRF-SAASTA, and NRF-SAAO and also included a performance by actor and writer Heather Massie.

The Sasol Techno X in partnership with the Mpumalanga Provincial Government hosted the 2019 Career Guidance Exhibitions event in Secunda from 29 July to 2 August. The exhibition targeted high school learners from across the country and enabled them to engage with the real-world application of STEM subjects in a way that creates interest and captivates the imagination. Learners were given access to relevant information on careers within STEM-related fields, career guidance, and bursary opportunities from different institutions. The exhibition also included various competitions that allowed different schools to compete for prizes.

ScopeX 2019 took place from 14 to 16 September at the Military History Museum in Johannesburg. ScopeX is a public outreach initiative that focuses on general astronomy, amateur telescope construction, astrophotography, science and technology and has been hosted annually since 2002 by amateur astronomers and members of the Astronomical Society of Southern Africa. African Young Generation in Nuclear (AYGN) hosted its 2nd African Youth Nuclear Summit from 7 to 11 October at the Royal Elaphant Hotel in Centurion under the theme “Unlocking the Potential of Nuclear Science and Technology Applications in Africa”. The summit brought together young experts in the field of nuclear from across the African continent to share their expertise and skills on Science and Technology.

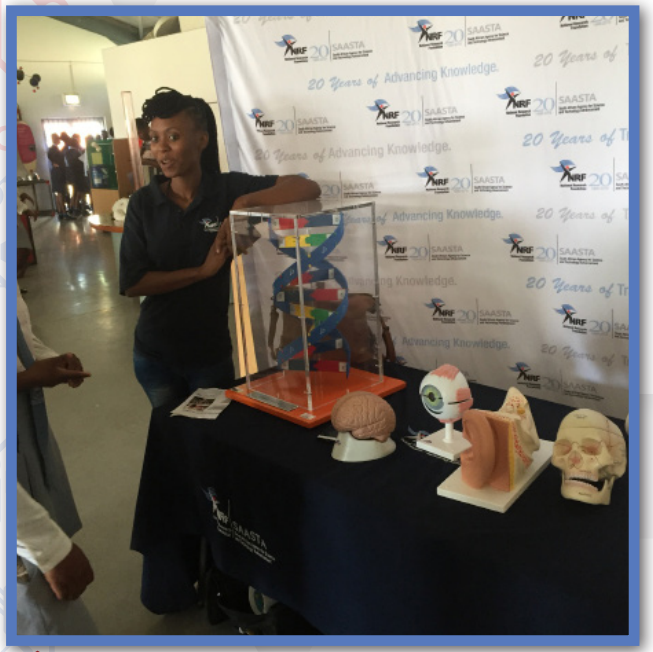
NRF-SAASTA participated at the DSI Minister’s Imbizos that took place at Orange Farm and Tembisa during April. The former Minister of the then Science and Technology and now Department of Science and Innovation, Ms Mmamoloko Kubayi-Ngubane, accompanied by the local councilors and municipal executives, addressed hundreds of learners, parents, and community leaders at local community halls. The exhibitors also conducted science experiments to encourage learners to pursue careers in the STEMI field. In addition, several other events, such as the Space Open Day in Delareyville, the Anglo-American Expo, the Africa Day Celebration, the Gauteng Youth Career Expo, and the Tshwane Career Expo, were supported.

The annual South Africa UNESCO Engineering Conference was held from 25 to 27 September at the North West University, Mafikeng campus. The event was organised by the Department of Science and Innovation in partnership with the North West University. The event was well organised and was attended by more than 15 organisations / companies demonstrating their knowledge in science. A total of 100 learners from different schools from the North West Province were exposed to coding and computing by different organisations and received training on high performance computing. In additon, Masters and PhD Engineering students also conducted their oral and poster presentations of their research theses.

Mothibistad Science Centre hosted the Science Beyond Borders Festival (Science Tube) took place) in Kuruman, Northern Cape from 25 to 28th February to celebrate the art of science, engineering ,and technology with dozens of activities and interactive exhibitions, outreach, and community visits.

Learners from various schools were hosted at the Mothibistad Science Centre, as well as Mothibistad Multipurpose Centre. On the last day, 28 October, the event consisted of a visit to Learamele Special School where learners with special needs were treated to an open exhibition and scientific demonstrations.

In addition, several other events, such as the Loxion Science Fair, Phalaborwa Career Expo, the Siyabuswa Career Day, the Space Open Day in Delareyville, the Anglo-American Expo, the Africa Day Celebration, the Gauteng Youth Career Expo, the Tshwane Career Expo, Jozini Science Festivals, Ehlanzeni District Career Expo, 2nd African Youth Nuclear Summit, Youth Engagement Focus and Expo, and the Space Science and Technology Awareness and Outreach Campaign, were supported, amongst others. At these events, the emphasis was placed on careers in STEMI by means of exhibitions by industry and HEIs, amongst others.



SCIENCE CENTRES

Science Centre Support - through a funding framework named Programmatic Support Grant Intervention (PSGI). The objective of this project is to enhance science engagement activities that are implemented in science centres.

A total of 32 funding applications from science centres were received and 26 applications were approved. A total investment of R7.85 million, in the form of grants, was awarded to the 26 science centres for laboratory equipment for experiments (9), interactive exhibits (10), mobile lab (1), centre refurbishment (1), centre activities (21), outreach activities (2), and learner subsidy (3). In addition, support visits were conducted by NRF-SAASTA to the Albertina Nonsikelelo Sisulu Science Centre, FOSST Discovery Centre and 20 other science centres. The science centres were also active in implementing the science engagement mandate, both at their centres, as well as through outreach activities in surrounding communities and thus the reach recorded above.

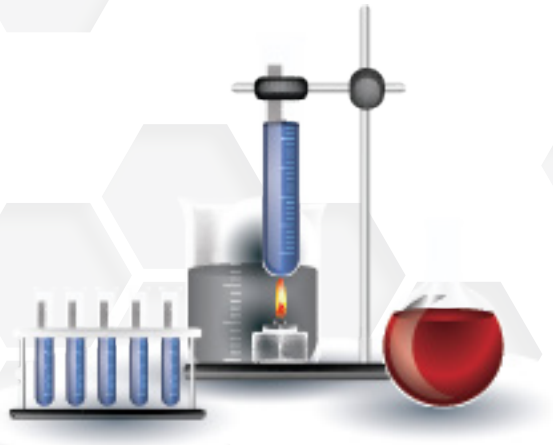
A total of 72 Science Centre personnel participated in the 21st Annual SAASTEC conference, hosted by Incubeko Youth and Science Centre in George, Western Cape, from 11 to 14 November 2018. Furthermore, 40 Science Centre managers and nine science festival organisers participated in the pre-SAASTEC conference meeting. The meeting discussed, amongst others: the importance of understanding Intellectual Property (IP) rules and regulations and the available IP4Kids / IP4 Teachers project – Training, improving access to development support funding and so forth.

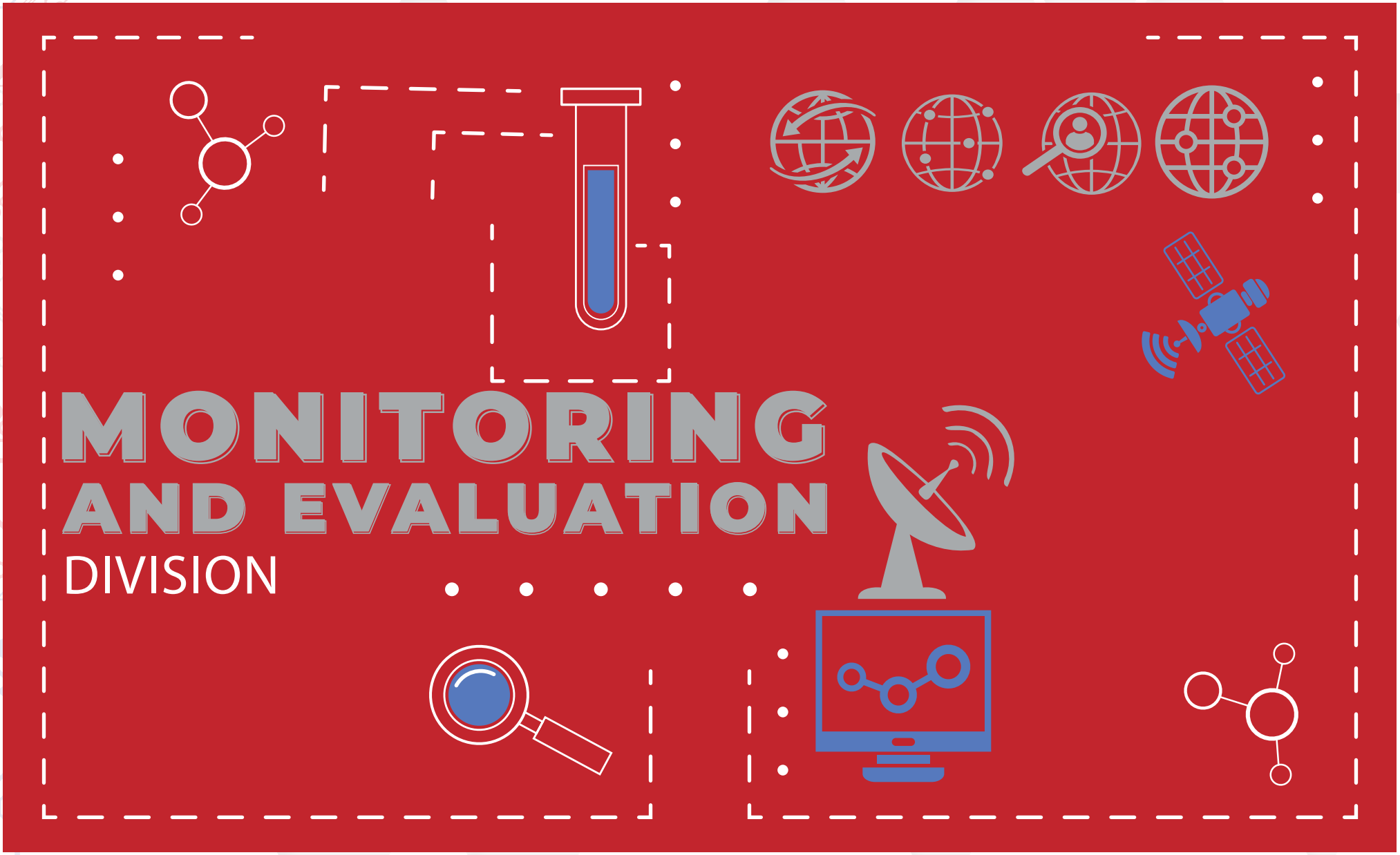
Science Centre Capacity Building – aims to empower Science centre staffto implement activities, exhibitions, lectures and other interventions efficiently.

On 28 May 2019, training was provided to the staff of science centres and museums on the relevant topics for the NSW theme, and the activities necessary for climate change. A follow-up session on climate change content took place on 25 July 2019 and the science centres explored hands-on activities and various experiments.

Image: *Science Centre personnel performing experiments during the JOCV workshop for science centres*

A Conference Paper Presentation Workshop took place from 26 to 27 September 2019 for 64 Science Centre staff. In addition, six Science Centres personnel from the University of Johannesburg Science Centre, Moipone Academy, Nkomazi Maths and Science Centre and Greater Giyani Foundation, participated in the Job Shadowing programme from 2 to 6 March 2020.



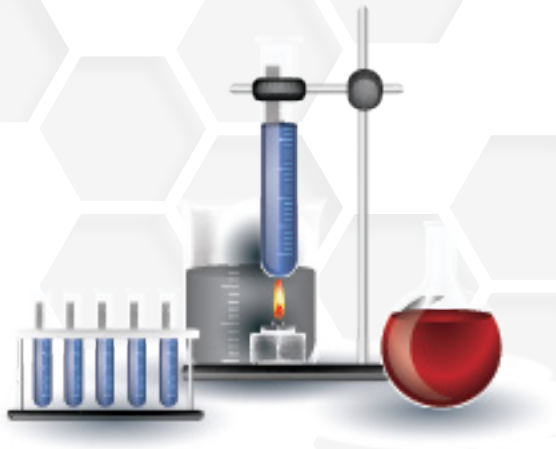

MONITORING
AND EVALUATION
DIVISION

ACCREDITATION OF SCIENCE CENTRES

We aim to create an environment for Science Centres to function optimally and improve target audiences' access to offered services.

The online Framework for the Promotion of Excellence in a National Network of Science Centres (PENNSC) platform has a total of 21 science centres registered on the system for accreditation purposes. A detailed outline of the Science Centres that underwent the accedidation process is split between those that completed the three stage process and those that only completed 1 and / or two stages of the process as stipulated below:

Science Centre Accreditation Process Status	
The three (3) stages completion of accreditation process	· JNF Walter Sisulu Science Centre, Mamelodi, Pretoria
	· UNIZULU Science Centre, Richards Bay, KZN
	· Christoph Meyer Maths and Science Centre, Richards Bay, KZN
	· FOSST Discovery Centre, Alice, Eastern Cape.
	· Giyani Science Centre, Limpopo
	· ArcelorMittal Science Centre, Sebokeng, Gauteng
	· Nelson Mandela Science Centre, Port Elizabeth, Eastern Cape
	· Vuwani Resources Centre, Thohoyandou, Limpopo
Sub-Total	**Eight (8)**



Science Centre Accreditation Process Status	
The one (1) and / or two (2) stages completion of accreditation process	· (UNISA Science Engagement Centre (ISET), Johannesburg, Gauteng
	· STEC@UKZN, Science and Technology Education Centre, Durban, KZN
	· KZN Science Centre, Durban, KZN
	· Nkomazi Mathematics and Science Project, Nkomazi, Mpumalanga
	· Sci-Enza, Pretoria, Gauteng
	· Mathematics and Science Integrated Improvement Centre (MASIIP), Bojanala, North West
	· Boitjhorisong Resource Centre, Fezile Dabi, Free State
	· ArcelorMittal Science Centre-Newcastle, KZN
	· ArcelorMittal Foundation NPC Saldanha Science Centre, Saldanha Bay, Western Cape
	· STEM Infinity, Uthungulu, KZN
	· Science Education Beyond Boundaries (SEBB), Uthungulu, KZN
	· UNISA Science Engagement Centre (ISET), Johannesburg, Gauteng
	· WESSSA Umgeni Valley Science Centre
Sub-Total	**Thirteen (13)**
Grand-Total	**Twenty One (21)**

NATIONAL SCIENCE OLYMPIAD TEN YEAR ANNIVERSARY

The study focusing on the National Science Olympiad Ten Year Anniversary with Harmony was completed, while the first progress report on the Natural Science Olympiad Baseline Study has been been produced. The following is a reflection of excerpts from the report as foreword of both the CEOs of the NRF and Harmony Gold Mining and, the experiences of learners, amongst others who were tracked.

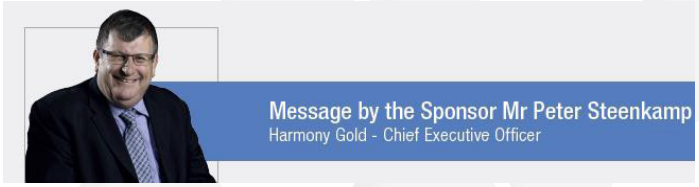
Booklet published on the National Science Olympiad Ten Year Anniversary with Harmony

This book celebrates 55 years of the National Science Olympiad and our Ten-Year Partnership Anniversary with Harmony Gold Limited.

For the coming years, the NRF - NRF-SAASTA wishes to increase the number of the National Science Olympiad Participants, expand the footprint in the SADC region, enhance the NSO's interest internationally, collaborate more with government and private sector and increase the learner and educatorsupport programmes.

"The organisation provides a variety of curriculum support initiatives that focus on educator and learner

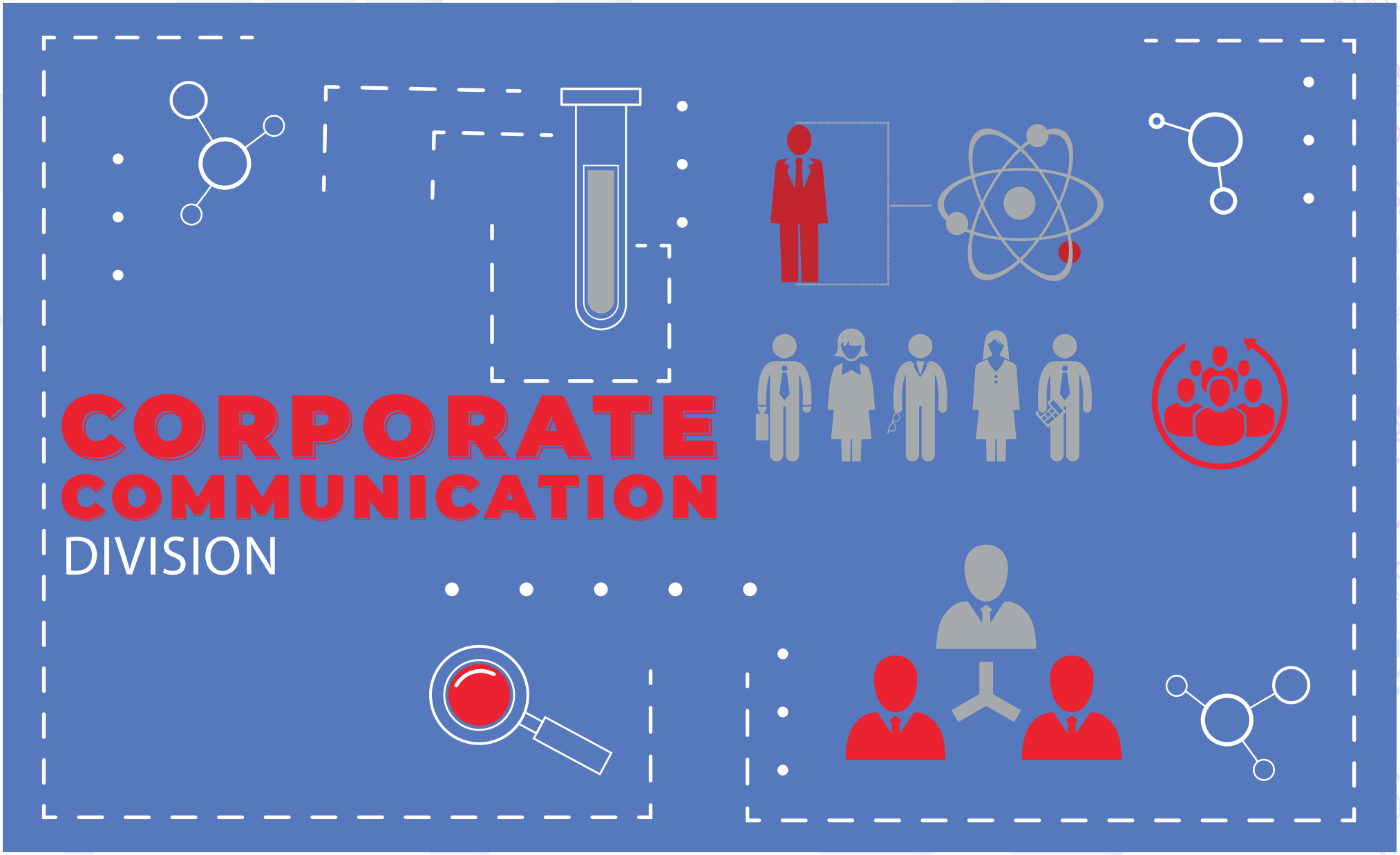
support, including the National Science Olympiad (NSO). Over the past 55 years, we have seen the NSO advancing knowledge, transforming lives and inspiring the youth."



"Our participation in this initiative was not only inspired by our desire to see NRF-SAASTA succeeding in their vital mission of encouraging youth excellence in science education, but it was also out of our deep commitment that Harmony has to continue playing a pivotal role in addressing the structural and socio-economic challenges that are prevalent within our communities."

"The great moment for me was when I attended the London International Youth Science Forum in 2013. I was excited to travel to another continent and meet other students who we"The great moment for me was when I attended the London International Youth Science Forum in 2013. I was excited to travel to another continent and meet other students who were also interested in Science. I learnt to be positive about achieving his goals. I put a lot of effort into the event and got good results."

"The NSOs motivated and encouraged me to be innovative in find solutions to global problems. My progress as a female scientist will inspire and empower a lot of women and previously disadvantaged students towork hard and prove to themselves and to the world that they can go far with dedication. A highlight has been her being a winner of the 2017 NSO and being presented with an opportunity to represent the country at the London International Youth Science Forum (LIYSF)."

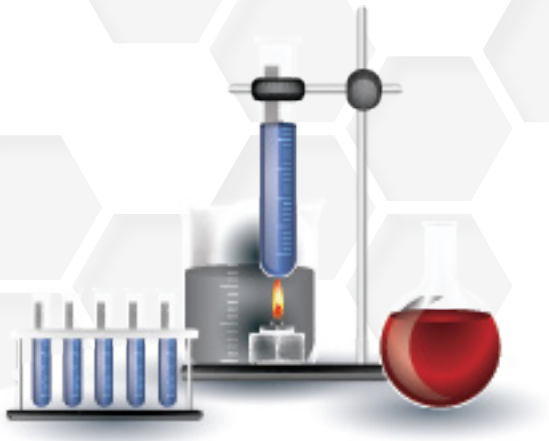

CORPORATE
COMMUNICATION
DIVISION

20-YEAR ANNIVERSARY FOR THE NATIONAL RESEARCH FOUNDATION (NRF)

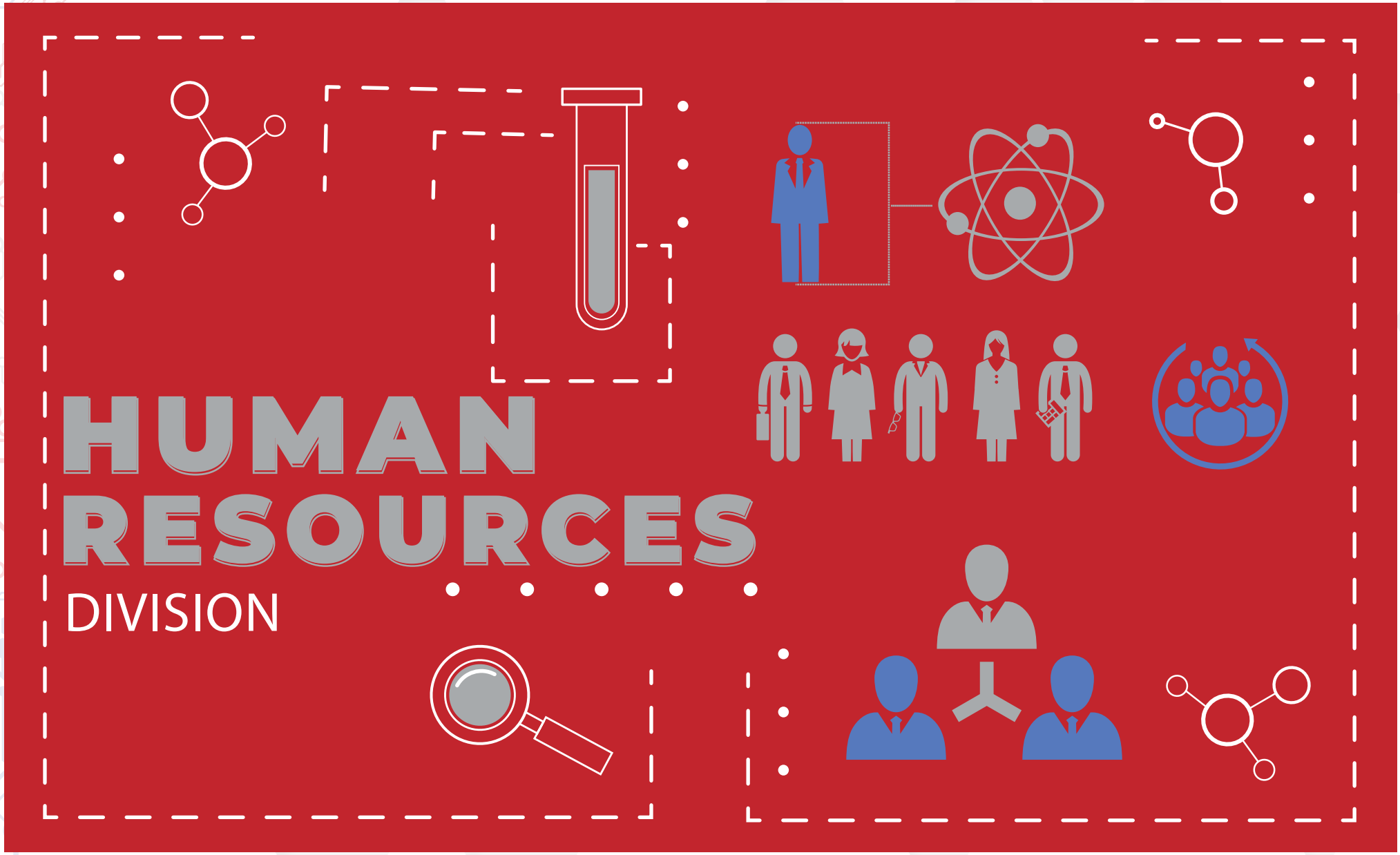
The year 2019 marked the 20-year anniversary for the National Research Foundation (NRF) and to celebrate this momentous milestone, NRF-SAASTA hosted an anniversary party for its employees to celebrate 20 years of Advancing Knowledge, Transforming Lives and Inspiring a Nation and produced a publication on the impact of the National Science Olympaid in transforming lives and inspiring a nation.

"Congratulations to the NRF on its 20th anniversary of supporting and catalyzing research work in our country. This 20th anniversary coincides with 25th anniversary of our democracy, thus requiring serious reflection on both achievements made, as well as the challenges that lie ahead," says Minister Of Higher Education, Science And Technology, Dr Blade Nzimande

Images: *Celebrating 20 years of advancing knowledge, transforming lives, and inspiring a nation*



Images: *Celebrating 20 years of advancing knowledge, transforming lives, and inspiring a nation*


HUMAN
RESOURCES
DIVISION

	NAME	SURNAME	DESIGNATION
MANAGING DIRECTOR			
1	Dr Jabulani	Nukeri	Managing Director
2	Mpho	Mashiane	PA to the MD

	NAME	SURNAME	DESIGNATION
CORPORATE COMMUNICATION DIVISION			
1	Jacky	Tshokwe	Cooperate Editor
2	Daphney	Molewa	Communications Officer
3	Daniel	Sathekge	Volunteer
4	Emmanuel	Mtolo	Volunteer
5	Sisanda	Mabasa	Volunteer
6	Mthobisi	Skhosana	Volunteer

	NAME	SURNAME	DESIGNATION
	HUMAN RESOURCES DIVISION		
1	Sophie	Ramaboya	HR Practitioner
2	Deborah	Mokone	Receptionist
3	Macdonald	Kapu	HR Project Officer
4	Viwe	Njikelana	Payroll Administrator
5	Kgomotso	Louw	HR Assistant
6	Ngciba	Landzela	Volunteer
7	Karabo	Leso	Volunteer

	NAME	SURNAME	DESIGNATION
	SCIENCE EDUCATION DIVISION		
1	Moloko	Matlala	Manager
2	Chrisna	Van Staden	Senior Administrator
3	Erna	Taljaard	Project Coordinator
4	James	Tlhabane	Project Coordinator
5	Makhanana	Nkhwashu	Project Officer
6	Gerald	Maluleke	Project Administrator
7	Msizi	Khathide	Project Coordinator
8	Nomathemba	Mdlalose	Project Officer
9	Simon	Rametse	Project Officer
10	Bonolo	Lekalakala	Assistant Project Administrator
11	Tebalo	Tsatsi	Project Coordinator

	NAME	SURNAME	DESIGNATION
12	Vhutshilo	Nekhwalivha	Project Officer
13	Zinzi	Madiope	Project Officer
13	Lufuno	Mudzhigi	Intern
15	Dakalo	Mudau	Volunteer
16	Khwathiso	Tshavhungwe	Volunteer
17	Vinolia	Mametja	Voluneer
18	Gomolemo	Mahlangu	Volunteer
19	Nthabiseng	Ndlovu	Volunteer
20	Xiluva	Mathebula	Volunteer
21	Rhulani	Mashaba	Volunteer

	NAME	SURNAME	DESIGNATION
	SCIENCE AWARENESS PLATFORM DIVISION		
1	Shadrack	Mkansi	Manager
2	Vanessa	Naidoo	Administration
3	Bafedile	Kgwadi	Project Coordinator
4	Brenda	Edwards	Administrative Officer
5	Kitso	Selebalo	Volunteer
6	Beatrice	Mkhize	Volunteer
7	Clement	Molefe	Volunteer
8	Zusakhe	Mbebe	Volunteer
9	Ofentse	Machete	Volunteer
10	Happy	Vilakazi	Project Coordinator
11	Njabulo	Duma	Project Officer
12	Thandamanzi	Mtsweni	Project Coordinator

	NAME	SURNAME	DESIGNATION
SCIENCE COMMUNICATION DIVISION			
1	Michael	Ellis	Manager: Science Communication
2	Refilwe	Mogami	Unit Administrator
3	Apfeswaho	Netshisaulu	Volunteer
4	Kholofelo	Molokomme	Volunteer
5	Joanne	Riley	Science Editor
6	Kedibone	Monyebodi	Project Officer
7	Zamahlubi	Radebe	Project Officer
8	Lithakazi	Masilela	Project Officer
9	Martha	Mokgoko	Project Administrator
10	Sipho	Dhlamini	ICT Coordinator
11	Sizwe	Khoza	Project Coordinator
12	Zamuxolo	Matiwana	Media Coordinator
13	Millicent	Masina	Intern

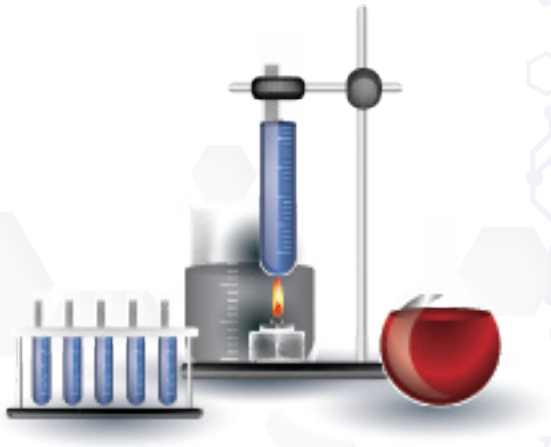
	NAME	SURNAME	DESIGNATION
MONITORING AND EVALUATION DIVISION			
1	Joyce	Khunou	Manager
2	Sipho	Sotomela	Unit Administrator
3	Gugulethu	Mtsweni	Project Coordinator
4	Lindie	Muller	Project Officer
5	Rofhiwa	Raselavhe	Project Coordinator
6	Archie	Kekana	Volunteer

	NAME	SURNAME	DESIGNATION
FINANCE & ADMINISTRATION DIVISION			
1	Nonhlanhla	Gumede	Finance and Admin Manager
2	Mavis	Mohumotjie	General Assistant / Receptionist
3	Elda Tshidi	Seboni	Financial Officer
4	Jacob	Manchidi	Registry
5	Jolien	Martins	Financial Officer
6	Malesela	Madiba	Finance Officer
7	Maphefo	Chauke	Grants Officer
8	Marlize	Delport	Financial Controller
9	Medupe	Moeng	Administrative Controller
10	Michael	Machete	General Maintenance Assistant

	NAME	SURNAME	DESIGNATION
11	Mandla	Shivuri	General Maintenance Assistant
12	Michael	Monametsi	Driver/Messenger
13	Moabi	Sethojane	SCM Volunteer
14	Rirhandzu	Mabasa	SCM Administrator
15	Sindisiwe	Ntuli	SCM Administrator
16	Tshepo	Matheane	Supply Chain Coordinator
17	Mantshadikana	Setuke	SCM Volunteer
18	Tsietsi	Machaa	Financial Officer
19	Kenneth	Collis	IT Network Systems Coordinator
20	Eunice	Mochoene	Kitchen

LIST OF ACRONYMS

ASTC	Association of Science Technology Centres
BAST	Beijing Association for Science and Technology
CA	Curriculum Advisers
CTF	Critical Thinker's Forum
DSI	Department of Science and Innovation
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
MST	Mathematics, Science and Technology
NRF	National Research Foundation
NSTF	National Science and Technology Forum
NSO	National Science Olympiad
NYS	National Youth Service
NPEP	Nanotechnology Public Engagement Programme
NZG	National Botanical Gardens
SET	Science, Engineering and Technology
SETI	Science, Engineering, Technology and Innovation
SAASTA	South African Agency for Science and Technology Advancement
SAMF	South African Mathematics Foundation
PUB	Public Understanding of Biotechnology
STEMI	Science, Technology, Mathematics and Innovation
SAASTE	South African Association of Science and Technology Educator



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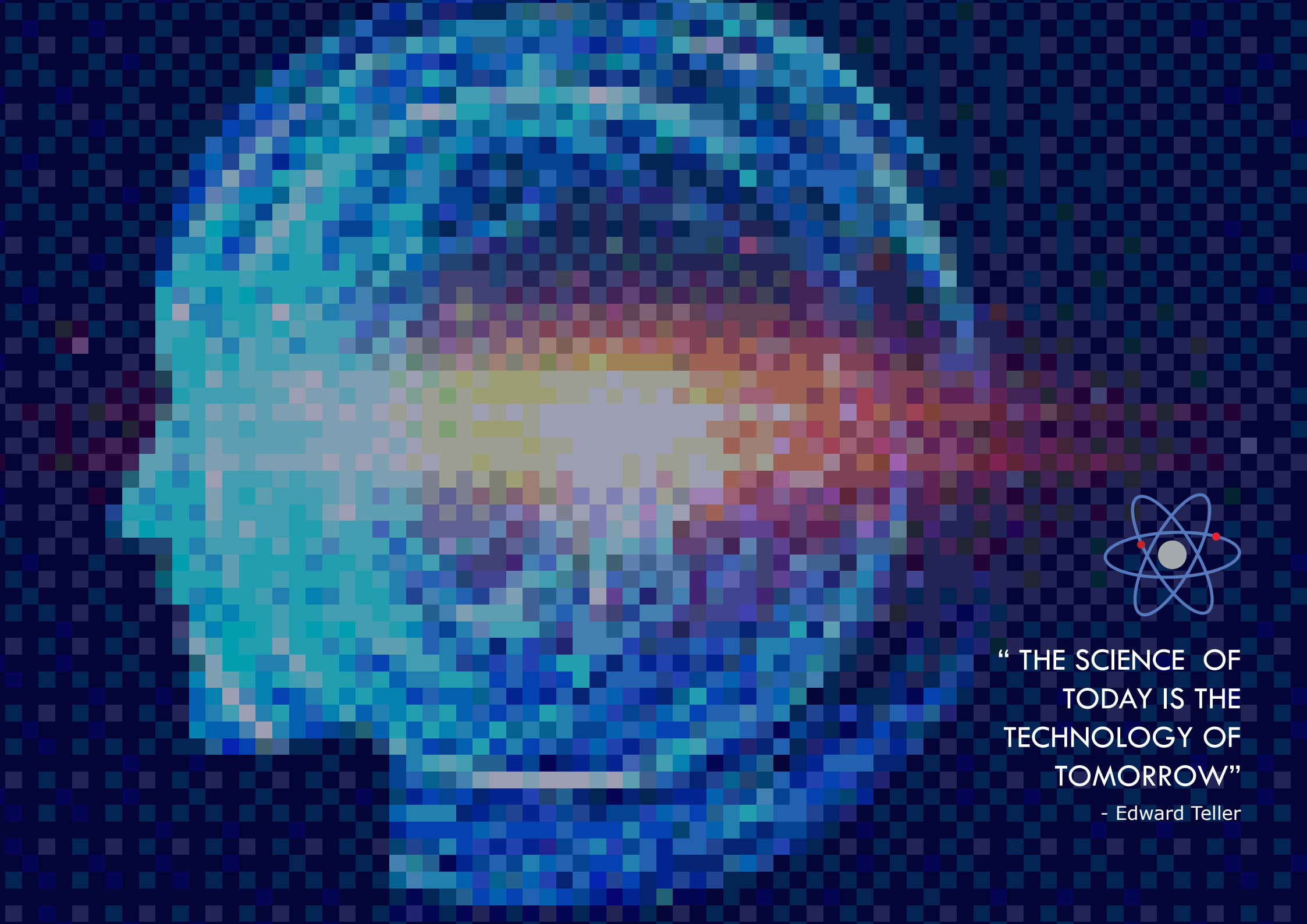
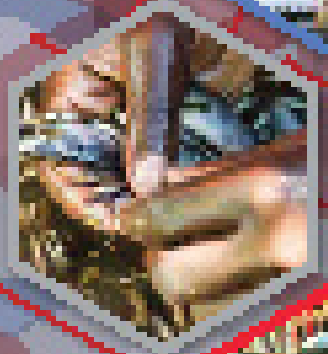

“ THE SCIENCE OF TODAY IS THE TECHNOLOGY OF TOMORROW”
- Edward Teller



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