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National Science and Technology Forum

celebrating 25 years

The NSTF celebrates 25 years

The National Science and Technology Forum (NSTF) has a long history as part of democratic South Africa. From 1991, the precursor for the NSTF, called the Science and Technology Initiative, was part of the negotiations held during the Convention for a Democratic South Africa (CODESA). The NSTF was consequently founded in 1995. Its then-mandate was to oversee the establishment of a democratic and inclusive science system.

This year is the 25th anniversary of the NSTF, now a national stakeholder body representing organisations involved in science, engineering, technology and innovation (SETI). The NSTF continues to have ongoing input into national policy and planning processes. One of its primary mandates is to hold discussion forums for an ongoing exchange between the SETI community and government.

"It's the largest, oldest and most representative stakeholder body of its kind. It represents more than 100 organisations, councils and institutions nationally and spans both the private and public sectors," says Ms Jansie Niehaus, NSTF executive director. "The NSTF is an independent SETI platform, an essential element of an active democracy and an important part of the collaboration process needed in SETI."

This not-for-profit organisation has seven membership sectors: business (including SMMEs and business associations), civil society and labour, government, higher education, professional bodies and learned societies, science councils and statutory bodies, and state-owned enterprises. (For the full list, look under membership on *www.nstf.org.za*.)

Within this SETI stakeholder group, there are researchers in various disciplines, engineers, entrepreneurs and innovators, technologists and technicians, administrators and managers, and academics and educators.

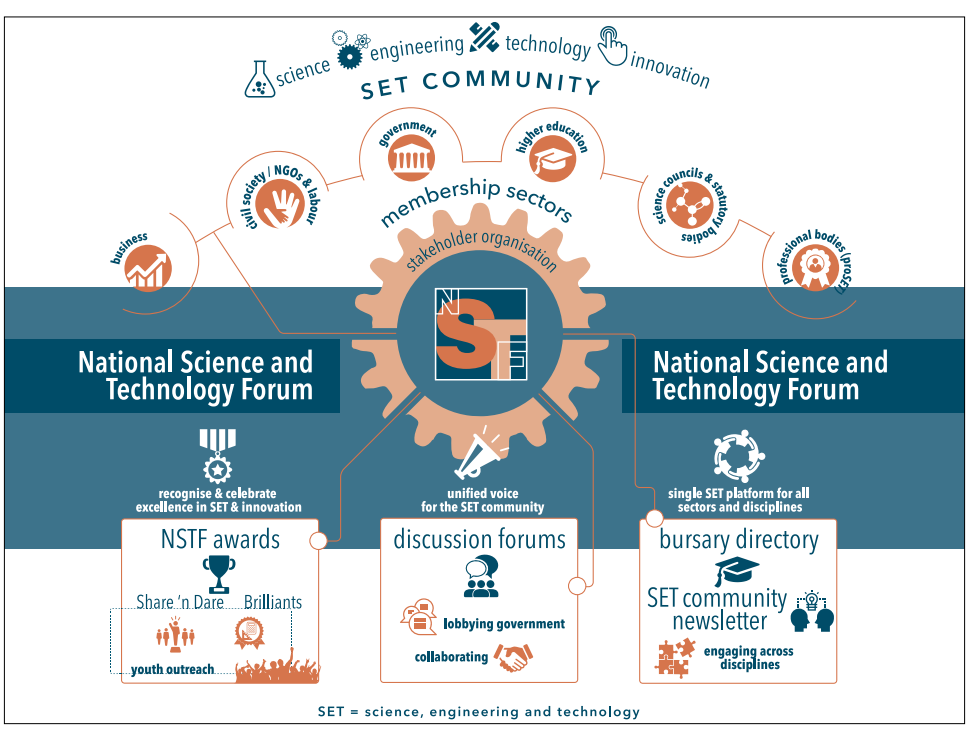
NSTF's role in the SETI landscape

The NSTF's work centres around representing SETI organisations through three main areas: networking stakeholders and engaging government departments around SETI-related issues, promoting SETI, and liaising with government on behalf of stakeholders. These areas then expand into various activities.

Recognising excellence in SETI

The annual NSTF-South32 Awards began in 1998 and are now considered South Africa's 'Science Oscars'. They recognise and celebrate excellence within SETI sectors, rewarding the efforts and contributions of top scientists and related professionals in South Africa. The awards are also used as a mechanism to promote SETI achievements to the youth and to the general public. There are two associated youth outreach programmes: the NSTF Share 'n Dare Programme (where award winners share their knowledge) and the NSTF Brilliants Programme (which recognises top physical science and mathematics students.

Left: **Prof Muhammad Ali Dhansay, NSTF chairperson** *Center:* **Dr Mpho Lekgoathi, NSTF vice-chair** *Right:* **Ms Jansie Niehaus, NSTF executive director**



Unified voice for SETI community around policy issues

The NSTF is collaborative space to engage around SETI policy and related issues. One of the ways it does this is with NSTF Discussion Forums. Run like short conferences, the topics are of cross-cutting relevance to the SETI community. Some recent topics include:

- Investigating the 4IR technologies needed for manufacturing and minerals processing
- Looking at how the career paths for researchers has changed, from embracing broad science and complexity to systems thinking and entrepreneurship
- Understanding the complexity of plastics pollution in the South African context

Single SETI platform for all sectors and disciplines

"The NSTF's aim is to create a collaborative space where the different sectors and disciplines can share information and engage with each other," explains Niehaus. To add cohesion, the organisation sends out a monthly e-newsletter about SETI-related public policies, events and other SETI-related news.

As part of representing the SETI community, the NSTF collates available bursaries and bursary providers as an online source. (It's under the 'Bursary' section on the NSTF website.) Further online youth engagement offers career information and role model profiles. The NSTF Bursary Directory and SETI Careers initiative was implemented with funding from the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the DSI in 2011.

The NSTF is also involved with various projects, primarily with the DSI. Recent examples include an NPO support programme for organisations led by black women. The NSTF also trains young science graduates from the DSI's National Youth Service and National Research Foundation Internship Programmes. This began in 2006.

From present to the future

"We are proud to have reached the important milestone of 25 years," says Niehaus. "It has come at a very relevant time for SETI. Lessons from the Covid-19 pandemic show us that it's more important than ever to debate the linkages between science, technology and society, the various causes and effects, the unintended consequences, and whom it benefits. As important is for everyone to be informed, including the public, the decision makers, the scientists and other SETI professionals."

The landscape of the National System of Innovation can be fractured. The NSTF represents most of the disparate research and information structures and creates a collaborative multi-disciplinary space. Niehaus notes that the NSTF is one of the few SETI entities that operates as an independent platform where bridges can be built – between science and education, between engineering and science, and between parts of government and science, and so on.

Future plans include representing even more SETI organisations in South Africa and developing stronger engagement with government departments. The NSTF is also creating international collaborations, such as partnering with the Triple Helix Association which aims to develop university-industry-government interactions to foster research, innovation, entrepreneurship and regional sustainable development.

The NSTF will be hosting, on behalf of South Africa, a virtual panel as part of the international conference 'ISPIM connects global - celebrating the world of Innovation'. This is an initiative by the International Society for Professional Innovation Management held continuously during 24 hours around the world. The conference runs from 6-8 December 2020 and the South African panel discussion led by the NSTF is on 7 December 2020 and is looking at 'Lessons in innovation from South Africa'. (Go to *www.ispim-connects.com* for details.)

A focus on professional bodies and learned societies

Professionals in science, engineering and technology (SET) is a sector of the NSTF titled pro*SET*. It consists of professional bodies and learned societies that represent professionals in various fields. The NSTF pro*SET* focuses on facilitating cooperation among professional organisations regarding SETI and education, among other areas.

pro*SET* reference guide

A project (soon to be launched) is the pro*SET* guide which details its member organisations. The aim is to build this into a handy reference of all professional societies operating within SETI and SETI education. It will include an overview of the SETI environment in South Africa and the role that various SETI professions play.

"This will enable various stakeholders to connect and collaborate, such as young graduates using the reference guide to build their professional networks," says Mr David Botha, co-chair of pro*SET*.

The STEMulator

The STEMulator is a virtual exploratorium of animated STEM (science, technology, engineering and mathematics) educational exhibitions.

"It is designed to ignite a spark of curiosity in young minds. In the STEMulator you can explore how things work, and the science and engineering behind them," explains project lead, Mr Richard Gundersen. "STEM careers related to the 'exhibits' are also explained. The development of the STEMulator is ongoing as we want to include as many aspects of STEM as possible." Find it at *www.stemulator.org*.

proSET
A sector of the NSTF representing professional bodies

STEMulator
Explore > Discover > Learn

National Science and Technology Forum

The ‘Science Oscars’ – the NSTF-South32 Awards

The National Science and Technology Forum (NSTF) has held annual awards since 1998. Named the NSTF-South32 Awards and considered South Africa’s “Science Oscars”, they recognise excellence within the science, engineering, technology and innovation (SETI) sectors. It’s been 22 years of rewarding the efforts and contributions of top scientists and related professionals in South Africa.

The NSTF-South32 Awards are national and open to everyone (they were the first of this type.) The awards are also collaborative, created for and adjudicated by the community. They encourage the involvement and participation of SETI organisations in research, and this includes business. The awards patron is the Minister of Higher Education, Science and Innovation, Dr Blade Nzimande.

Contributions are recognised in these areas:

- Scientific research
- Management of SETI and innovation
- Capacity building in engineering research
- Water management solutions
- Environmental sustainability and biodiversity conservation
- Data for research
- Innovations and their research and/or development
- Science communication and creating awareness
- Non-governmental organisation (NGO) activities, which could include technology transfer activities, and education and training
- A special annual theme award

The awards provide space for individuals, teams and organisations, the latter being corporate, non-profit and SMME organisations. Junior and senior individuals are also recognised. This year marks 247 winners, inclusive of individuals, teams and organisations. Of the individual winners, 35% have been women and 39% represent previously disadvantaged people.

The Gala Dinner goes online: Above shows the 2019 Gala dinner. This year the Gala event was online and live-streamed because of the Covid-19 pandemic. The QR code will link you to the edited highlights: *https://www.youtube.com/watch?feature=youtu.be&v=eHX9t3gG710*

Award winners as SETI role models

The awards play an important role in raising awareness among the general public and youth about local research and its relevance. Besides the awareness around the awards, there’s a partnership with the South African Journal of Science (SAJS) where NSTF Award winners can submit commentaries.

There is also an associated outreach programme called NSTF Share ‘n Dare. It is a targeted intervention to promote the winners’ work and to showcase role models for SET and innovation. It includes significant outreach work, such as talks, knowledge sharing, and career advice, as well as raising awareness among the public through the media. The programme has been running since 2009.

Promoting science and maths

Beginning in 2001, there is another initiative associated with the annual awards called the NSTF Brilliants Programme. It focuses on the top science and mathematics matriculants from public schools from the previous year – a man and a woman from each of the nine provinces. Top marks really mean top marks: above 90%. The programme involves at least 18 first-year students who are studying in the science, medicine and engineering fields.

The programme aims to motivate these students to complete their studies and then pursue SETI-related careers. It enables access to potential role models and mentors, and advice from experts who can address their study and career concerns. It also exposes the students to science and engineering in the field and contact with experts.

When Covid-19 isn’t upturning the normal, the Brilliants students are sponsored to get to the awards and are then recognised and applauded at the NSTF-South32 Awards Gala Dinner. There is also an educational tour in a SETI-related industry and a motivational speakers’ programme.

The Department of Science and Innovation provides a bursary fund for the NSTF Brilliants Programme and other selected students. This gives once-off top-up funding if the students don’t have full bursaries for their first-year expenses.

Watch what the NSTF Brilliants students have to say. Use this QR code *(https://www.youtube.com/watch?v=4AvkAlbYyPc&list=PL4z1BKAYN2zyiLS_Xe_J1otbI1kYv5Erz)* to view their speeches.

Share ‘n Dare goes online

Usually NSTF-South32 Award winners go out into the community to present and engage, with a focus on the youth. However, with Covid-19, this engagement has been brought online. The QR code will link you to this year's online talks: *https://www.youtube.com/playlist?list=PL4z1BKAYN2zyO1YL5wN6Uts1A8VFijlk2*

Call for nominations for 2020/2021

#NSTFawards2021

The National Science and Technology Forum (NSTF) calls for nominations for the 23rd NSTF-South32 Awards. See ***www.nstf.org.za/awards/nominations.***

You can register nominations for individuals, teams and organisations for an outstanding contribution to science, engineering, technology and innovation (SETI) in South Africa. (The 2020/2021 Special Annual Theme Award is for an outstanding contribution to SETI towards the Creative Economy for Sustainable Development.)

There is a two-stage nomination process

Register a nomination online by **Monday, 14 December 2020.**
Then submit completed nomination documents by **Monday, 1 March 2021.**
See ***www.nstf.org.za/awards/nominations/how-to-nominate*** for more information.

Message of Support

Director General Dr Phil Mjwara, Department of Science and Innovation

The Department of Science and Innovation (DSI) has had support from the National Science and Technology Forum (NSTF) from inception and I'm not sure people are aware of this. The 25th anniversary of the NSTF is a celebration of the many years that we have worked together.

When we started as the Department of Arts, Culture, Science and Technology, there was a fragmented science community. It was a new government and, consequently, a new journey. We needed to bring the science community together and the only mechanism we had was the NSTF. This set the tone for how the Department engaged with the science, engineering, technology and innovation (SETI) community for many years. An example is the first science, technology and innovation White Paper in 1996, part of its success is due to the tone, engagement and transparency between all the stakeholders. The NSTF has always been part of the engagement and have helped the Department across the years of policy development. The organisation is a forum to learn more about what the government is thinking. In the same way, there has always been excellent feedback from the NSTF about what the SETI community is thinking. None of this is taken for granted by the Department.

Going back to the early years, we could see the positive outcomes (of the government programmes) as the SETI community responded to national strategies. This success needed to be rewarded and, once again, the NSTF came through with their awards (now called the NSTF-South32 Awards). These have been running for 22 years. The Department is impressed with increased representation of the awards recipients. The NSTF worked hard on the profiles, ensuring that younger and upcoming members of the community are recognised. The NSTF can be proud of their contribution to transformation in the SETI community.

The DSI is serious about encouraging younger people and we're delighted with the work that the NSTF does. You cannot underestimate the impact of the NSTF Brilliants and Share and Dare programmes. (These are youth engagement programmes that involve outreach into the community and raising the profile of SETI.) I can still see the young Brilliants recipient saying that just standing in front of all these highly respected scientists encouraged him to want to do more.

Yearly we have the Science Forum South Africa as a platform to connect further with our SETI community as well as like communities across the continent. One of the ways South Africa is an example and a leader is by showing the importance of having a platform such as the NSTF. This is an independent space where the SETI community can engage and hold discussions.

We would also like to thank the NSTF for being a nurturing environment for some of the organisations that we focus on. Two examples are Black Women in Science and Nka'Thuto Edu Propeller. The Department wanted a home for young science graduates where they can network and create a larger profile within the SETI environment. This has been extremely valuable to us and is part of an incubation process.

We are now finalising our decadal plan on science, technology and innovation. There will be new proposals and a range of programmes happening in the next few months. We see the NSTF playing an important role in the transition and this includes bringing public-private partnership players into the programme.

Director General Dr Phil Mjwara, Department of Science and Innovation, at the 2019 NSTF-South32 Awards with the Lifetime Award Winner, Prof Robin Crewe.

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

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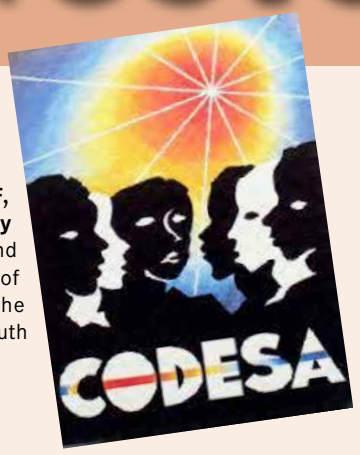
Milestones over the N

1991

The **pre-cursor of the NSTF, the Science and Technology Initiative,** called the Science and Technology Initiative, was part of the negotiations held during the Convention for a Democratic South Africa (CODESA).



1995

The **NSTF is founded to oversee the development of a democratic and inclusive science system,** later to be re-defined and called the National System of Innovation (NSI). There are joint chairs: Jay Naidoo, the first Secretary-General of the Congress of South African Trade Unions (COSATU) and Dr James Brian Clark, then-president of the Council for Scientific and Industrial Research (CSIR). The NSTF **contributes to the first White Paper on Science and Technology** and other policy and planning processes within government. It initiates the discussion that leads to 1998 being South Africa's first Year of Science and Technology (YEAST).

Deputy President Thabo Mbeki launching YEAST in 1998.

1997

The **first CEO is appointed, Dr Xolani Humphrey Mkhwanazi.** He is seconded by the CSIR to build up the NSTF. (The CSIR is a founding member of the NSTF). At the time he is the Technology Transfer Manager, Technology for Development division at the CSIR. The **first chair is Prof Malegapuru William Makgoba,** then-President of the South African Medical Research Council (SAMRC). He goes on to receive the Order of Mapungubwe in Silver in 2013.

Dr Xolani Mkhwanazi

Prof Malegapuru Makgoba

1998

The NSTF establishes **the prestigious annual NSTF Awards** to reward excellent achievements in science, engineering and technology (SET). The then-Department of Arts, Culture, Science and Technology (DACST) becomes the first sponsor of the awards, and this continues until today through the Department of Science and Innovation. From the start, the Minister of Science and Technology has served as the awards' patron. Denis Hunt is appointed Head Adjudicator and continues in this position until present. Also in the year, the NSTF is **part of establishing the National Research Foundation** (NRF). The NSTF launches its first website and first newsletter.

Prof Makgoba welcoming Minister Sibusiso Bhengu, the then Minister of Education.

1999

The **second CEO is Dr Mziwenkosi James Hlongwane.** He previously, for 13 years, had founded and ran a school for science and technology for black learners. The **second chairperson is Dr Steve Lennon,** then-managing director of Eskom Resource and Strategy.

Dr Steve Lennon, Dr Ben Ngubane (Minister of DACST) and Dr MJ Hlongwane at the 1999 NSTF Plenary meeting.

2000

The **Science, Technology, Engineering and Mathematics Education Initiative** results in a National Consultative Conference On Science, Mathematics And Technology Education (SMTE) in 2000 in partnership with the Department of Education (DoE) and DACST. The then-Ministers of the Departments, Prof Kader Asmal and Dr Ben Ngubane, officiate at the launch.

2001

The SMTE Conference results in a **national SMTE strategy** by the DoE, where the then-Deputy Minister of Education, Mosibudi Mangena, officiates with then-Deputy Director-General of Education, Ketsi Lehoko. The NSTF Awards expands to include SMTE in schools with the NSTF Education Recognition Programme (ERP). This **becomes the NSTF Brilliants Programme,** only focusing on boys and girls that are top performers in matric science and mathematics. The NSTF commissions a joint study between the NSTF and the National Advisory Council on Innovation (NACI) on the interaction between economic growth, science, technology and human capital. The resulting Growth and Innovation Report is presented jointly to the Portfolio Committee in Parliament.

2002

The NSTF is part of creating and reviewing the **National Human Resource Development Strategy,** the **National Research and Development Strategy** and the **National Research and Technology Foresight Exercise.** The NSTF also initiates discussions on "Ethics in SET in South Africa", which leads to a discussion document and a charter for establishing a National Consultative Council on SET Ethics in South Africa. The NSTF participates in **lobbying for a separate government department** that focuses solely on SET in SA. The structure and plans for the new DST are presented to the NSTF and its members for comment. The NSTF receives accreditation from the World Summit on Sustainable Development (WSSD), allowing NSTF members and stakeholders to register as participants; 60 organisations then do so.

The World Summit on Sustainable Development event

2003

The **third NSTF chairperson is appointed,** John Marriott, retired General Manager: Sasol Limited. He is the first from private industry. His focus is on continuing to build a strong SET community, essential for promoting development and economic growth. The NSTF and NACI commit to co-operating on issues of common interest and promoting the NSI. This is driven by their respective executive committees and the then-Minister. From then on, NACI has a permanent seat on the NSTF Executive Committee. The NSTF contributes to the development of the **science and technology division of the New Partnership for Africa's Development** (NEPAD) to ensure that SETI plays its rightful role on the African continent. The NSTF creates a new membership group, known as SETAG (Scientific, Engineering and Technological Societies and Allied Professions Group of South Africa). It consists of professional bodies and learned societies. Some of the membership of the Associated Scientific and Technological Societies of South Africa (AS&TS) join the NSTF under SETAG, which is renamed pro*SET* (Professional in Science, Engineering and Technology) in 2009.

John Marriott, third NSTF chairperson

2004

Eskom and the NRF each create three NSTF Awards categories. These recognise senior and emerging researchers, as well as research capacity development. The **six new awards promote inclusiveness** – the four awards sponsored by the NRF are awarded to black researchers and split between men and women. The two research capacity development awards, sponsored by Eskom, are made to researchers who have supervised a large number of black postgraduate students. The Eskom partnership continues until present. The CSIR becomes an awards sponsor. The Technology and Human Resources for Industry Programme (THRIP), an initiative of the Department of Trade and Industry (DTI) and the NRF, becomes an awards sponsor. The **first NSTF Awards "Who's Who in SETI"** booklet is published and they have been produced every year since. These provide a list of the achievements, skills and expertise of the finalists.

2005

NSTF workshops extend to other provinces. These later **become the NSTF Discussion Forums** that are still part of NSTF activities. The **Science Councils and Statutory Bodies** sub-committee is formed.

2006

Jansie Niehaus is appointed as Executive Director of the NSTF. She remains in this position to date. Her focus is on making the NSTF more active and visible and to expand and improve its activities and reach. This is done with the help of the Exco, Manager Wilna Eksteen and staff. The South African Agency for Science and Technology Advancement (SAASTA), a business unit of the NRF, partners with the NSTF to introduce a **new award for science communication and outreach.** Policy consultations are held on the **NSI and the DST's 10 Year Innovation Plan.** The DST presents to the NSTF membership about their plans for the Technology Innovation Agency, Human Capital Development, the Youth into Science Strategy and the Hydrogen Economy.

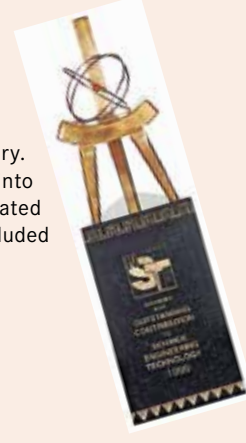
2007

Prof Brenda Wingfield is appointed the fourth chairperson (and first woman). At the time, she is Professor of Genetics at the University of Pretoria and Deputy Dean of Research and Postgraduate Studies, as well as DST/NRF South African Research Chair Initiative: Chair in Fungal Genomics. The NSTF manages the National Youth Service (NYS) programme on behalf of the DST for five years, benefitting 330 young unemployed SETI graduates. The NYS provides science graduates with additional skills to enable them to find suitable employment.

Left: **Prof Brenda Wingfield** *Right:* **First group of NYS volunteers working in the NSTF office**

2008

NSTF Awards celebrates its 10th anniversary. The **NSTF Brilliants Programme** comes into being. Later, educational tours to SETI-related sites and national research facilities are included in the programme.



Awards trophy 1998 to 2014

2009

The NSTF **Share 'n Dare Programme** is initiated to inspire the youth and public with the NSTF Awards Winners as SETI role models.

NSTF's 25-year history

2010

NSTF Discussion Forums on specific topics replace the workshops, as well as the discussions at the twice-yearly plenary meetings.

2011

BHP Billiton becomes the first co-branding sponsor of the NSTF Awards. They are the first large **private sector partner.**

2013

Prof Muhammad Ali Dhansay is appointed as the new NSTF chairperson and continues to serve to date. At the time, Prof Dhansay was the Director of the SAMRC's Nutritional Intervention Research Unit.

Prof Muhammed Ali Dhansay

2015

The new NSTF Awards trophy, manufactured from titanium and using additive manufacturing (3D printing), is launched to celebrate the NSTF's second decade. The **first Special Annual Theme Award** is introduced, recognising an outstanding contribution in photonics research and innovation. The awards theme celebrates the United Nations International Year of Light and Light-based Technologies. Henceforth annual themes are adopted for the awards. GreenMatter partners with NSTF to launch a new award for contributions to environmental sustainability, biodiversity conservation and the green economy.

New NSTF Awards trophy

2016

When BHP Billiton demerged, South32 is established as a company. It takes over the co-branding partnership of the NSTF Awards. **The Carl & Emily Fuchs Foundation** becomes the sponsor of all NSTF youth programmes, including the bursary directory.

2017

The Water Research Commission (WRC) partners with the NSTF to launch a new award that recognises contributions to sustainable water management, knowledge generation and solutions. The **Network of Data and Information Curation Communities (NeDICC)** cofounds the new Data for Research Award. The South African Astronomical Observatory (SAAO) and the South African Radio Astronomy Observatory (SARAO) join forces with the NSTF to initiate a **national astronomy tour** for the Brilliants students.

2018

The NSTF organises DST consultations to review the existing White Paper and participates in the launch of **DST's new Science, Technology and Innovation White Paper.** The NSTF celebrates 20 years of the NSTF Awards. To celebrate, the first CEO of the NSTF, Dr Xolani Mkhwanazi, is awarded the NSTF Ukhozi Award for an essential contribution to the NSTF and South Africa.

2019

Innovation is rewarded when the **National Intellectual Property Management Office** (NIPMO) partners with the NSTF to sponsor the Innovation Award to a small, medium or micro enterprise (SMME).

2020

The **NSTF is 25 years old.** It celebrates its Silver Jubilee as an established player in the NSI, with a loyal and representative membership, a wide network and reach, an all-inclusive platform for recognition of excellence, a neutral platform for discussions, and as promoter and influencer of SET and innovation in South Africa.

NSTF celebrating 25 years
National Science and Technology Forum

Members of the NSTF

Following is a list of member organisations of the NSTF, representing sectors from science, engineering, technology and innovation. These include: business, civil society and labour, government, higher education, professional bodies and learned societies, science councils and statutory bodies, and state-owned enterprises. The highlighted organisations are founding members of the NSTF.

Academy of Science of South Africa (ASSAf)
AfricaBio
African School of Innovation and Technology Management (ASITM)
Agricultural Business Chamber (Agbiz)
Agriculture Research Council (ARC)
Agritourism South Africa (ASA)
Aluminium Federation of South Africa (AFSA)
Association for Mathematics Education of South Africa (AMESA)
Association of Science Technology Engineering Mathematics and Innovation (ASTEMI)
Black Science, Technology and Engineering Professionals (BSTEP)
Black Women in Science (BWIS)
Bokamoso Science & Technology Education Centre (BOSTEC)
Cape Bio Pharms (CBP)
Cape Peninsula University of Technology (CPUT)
Capricorn Educational Resource Centre
Carl & Emily Fuchs Foundation
Central University of Technology (CUT)
Centre for the Advancement of Science and Mathematics Education (CASME)
Chamber of Engineering Technology (COET/CET)
Chemical & Allied Industries' Association (CAIA)
Consulting Engineers South Africa (CESA)
Corrosion Institute of Southern Africa (COrrISA)
Council For Geoscience (CGS)
Council for Mineral Technology (MINTEK)
Council for Scientific andIndustrial Research (CSIR)
Count Educational Institute
Department of Agriculture, Land Reform and Rural Development (DALRRD)
Department of Science and Innovation (DSI)
Department of Trade, Industry and Competition (DTIC)
Design Biologix
Durban University of Technology (DUT)
Econocom Foods (ECO)
Engineering Council of South Africa (ECSA)
Entomological Society of Southern Africa (ESSA)
Eskom Holdings Limited
EXPO for Young Scientists
Federation of Unions of South Africa (FEDUSA)
Fertilizer Association of Southern Africa (FertASA)
Geo-Information Society of South Africa (GISSA)
Geological Society of South Africa (GSSA)
Geostatistical Association of Southern Africa (GASA)
Grassland Society of Southern Africa (GSSA)
GreenMatter
HORTGRO (Pty) Ltd
Human Sciences Research Council (HSRC)
IEEE SA
Institute of Information Technology Professionals South Africa (IITPSA)
Institute of Municipal Engineering of South Africa (IMESA)
International Association of Impact Assessment South Africa (IAIASA)
Kwetso Foundation
Mangosuthu University of Technology (MUT)
Mapungubwe Institute for Strategic Reflection (MISTRA)
Masithu Consulting and Project Managers (MCPM)
Maths Centre Incorporating Sciences (MCIS)
Medical Research Council (MRC)
Mine Ventilation Society of South Africa (MVSSA)
Mineral Councils South Africa (MINCOSA)
Muandiso NPC
National Advisory Committee on Innovation (NACI)
National Agricultrural Research Forum (NARF)
National Health Laboratory Service (NHLS)
National Intellectual Property Management Office (NIPMO)
National Metrology Institute of South Africa (NMISA)
Nka'Thuto EduPropeller
North-West University (NWU)
ORT South Africa
Program for Technological Careers (PROTEC)
Rand Water
Rapid Product Development Association of South Africa (RAPDASA)
Sci-Bono Discovery Centre
Science Stars
Society for Automation, Instrumentation, Measurement and Control (SAIMC NPC)
South African Academy for Arts and Sciences (SAASA)
South African Academy of Engineering (SAAE)
South African Association for Theoretical and Applied Mechanics (SAAM)
South African Association of Science and Technology Centres (SAASTEC)
South African Bureau of Standards (SABS)
South African Chemical Institute (SACI)
South African Council for Automation and Control (SACAC)
South African Council for Natural Scientific Professions (SACNASP)
South African Environmental Observation Network (SAEON)
South African Genetics Society (SAGS)
South African Geophysical Association (SAGA)
South African Institute of Agricultural Engineers (SAIAE)
South African Institute of Electrical Engineers (SAIEE)
South African Institute of Physics (SAIP)
South African Institution of Chemical Engineers (SAIChE)
South African Institution of Civil Engineers (SAICE)
South African Mathematics Foundation (SAMF)
South African National Biodiversity Institute (SANBI)
South African Nuclear Energy Corporation (NECSA)
South African Society of Biochemistry and Molecular Biology (SASBMB)
South African Space Agency (SANSA)
South African Sugarcane Research Institute (SASRI)
South African Weather Service (SAWS)
South32 SA Holding (Pty) LTD
Southern African Association dedicated to the advancement of Research in Mathematics, Science and Technology Education (SAARMSTE)
Southern African Institute for Industrial Engineering (SAIIE)
Southern African Institute of Mining and Metallurgy (SAIMM)
Southern African Society for Plant Pathology (SASPP)
Stellenbosch University (SU)
The Independent Institute of Education (Pty) Ltd (The IIE)
The Lewis Foundation
Technology Innovation Agency (TIA)
The Ukuqonda Institute
Tiziri Advanced Manufacturing Technologies (TiziriTech)
Transnet Engineering
Tshwane University of Technology (TUT)
Universities South Africa (USAf)
University of Cape Town (UCT)
University of Fort Hare (UFH)
University of Johannesburg (UJ)
University of KwaZulu-Natal (UKZN)
University of Limpopo (UL)
University of Limpopo Science Centre
University of Pretoria (UP)
University of South Africa (UNISA)
University of the Free State (UFS)
University of the Western Cape (UWC)
University of the Witwatersrand
Vaal University of Technology (VUT)
Water Institute of Southern Africa (WISA)
Water Research Commission (WRC)
Zoological Society of Southern Africa (ZSSA)

Mr Solomon Lechesa Tsenoli, Deputy Speaker of the National Assembly, Parliament South Africa

Promoting dialogue

Discussions and feedback on SETI-related policy

Part of the National Science and Technology Forum (NSTF) mandate is to hold regular policy-related discussions, including on burning issues within the science, engineering, technology and innovation (SETI) community. Since 1995, these events have promoted dialogue among SETI stakeholders – including between the public and private sectors, between government and other stakeholders, and between experienced SETI professionals and the youth.

The discussion forums provide a non-partisan space for the SETI community to monitor related policies and to provide feedback on these and other policy issues to government, the public and the rest of the community. Represented sectors include higher education where many researchers reside, business, science councils and statutory bodies, government and civil society.

Additional SETI policy resources

The NSTF's monthly newsletter has been sent out since 1998. Over the years it has become a resource, containing SETI-related news and SETI policy news; it serves as a monthly snapshot of what's happening in science in South Africa. (To subscribe, go to www.nstf.org.za.) Furthermore, the National Development Plan (NDP) has been summarised from a SETI perspective. Find it on the NSTF website under news/set policy.

Excerpts from media releases

The following are excerpts from media releases about specific discussion forums. These relate to the theme of the fourth industrial revolution (4IR), an important SETI-related topic that affects all people and industries in South Africa.

The 4IR has huge potential to improve operations in various industries, in education, and in people's lives. Part of the NSTF's vision is a transformed country where SETI contributes to a high quality of life for all who live in South Africa, as well as where the education system is effective, particularly regarding performance in SETI subjects and promoting innovation.

Manufacturing and minerals processing – 4IR technologies South Africa needs to acquire

The NSTF Discussion Forum was part of Science Forum South Africa, an annual initiative of the Department of Science and Innovation in December 2019.

NSTF Discussion Forum report-back: When it comes to 4IR and manufacturing, the concern is that South Africa is, in general, far behind its BRICS partners (Brazil, Russia, India, China, and South Africa).

Industry 4.0 can be seen as the intersection of manufacturing, automation, and ICT systems to create a pathway for increased efficiencies, better production, decreased cost of production, and the subsequent benefits. It holds the potential for very small localised production and what this can do for the economy. Think living room scale and micro industries using 3D printers and other technologies.

The World Economic Forum Report on "Readiness for the Future of Production" examines 12 emerging

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Use this QR code to access previous NSTF Discussion Forums and material such as videos of presentations and the media release with the summary. (You can also go to *www.nstf.org.za*.)

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technologies for 4IR, including: artificial intelligence (AI) and robotics; Internet of Things; virtual and augmented reality; additive manufacturing; blockchain and distributed ledger technologies; advanced materials and nanomaterials; and energy capture, storage and transmission. To be efficient and competitive, the South African manufacturing industry will have to implement at least some of these technologies. The "how it is done" is key. It's possible to transition without losing jobs, so there needs to be a clear strategy that includes upskilling.

The BRICS South African Working Group has a number of proposals. One of these is a technology bank for protecting intellectual property (IP) with the next step of facilitating manufacturing within the country. South Africa can't continue to primarily import technologies. There is a need to use homegrown IP to create new technology, and to customise imported technologies while including local resources and locally developed material.

The Working Group suggests developing frameworks for regulation and ethics. Other proposals include the need for the appropriate digital infrastructure (such as connectivity, inexpensive data and a secure power supply) and the relevant cyber security and associated qualifications.

Looking at skills, feedback from the discussion forum shows concern over how long it takes to develop courses and qualifications. This could lead to even bigger skills gaps if it is not addressed. It's also imperative to develop a critical thinking mindset.

Other proposals involve students, while studying, having the opportunity to be entrepreneurs and to involve themselves more in industry. Ideas and education aren't enough: South Africa needs people who can implement their ideas.

Developing skills for 4IR technologies must put people at its centre and show they will not be left behind. This means communication — sharing what is happening with the reasoning and the pathways for skills development. In South Africa, there is a large population of unemployed people who need to be part of the solution. The consensus is that digital literacy and education, in general, are key, with the need to develop a culture of lifelong learning and self-development.

Delegates at the NSTF Discussion Forum on 'Career paths for researchers – where to in a changing world?' from 2-3 December, 2019. For details, go to *www.nstf.org.za/discussion-forum/researcher.*

Communication needs to be an exchange and it cannot be top down. The advice was to go to people where the challenges exist. Communities know what the issues are and have a handle on solutions that take multiple factors into account, but they need partners.

Find more information at *www.nstf.org.za/discussion-forum/ibsfsa-session.*

Advanced manufacturing and automation: potential and challenges

This NSTF Discussion Forum addressed how new technologies, and 4IR in general, have the potential to revolutionise manufacturing industries in South Africa. The three-day event was conducted in partnership with the NSTF pro*SET* sector (professional bodies and learned societies) and ran from 11-13 September 2019.

NSTF Discussion Forum report-back: Manufacturing industries in South Africa need very specific skills. This is an environment where companies have to continuously improve efficiencies and productivity to stay in business. It's a sector that embraces technology and where 4IR technologies are already being deployed.

The term "4IR" can be understood as cyber-physical systems, networks, and AI embedded in new ways within larger societies, communities, and even in the human body. Industry 4.0 can be seen as connecting embedded system technologies and smart processes to radically transform industry and production value chains and business models.

When it comes to people and the concern that robots will replace people in factories, it was put forward that policies shouldn't focus on protecting jobs, but on protecting the individual. There will be jobs, but employees will need higher-end skills such as programming, designing and developing apps.

Research published by the Department of Trade and Industry (DTI) in 2016 shows that manufacturing output volume has only increased marginally since 2004. Importing is the standard, with little exporting, and this needs to change. However, private investment challenges point to restrictive labour regulations, an inad-

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equately educated workforce and poor work ethics in the national labour force. The DTI aims to grow the manufacturing sector as this is positioned as a particularly important sector for job creation, new business and skills development.

South African data, across industries, shows an increasing gap between skills demand and skills supply. The Intsimbi Future Production Technologies Initiative is a partnership between government and industry. The aim is skills development and enterprise competitiveness, focusing on the advanced manufacturing sector. Here industry has taken the lead.

South Africans are the innovators on this international pilot. It differs from other skills initiatives in how it operates. There is a country-level nodal network that sits on an ICT platform. The devices and data from the programme stream to this. The creation of large amounts of data and the analysis thereof (Big Data) allow AI and other 4IR technologies to play a significant role.

The learning pathways are centred around competencies needed by industry and customised to the individual. It's about packaging curriculum content into frameworks that meet industry needs. Intsimbi is using existing international standards. Students work on modules and the training is free. Companies put their training material on the platform and provide equipment for the practical learning labs.

When it comes to manufacturing, South Africa has a role to play in developing appropriate technology that results in low-cost devices. It's about context and responding to Africa-specific challenges.

Find more information at *www.nstf.org.za/discussion-forum/am-and-auto/.*

Implications of 4IR for SETI, industry, society, and education

The Fourth Industrial Revolution (4IR) themed event was held from 11-13 September 2018. The aim was to explore the collective understanding of 4IR.

NSTF Discussion Forum report back: A number of approaches to 4IR were proposed. One is that sustainable economic growth relies on productivity growth, which is driven by technological change. The idea is to focus on what needs to be achieved rather than the name. Globally these aims range from improving competitiveness and developing 4IR technologies to enhancing digital start-ups and ecosystems.

Another approach is understanding technological change as more evolution than revolution. Various 4IR technologies aren't that new (for example, robotics). They should be integrated into organisational, sector and industrial strategies rather than seen as a massive change.

Another 4IR approach is to embrace choice and the shaping of our future, both collectively and individually. Society and technology can co-evolve with technology embedded in society.

For South Africa to be truly competitive, we need to take 4IR opportunities appropriate to our context. This includes creating industries around opportunities and ensuring affordable broadband connectivity. South Africa also needs to do its own technology R&D, as well as assimilate and adapt inbound technologies. Furthermore, it's essential to build people's capabilities and skills around technology.

There is a lot of anxiety around 4IR. One is 'technology singularity' where machines and artificial intelligence are so advanced, they surpass humans. However, the more immediate concern is job losses. Current thinking sees rote jobs as being the most vulnerable. The agreement is that there will probably be job losses, especially in the low-skilled sectors. Job creation will probably not match job losses, plus the nature of current jobs will evolve. This means education becomes critical, as does reskilling and upskilling. A national dialogue is needed.

4IR is a key theme for government with numerous initiatives and strategies around it. Thematic areas cover: digital society, ICT policy, regulatory and legislative reforms; innovation, research and development; economic policy and inclusive growth; industrial restructuring and trade; labour market restructuring; education and skills development; and transforming government and service delivery. All this needs to be agile enough to keep up with the fast-changing pace of technology.

There is also a need for evidence-based research to inform decision making. Tackling big societal problems, such as high youth unemployment and water scarcity, will need collaboration (especially across government), multi-disciplinary partnerships and a regional perspective.

Find more information at *www.nstf.org.za/discussion-forum/implications-of-the-4th-industrial-revolution-for-set-industry-society-and-education-4irsciza/.*

Yanesh Naidoo, Sales and Design Director at Jendamark, addressing the audience on 'Opportunities for SA companies in the 4IR space'