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science & technology



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Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA



editorial

DST a strategic player in international forums

The first quarter of the 2018/19 financial year saw the Department of Science and Technology (DST) hosting two significant international events, demonstrating its growing influence in global science.

South Africa took over the chair of the Southern African Development Community (SADC) last August, and as part of its chairship the DST hosted the Education, Training and Science, Technology and Innovation (ET-STI) Meeting. The ET-STI meeting, co-hosted with the Departments of Basic Education and Higher Education and Training, took place in Durban in June and reflected South Africa's SADC theme, "Partnering with the private sector in developing industry and regional value chains". See page 6

Following hard on the heels of the SADC ET-STI Meeting was the multilateral Brazil, Russia, India, China and South Africa (BRICS) Young Scientist Forum, which South Africa is also chairing. Held under the theme, "Building BRICS youth leadership through science, technology and innovation", the meeting saw young people discussing youth innovation and entrepreneurship. The next generation of scientists and researchers believe the youth need to own their future. See page 1 and 2.

Still on the international stage, read all about how our young people made South Africa proud at an international supercomputing competition in Germany. The team, trained by the CSIR's Centre for High Performance Computing, scooped third place. Read more on page 5.

Continuing to make waves in global science, the DST-NRF Centre of Excellence in Palaeosciences made a significant find with the discovery of the first tetrapods in Africa which lived within the Devonian Antarctic Circle. See page 13.

The Minister of Science and Technology, Mmamoloko Kubayi-Ngubane, launched the 2017 South African Science, Technology and Innovation Indicators Report, published by the National Advisory Council on Innovation, on 28 June. See how the country is performing in this sphere on page 3.

And on the same day the Minister hosted the founder and executive chairman of the World Economic Forum, Prof. Klaus Schwab, at the CSIR for a discussion on the Fourth Industrial Revolution. See page 17.

The Minister also launched SANSa's new Space Weather Warning Centre, which will benefit not only South Africa but the entire African continent. Read more on page 16.

On pages 10 and 11 we celebrate the achievements of our colleagues who were rewarded for hard work under the Department's Rewards and Recognition Programme.

See these and many more interesting stories. Enjoy the read!

Taslima Viljoen

Meeting of BRICS science ministers adopts Durban Declaration

By Taslima Viljoen

The 6th Brazil, Russia, India, China and South Africa (BRICS) Science, Technology and Innovation (STI) Ministerial Meeting welcomed a proposal to establish a BRICS vaccine research and development centre.

Support for the proposed centre is included in the Durban Declaration, adopted at the meeting held on 3 July.

The Minister of Science and Technology, Ms Mmamoloko Kubayi-Ngubane, who addressed the opening said the theme, "Leveraging science, technology and innovation through inclusive growth and development", captured South Africa's aim to use its term as BRICS President to focus on enhancing BRICS cooperation in the generation and application of new knowledge, to improve the quality of life of all BRICS citizens, and to advance global sustainable development.

South Africa assumed the rotating BRICS Presidency on 1 January 2018 and is hosting several activities around the 10th BRICS Summit, which is taking place later this month. The theme for the Summit is "BRICS in Africa: Cooperation for inclusive growth and shared prosperity in the 4th Industrial Revolution".

"The work of the BRICS Working Group on Information and Communication Technologies and High Performance Computing, and its proposals for a flagship partnership to invest in big data technologies for socio-economic benefit, is an excellent example of our BRICS partnership responding to the opportunities and challenges of the Fourth Industrial Revolution," said Minister Kubayi-Ngubane.

BRICS brings together the five major emerging economies, which occupy 26% of the world's territory, and make up 40% of the global population. This is an enormous consumer market with a constantly growing demand for modern goods and services.

In the past four years, these countries have accounted for 22% of the world's gross domestic product and 17% of world trade share, producing a third of the world's industrial products and one half of its agricultural goods. Intra-BRICS investment has grown 10%. The BRICS countries have also contributed to the robust performance of the G20.

South Africa's BRICS Sherpa, Ambassador Anil Sooklal, who also addressed the event, said the July summit had special significance, as it concluded the first decade of BRICS Summits at the highest diplomatic level. "This year is also important as the BRICS Chairship coincides with the centenaries of Nelson Mandela and Mama Albertina Sisulu," said the Ambassador.

Brazil's Vice-Minister of Science, Technology, Innovation and Communication, Dr Álvaro Prata, said that BRICS was an important player in global affairs. He said that, in spite of Brazil's economic difficulties, the country remained committed to participating in all the BRICS STI meetings.



BRICS Ministers on STI adopted the Durban Declaration during the meeting, held on 3 July.

Vice-Minister Prata said, "Innovation and entrepreneurship is a way of moving ahead even in the presence of challenges. The transformation of technology in terms of the Fourth Industrial Revolution will benefit all societies. The question now is how we empower them to participate in this revolution."

India's Minister of Environment, Forestry and Climate Change, Dr Harsh Vardhan, said his country was on a mission to create a culture of innovation and entrepreneurship. India implemented initiatives at all levels of society to create innovative communities, including at school level. Young people were exposed to new technologies like robotics and 3D printing, and young innovators were assisted with technology incubation.

China said BRICS STI cooperation was successful and represented a significant proportion of the world's knowledge production. "China ranks number 1 in scientific publications," said Huang Wei, China's Vice Minister of Science and Technology.

Russian Ambassador Mikhail Petrakov said that societies could not move forward without STI, and that the BRICS meeting should have concrete and practical results.

The Durban Declaration includes the establishment of a BRICS partnership on the new industrial revolution, and South Africa will explore mobilising STI resources in support of this initiative.

Grassroots innovation – doing better with less

By Taslima Viljoen

Youth innovation and entrepreneurship was the focus of day 3 of the Brazil, Russia, India, China and South Africa (BRICS) Young Scientist Forum (YSF) taking place in Durban. Held under the theme “Building BRICS youth leadership through science, technology and innovation”, the 3rd BRICS YSF highlights the strategic importance of science, technology and innovation as key drivers of youth entrepreneurship and leadership.

A panel discussion on the topic kicked off the debate, with experts from BRICS countries tackling various issues around youth innovation and entrepreneurship.

Patrick Krappie, Executive Directive at the Technology Innovation Agency, an entity of the Department of Science and Technology (DST), told about 200 YSF delegates that current funders of innovation and entrepreneurship are “still caught up in the corporate mode of thinking when it comes to the youth; they still expect business plans”. He said this mindset needed to change as, “millennials are less about experience and more about passion and achieving dreams”.

Krappie said funders should allow young innovators and entrepreneurs to try, fail, try again and move on. He urged the forum to think about who owned the youth agenda.

Locally and within BRICS, there is consensus that investing in youth innovation is critical to reducing unemployment. Establishing an ecosystem that is conducive to growing youth innovators is especially important in countries with a large youth population like South Africa.

The relevance of frugal or grassroots innovation to the BRICS countries was raised by panel expert Vishen Pillay. The concept involves leveraging what you have and using minimal resources, while adding value. Pillay spoke about the DST’s Grassroots Innovation Programme, which is implemented by the CSIR’s Technology Localisation Unit. The programme supports innovators with technology packages, access to technical, academic and incubation expertise, value addition and intellectual property protection, as well as with marketing their innovations.

Some of the successes of the programme were highlighted. One young innovator, Nkosana Madi from KwaThema in the East Rand, developed a motorised bicycle that can be pedalled like an ordinary bike or driven using a petrol motor, with a maximum speed of 60 km per hour. The distance it can travel before refuelling depends on the load carried.

Another interesting frugal innovation mentioned by Pillay was the Mitticool Clay Refrigerator. An innovation by Mansukhbhai Prajapatifrom Gujarat in India, the clay-based evaporation refrigerator does not require electricity. Composed of various clay chambers, water from an upper chamber drips down the sides of the unit and evaporates, removing heat from the inside out. It keeps products fresh for about a week.

Dr Nitin Maurya, an expert from India, said that the country’s government had prioritised innovation and entrepreneurship, introducing policies that were implemented from school level onwards. A wide spectrum of innovation was covered, from grassroots innovators to highly qualified researchers. He said the country was working hard to develop a thriving culture of innovation and entrepreneurship.

The YSF closes on Friday with the awarding of the Young Innovators Prize. The competition recognises talented young entrepreneurs and researchers, whose outstanding innovations (inventions, products, apps and services), will make a profound impact on the socio-economic environment and conditions of life in BRICS countries.



South African Science, Technology and Innovation Indicators 2017

By Taslima Viljoen

The 2017 South African Science, Technology and Innovation (STI) Indicators Report, which analyses the state of the country's innovation, shows both positive and negative trends.

Released on June 28, by the Minister of Science and Technology, Ms Mmamoloko Kubayi-Ngubane, the report uses the new South African Innovation Scorecard Framework, which categorises STI activities into three components – the public sector's enabling activities, firm-level innovation activities, and the economic and social outputs of innovation.

The report, published by the National Advisory Council on Innovation (NACI), an entity of the Department of Science and Technology, was unveiled during NACI's annual symposium.

Science, technology and innovation are instrumental in support of government's short, medium and long-term plans for economic growth, as well as the reduction of unemployment and inequality.

The country's economy has not been growing at the desired pace and this has affected budgets.

"Over the past few years the country's funding for research has remained stagnant at about 0,7% of the GDP. This is way below the target of 1,5% of GDP that we wanted to achieve by 2020," said Minister Kubayi-Ngubane.

She added that resources invested in research and development (R&D) should be used effectively, and that the NACI report helped South Africa understand how this could be done. It also showed the impact science, technology and innovation was making in the lives of South Africans.

The Minister stated that the country had shown good progress in the implementation of the 1996 White Paper on Science and Technology, but had not yet fully realised the potential of STI to advance the objectives of the National Development Plan (NDP).

According to Minister Khubayi-Ngubane, the STI institutional landscape has expanded over the years, seeing a threefold increase in publications, significant growth in the participation of black people and women in the research and development workforce, and a rise in doctoral graduation rates. However, there are still challenges. The national system of innovation (NSI) is still not fully inclusive, and since 1996 South Africa's innovation performance (measured in patents and products) has been relatively flat.

"As the Department of Science and Technology, we are responsible for ensuring that the NSI improves its performance. This means that, together with all the stakeholders, we have to overcome all the constraints that are limiting our NSI performance," said the Minister.

Report highlights

- There are few black doctoral graduates in life sciences and engineering.
- South Africa ranks 18th in the world for scientific publications in social sciences, arts and humanities.
- Government's contribution to expenditure on research and development was low and there was no appropriate

coordination mechanism for a coherent response by various government entities.

- Government contributes significantly to the South African venture capital industry.
- High-technology exports remain low, leaving the country very dependent on imported products.
- South Africa ranked high in the opportunity and foundations of well-being category of the Social Progress Index.

Despite the introduction of the R&D Tax Incentive Programme, gross expenditure on R&D remains low, at 0,7% of GDP. There is consensus that most of the increase in R&D expenditure should come from industry through instruments such as the Sector Innovation Fund. This is important if the country is to achieve an outcome of decent employment through inclusive economic growth.

South Africa's ranking on the Global Innovation Index (GII) dropped from 54th in 2016 (out of 128 countries) to 57th in 2017. The main categories contributing to the lower ranking are financial market development and goods market efficiency. The country's total early-stage entrepreneurship activity also declined, from 22nd in 2012 to 46th in 2016. Overall, the country is experiencing a slight deterioration in innovation, competitiveness and entrepreneurship.

However, South Africa's innovation and competitiveness are still the best among the African countries, most notably above Nigeria and Egypt.

In South Africa, 55,1% of new entrepreneurs and 53,2% of established entrepreneurs innovated with technology less than five years old in 2016.

Total early-stage entrepreneurship activity rate is higher for those with post-secondary education (11,9% in 2016) than those with low levels of education.

The South African national system of innovation enables entrepreneurship and competitiveness for both new and established businesses.



Minister of Science and Technology Mmamoloko Kubayi-Ngubane addressed the annual NACI symposium on 28 June.

Science, technology and innovation are central to Africa's future growth prospects

By Thabang Setlhare

Africa must implement a programme aimed at accelerating industrialisation in order to meet the demands of the Fourth Industrial Revolution. This is according to speakers from various parts of the continent who attended the eighth African Unity for Renaissance Conference and Africa Day Expo held in Pretoria from 23 to 25 May.

The conference formed part of the Africa Month commemorations and served as a platform for experts from various sectors across the continent and beyond to contribute to sustainable growth and development in Africa.

The event is organised annually by the Africa Institute of South Africa in the Human Sciences Research Council (HSRC), in collaboration with the Department of Science and Technology and other partners such as the Thabo Mbeki African Leadership Institute, Tshwane University of Technology, Water Research Commission, and International Council for Science Regional Office for Africa.

The theme for this year's conference was "Accelerating Industrialisation in Africa: Implications for Job Creation and Poverty Reduction".

"This quest to industrialise is not new," said Prof. Crain Soudien, CEO of the HSRC. "The leaders of the liberation struggle envisioned that the sustainable pathway to Africa's development was to modernise our agricultural sector, industrialise, and build the required human capacity with a strong focus on science, technology and innovation."

While efforts are under way to increase the number of graduates in Africa, the conference heard that 50% of existing graduates were unemployed as at the end of 2016. The challenge is to create jobs for these graduates, or risk losing them to other countries and continents. According to Prof. Soudien, the need for Africa to diversify the productive capacity of its economies through industrialisation is more urgent than ever. "We need to create sustainable long-term jobs," he said.

"Africa today has the youngest population in the world. Seventy percent of our population is below the age of 35 years, and it has been estimated by the World Bank that by 2020 Africa's youth population will increase by 42,5 million.

"This anticipated youth bulge has led to speculation that Africa is about to benefit from the demographic dividend. Ultimately, the measure of success for Africa's industrialisation efforts should be job creation and poverty alleviation", Prof. Soudien argued.

African leaders recently signed an agreement launching the African Continental Free Trade Area, a single continental

market for goods and services to boost Africa's growth. The free trade area promises to open up substantial opportunities for industrialisation, diversification and high-skilled employment in Africa.

By 2030, the continent's market size is expected to exceed 1,7 billion people with a combined consumer and business spending power of US\$6,7 trillion – provided all African countries have joined the free trade area by then.

South Africa is the current chair of the Southern African Development Community (SADC), whose long-term development plan is focused on industrialisation. The SADC Industrialisation Strategy and Roadmap 2015-2063 outlines thematic focus areas for accelerated industrialisation in the region.

These are grouped broadly under infrastructure development on the one hand, and value chain development and value addition on the other.

Mr Daan du Toit, Deputy Director-General: International Cooperation and Resources in the Department of Science and Technology, told the conference that Africa is at the heart of the Department's agenda.

"Africa needs to invest more in new research, infrastructure, knowledge, innovation and technology that can play an important role for the unity of the continent through joint funding programmes," said Mr Du Toit.

"A technology foresight exercise in energy, and a 10-year Science, Technology and Innovation (STI) Strategy for Africa, are just some of the illustrations that South Africa supports STI-led development both at SADC and at African Union levels."

Mr Du Toit also noted that South Africa has been identified as the host of the southern African node of the Pan African University (PAU). The fifth PAU Institute, focusing on space sciences, will be based at the Cape Peninsula University of Technology.

However, the conference acknowledged that the skills Africa will need to participate in the Fourth Industrial Revolution, in areas such as artificial intelligence and robotics, are still not being taught at most institutions across the continent.

South African student team takes third place at supercomputing competition in Germany

By Nox Moyake

The South African supercomputing team that participated in the International Student Cluster Competition in Frankfurt, Germany, scooped third prize, after Tsinghua University, China who took 1st prize and Nanyang Technological University, Singapore who clinched 2nd place.



The CHPC's Director, Dr Happy Sithole with the team who represented South Africa in Germany.

The team of six, made up of undergraduate computer science and engineering students from the Universities of the Witwatersrand and Limpopo, was one of 12 teams from around the world that participated in the prestigious challenge from 25 to 27 June 2018.

This year's team included, Meir Rosendorff, Joshua Bruton, Kimessha Paupamah, Katleho Mokoena, Nathan Michlo and Njabulo Sithole

The team said it was excited to have been placed third in spite of the tough competition. They squared off against the following teams:

- Nanyang Technological University, Singapore.
- The Edinburgh Parallel Computing Centre at the University of Edinburgh, UK
- Polytechnic University of Catalonia, Spain.
- Kasetsart University, Thailand.
- Hamburg University, Germany
- Heidelberg University, Germany.
- Friedrich-Alexander University Erlangen-Nürnberg, Germany.
- The Federal University of Paraná, Brazil.
- The University of Warsaw, Poland
- Tsinghua University, China. ShanghaiTech University, China.

The students showcase computing systems of their own design, adhere to strict power constraints and seek to achieve the highest performance across a series of standard high-performance computing benchmarks and applications.

South Africa has been participating in the international competition since 2013 and won it in 2013, 2014 and 2016, coming second in 2015 and 2017. It is one of the few teams that consists entirely of undergraduate students, and that sends different students each year.

Before participating, the members of the team received extensive training from the Centre for High Performance Computing (CHPC), an initiative of the Department of Science and Technology and the Council for Scientific and Industrial Research.

The CHPC's Director, Dr Happy Sithole, said that the placing was "a significant achievement for South Africa". The CHPC hoped to increase the number of students who received exposure of this kind in the field of high-performance computing. "In the past six years we have had 36 students performing well on the world stage," he said.

The South African team was chosen from 10 participating teams at a national student cluster supercomputing competition held in December last year.

Team selection for the national competition takes place at the CHPC's Winter School, which is designed to impart critical knowledge for building a cluster. This includes using Linux systems, the basic software stack of a cluster, and considerations that should be taken into account when choosing hardware. Team selection concludes with an assignment that requires each team to build a prototype cluster in the Cloud.

SADC ministers, experts discuss Industry 4.0 skills challenge

By Taslima Viljoen

The ministers of education, training, science and technology in the Southern African Development Community (SADC) are unanimous that interventions are needed to prepare the region's young people for digitisation and the Fourth Industrial Revolution, also known as Industry 4.0.

The ministers were participating in the Joint Meeting of SADC Ministers responsible for Education and Training and Science, Technology and Innovation (ET-STI), which took place in Durban, KwaZulu-Natal last week.

The theme for the meeting reflected the theme of South Africa's SADC chairship, "Partnering with the private sector in developing industry and regional value chains". This is in line with the SADC Industrialisation Strategy and Roadmap (2015-2063), which regards education, skills development and STI as key to the implementation of industrialisation in the region.

The ministerial meeting was preceded by a round table discussion on "Digitisation and Industry 4.0". Industry 4.0 refers to automation and data exchange in manufacturing technologies. It covers cyber-physical systems, the Internet of Things, cloud computing and cognitive computing.

Dr Bernie Fanaroff, director of the South African Radio Astronomy Observatory and one of the round table panel of experts, said South African President Cyril Ramaphosa had recently emphasised the importance of Industry 4.0.

Southern Africa could not afford to be left out of Industry 4.0, Fanaroff said, as new global industries would soon be working with trillions of gigabytes of data. Big data, high performance computing, genome analysis, earth observation via satellites and drones, and 3D printing were among the key elements of Industry 4.0, and some SADC countries were already involved in these disciplines.

Fanaroff said that developments such as smart manufacturing, agro-processing, precision medicine involving nanotechnology, and smart cities were already having an impact in the region and across the continent.

Dr Laura Brewer from the International Labour Organization (ILO) highlighted internet connectivity as a key factor that was hampering digitisation in the region. She said the SADC had to put connectivity infrastructure in place in order to bridge the digital divide.

Brewer said the ILO programme Decent Jobs for Youth, which sought to tackle youth employment through effective, innovative and evidence-based interventions, had identified a number of priority areas for action. One of these areas was the nurturing of

new digital skills, including robotics, artificial intelligence, cloud computing and the Internet of Things.

There was currently a skills mismatch in the region, Brewer argued, with young people learning things at schools, colleges and universities that were at odds with the needs of industry.

Prof. Nelson Torto, Executive Director of the African Academy of Sciences, echoed Dr Brewer's sentiments, saying the education system was stuck in the 1960s. It was no surprise if children were bored in the classroom, he said, as "the education system is slower than the people in it".

Maria do Rosário Bragança Sambo, Angola's Minister of Higher Education, Science, Technology and Innovation, said the governments of the region needed to establish a culture of digitisation, supported by adequate training.

Phineas Magagula, eSwatini's Minister of Education and Training, said the region needed to upgrade its digital infrastructure and integrate digital skills in the education system. "We are in the middle of a true revolution as it is changing economies, lives and industries, especially in manufacturing which is a central pillar in the SADC economy. We need to act quickly and embrace Industry 4.0," Magagula said.

Mozambique's Minister of Science and Technology, Jorge Nhambiu, reported that his country had witnessed accelerated growth in ICT, with mobile phone coverage expanding to more than 90% of the country. While this had created new opportunities to deliver services, it had also created a need for new policy and legal instruments.

Thesele Maseribane, Lesotho's Minister of Communications, Science and Technology, also highlighted the need for an updated legal framework to cover e-commerce and other aspects of digitisation.

South Africa's Deputy Minister of Education, Enver Surty, said the Fourth Industrial Revolution was already part of our lives. Areas such as robotics, artificial intelligence and 3D printing were developing rapidly and could not be ignored.

South Africa was already heavily invested in these disciplines, Surty said, adding that the country was ready to share the benefits of this investment with its SADC neighbours.

Ministerial Meeting Statement

Joint meeting of the SADC Ministers Responsible for Education & Training, Science, Technology and Innovation 22 June 2018 Zimbali Resort, Durban South Africa

The SADC Ministers responsible for Education and Training, Science, Technology and Innovation convened for their Joint Meeting on the 21-22 June 2018 at Zimbali resort, Durban, Republic of South Africa where twelve Member States were in attendance namely: Angola, Botswana, Eswatini, Lesotho, Malawi, Namibia, Seychelles, South Africa, Tanzania, Zambia and Zimbabwe. The meeting of the Ministers was preceded by the Joint Meeting of Senior Officials responsible for Education and Training and Science, Technology and Innovation from 18-20 June 2018. On the 20 June 2018 a Ministerial Policy Dialogue was held under the theme: **“Digitization and Industry 4.0- Implications for STI and Skills Development”**.

The Joint Meeting of Senior Officials reviewed progress and implementation of new and on-going programmes and initiatives in the related sectors in relation to education and training and science, technology and innovation for consideration by the Ministers meeting.

The Ministers considered key policy and strategic instruments of cooperation on regional integration in the areas of education and training, and science, technology and innovation (STI). The role of education and skills development and science, technology and innovation is key in contributing to the advancement of the SADC Industrialization Agenda through building the necessary skills and capacities and investments in research, development and innovation for modern, knowledge economies.

The following policies and programmes were reviewed by the Ministers:

- Draft Framework and Guidelines on establishment and strengthening of
- Centres of Excellence and Centres of specialization,
- Proposed establishment on SADC University of Transformation,
- Draft SADC Intellectual Property Rights (IPRs) Framework and Guidelines,
- Draft SADC Innovation and Technology Transfer Framework and Action Plan,
- Signing of Charter on Women in Science, Engineering and Technology,
- Draft Framework for Professional Teacher Standards and Competencies,
- Draft Common Nomenclature on Vocational Education and Training in the Region.
- Draft Revised Technical and Vocational Education and Training Strategic Framework.

In her opening remarks, the Minister of Higher Education and Training for the Republic of South Africa, and Chairperson of the Joint meeting of SADC Ministers responsible for Education and Training and Science, Technology and Innovation, Honourable Grace Naledi Mandisa Pandor stated that in its efforts to implement the Revised Regional Indicative Strategic Development Plan 2015-2020 and the SADC Industrialisation Strategy and Roadmap

2016-2063, the SADC region needs to focus on value-added industrialisation in the context of the current economic and policy conditions prevailing in SADC Member States. Minister Pandor also underlined that the SADC region aims to move up the value-chain from producing and exporting basic manufactured and semi-finished goods, to producing final consumer and industrial goods. She also thanks SADC Member States for supporting South Africa's nomination to the United Nations Security Council.

The SADC Deputy Executive Secretary for Regional Integration, Dr. Themkinkosi Mhlongo said that the Joint Meeting of Ministers of Education and Training, Science, Technology and Innovation attests to the importance that the region attaches to the values and ideals of SADC goals most importantly the policy frameworks that guide work including the revised RISDP and the SADC Industrialisation Strategy.

The Director of the International Labour Office (ILO) for East and Southern Africa, Dr. Joni Musabayana also addressed the Ministers, and underscored that technological innovation, globalization, climate change, shifts in the organization of work through platform-based economies, digital technologies and artificial intelligence are rapidly transforming the world of work, therefore, investments in skills development and training systems are more important than ever. He also emphasised the need for the Education, Science, Technology and Innovation, and Labour sectors to engage in a joint dialogue to address current emerging policy issues such as the Future of Work and its implications for the economy.

In efforts towards bridging a gender gap in Science, Technology, Engineering and Mathematics in the SADC region, Angola, Eswatini, Lesotho, Mozambique, Namibia, South Africa & Tanzania signed the SADC Charter on Women in Science, Engineering & Technology (WISETO). The Charter promotes women in science, engineering and technology in the SADC Region with the aim of enhancing their full participation in the socio-economic development of their respective countries through the application of scientific knowledge and technological innovation.

The Ministers reviewed key policy and strategic documents aimed towards the contribution of the industrialization of the region, and the work to be undertaken over the next years towards the implementation of the regional frameworks that will culminate in fuller and better regional integration.



Compensation for occupational injuries and diseases

By Human Resources

Did you know that when you are injured at work while conducting your official duties you are not expected to use your medical aid or personal funds to treat the injury?

If you are an employee of the Department, it is important that you understand the provisions of the **Compensation for Occupational Injuries and Diseases Act**, which deals with accidents or incidents “arising out of and in the course of an employee’s employment and resulting in a personal injury, illness or the death of the employee”.

This article will concentrate on what to do in the case of occupational injuries.

What should you do if you are injured in the course of your employment?

1. Report the incident to your supervisor or the Occupational Health and Safety Unit (OHS) unit of Human Resources (HR) immediately.
2. Inform the medical practitioner or institution to which you go for treatment that your injury is an “injured on duty” incident.
3. HR will investigate the matter and submit a written report on a **WCL 2** form to the Compensation Commissioner (Department of Labour) within 14 days.

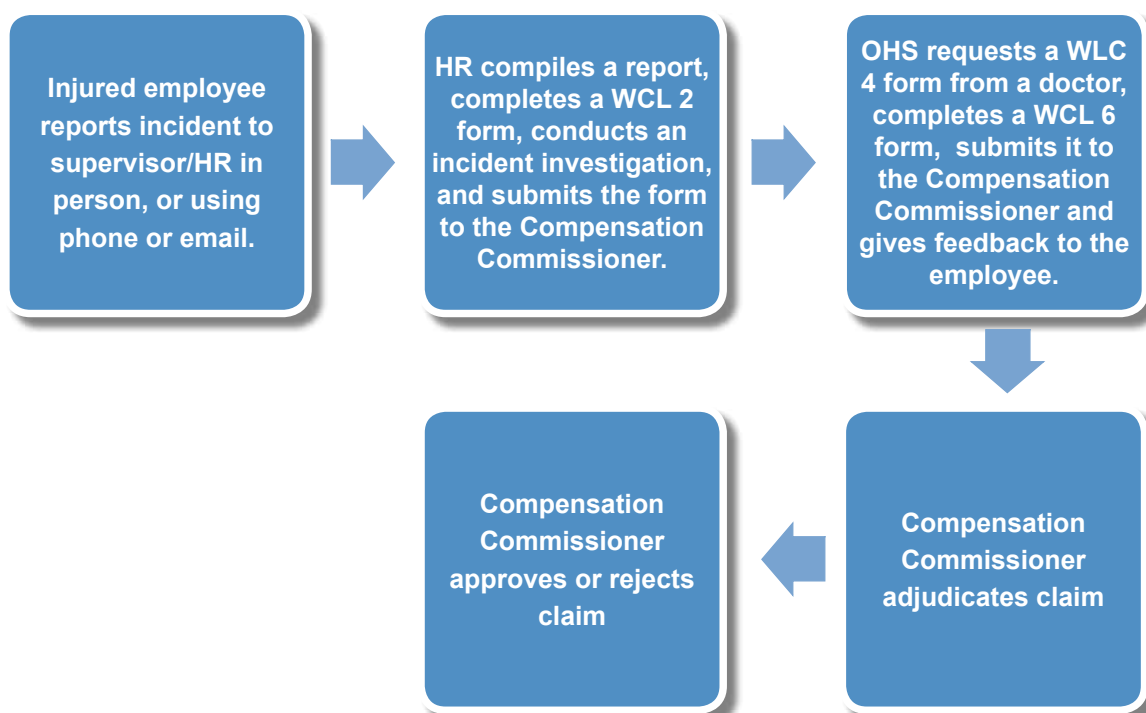
4. The medical practitioner should complete and submit a **WCL 4** form to HR after the treatment has been administered.
5. Your medical practitioner should provide you with a medical progress report on a **WCL 5** form. If an employee is booked off for more than 14 days, the medical practitioner should report to the employer immediately after the decision has been made.
6. Once the medical practitioner has declared the injured employee fit to return to work, the employer will complete a **WCL 6** form and submit it to the Compensation Commissioner.
7. HR will provide continuous feedback regarding the claim.

Important

1. All incidents need to be reported, no matter how minor they may appear, in case the injury is found to be severe at a later stage.
2. If the injury is not reported to HR **within 24 hours** of the incident, the Compensation Commissioner will not issue any compensation.
3. If the employer fails to report an incident to the Compensation Commissioner **within 12 months**, the employer will be responsible for costs.
4. The employee must cooperate fully with the employer, submitting the relevant medical reports and any other information or documentation required.

Reporting procedure

The procedure for reporting incidents to the Compensation Commissioner is illustrated in the flowchart below.



For more information you can find the Act at www.labour.gov.za and click on the “Legislation” tab.

Summit calls for enabling environment to support Africa's innovators

By Julian Leshilo-Sebake

Greater investment and the creation of enabling ecosystems are required to support Africa's innovators. This was one of the key messages that emerged from the African Innovation Summit (AIS) held in Kigali, Rwanda earlier this month.

The AIS is an Africa-wide initiative to mobilise investors, policy makers, researchers, the youth, innovators and thinkers into a coalition for collective action to foster an enabling environment for innovation in Africa.

Speaking at the summit, Rwandan Prime Minister Édouard Ngirente said that initiatives such as the AIS were critical for Africa's development.

"The challenge facing Africa is building robust ecosystems of innovation," the Prime Minister said. "I am happy that AIS is helping our countries build a culture of innovation as a way of life. It is a critical element of development and economic growth."

Delegates at the summit agreed that a multi-sectoral and multi-stakeholder approach was needed to ensure that policies, investments and enabling ecosystems were put in place to empower and propel African innovators and their solutions forward.

The summit concluded with a call to action addressed to innovators, government leaders, the private sector, civil society and academia: "Let us throw out the boxes that have caged us".

These sentiments were echoed at a satellite AIS event hosted in Pretoria by South Africa's Department of Science and Technology (DST). While the Kigali summit focused on how the continent can innovate to address pressing developmental challenges, the DST's satellite event focused on innovation in the Southern African region.

The Southern African Development Community (SADC) Industrialisation Strategy and Roadmap was discussed in this context. The strategy seeks to promote economic and technological transformation in order to enhance the competitive and comparative advantages of the region's economies.

Anneline Morgan, Senior Technical Advisor: Science, Technology and Innovation for the SADC Secretariat, said that African countries such as Zambia, Botswana and South Africa should benefit their material wealth instead of merely exporting it to other continents.

"African countries can get more value from benefiting their mineral resources by transforming them into high-value products," Morgan said.

Dr Thomas Auf der Heyde, Deputy Director-General: Research Development and Support at the DST, said that in order to achieve structural transformation through innovation and industrialisation, countries in the region needed to address policy deficits.

"Government must also undertake policy reforms, promote greater investment in research and development, finance technology entrepreneurs, improve access to local and international markets

by small to medium enterprises, and develop indicators that will ensure impact at every level of the innovation value chain," Auf der Heyde said.

Professor Shirley Motaung of the Tshwane University of Technology told delegates that, while it was necessary to create an enabling environment for innovation, training a cohort of knowledge entrepreneurs was equally important.

"We must not limit ourselves to the classroom," Motaung added. "Policy makers need to introduce entrepreneurship as a module or school subject. Degrees offered by our universities do not prepare students for entrepreneurship but for jobs."

Fannie Gondwe of Perisha Agro and Packaging Enterprise, and Lilitha Mahlati of Ivili Loboya, demonstrated the socio-economic value derived from product beneficiation in their respective businesses. Malawi-based Perisha Agro and Packaging grows orange-fleshed sweet potatoes, which are more nutritious than ordinary sweet potatoes and have been shown to alleviate Vitamin A deficiency. Gondwe's plans include embracing the value chain of orange-fleshed sweet potatoes by adding production of juices, chips and skin lotions.

Ivili Loboya is a wool and cashmere beneficiation enterprise based in the Eastern Cape. The company uses fibre from goats to produce cashmere, which in turn is used to produce safety footwear innersoles, clothing and homeware.

Delegates at the DST's satellite AIS event agreed that more businesses need to follow the beneficiation route, as it leads to the creation of much needed jobs and economic growth.

Dr Olugbenga Adesida, co-Director of AIS, called for bolder thinking about the future and a greater sense of urgency around Africa's transformation. "Africa cannot simply be consumers, nor can it outsource its development," Adesida said. "We all must engage with a new sense of urgency to facilitate change."

Investors, policy makers, researchers, the youth and innovators from the Continent gathered in Kigali to discuss innovation.



Rewards and Recognition Programme 2017/18 Awards

By Human Resources

The Department of Science and Technology (DST) has a Rewards and Recognition Programme that is intended to recognise exceptional achievements and dedication to increase employee morale. A committee evaluates nominations received from staff, and allocates awards in individual and group categories.

For 2017/18 three bronze awards were made in the individual category. These went to Ms Tshildzi Mulaudzi, Ms Ria Vogel and Mr Ernest Rachilo.



Tshildzi Mulaudzi

Ms Mulaudzi, Senior Secretary: Human Resources, was recognised for her excellent service and the spirit of teamwork she displayed in assisting the Directorate: Performance Management (PM) during the annual performance assessment period. At this time of year, the directorate has an overwhelming amount of administration to do in a short space of time. Ms Mulaudzi selflessly offered to assist PM with administrative support during this period, and made a valuable contribution to the PM process while still carrying out her normal duties.



Ria Vogel

Ms Vogel, Deputy Director: Administration in the Office of the Deputy Director-General: Technology Innovation, was acknowledged for her excellent service, professionalism and job knowledge. Among other things, she ensured the satisfaction of the Auditor-General with the evidence required for all the chief directorates in the Programme. This was done in the absence of a Director: Administration.



Ernest Rachilo

Mr Rachilo, Messenger in the Chief Directorate: Information Systems and Knowledge Management, received recognition for his excellent service and the professionalism he displays in assisting DST employees to obtain the visas necessary for work-related international travel. This is possible because of the strong relationships of trust he has built with local embassies, and his comprehensive understanding of visa requirements. He serves as a model for service excellence.

Two bronze awards were made in the group category.

The Corporate Services team that carried out the Sigdisabathembu Primary School computer laboratory project received an award for service excellence and project delivery. In 2014, the former Deputy Minister of Science and Technology made a commitment to provide the school, which is in Ladysmith, KwaZulu-Natal, with a fully functioning computer laboratory. The team members were recognised for going beyond what was expected of them, travelling and working unpaid overtime to ensure that this commitment was met.

The Sigdisabathembu project team
Abram Sefohlan, Mogale Mahlaela, Siphwe Mthombeni,
Clement Mtetwa, Dolly Masuku and Robert Shaku
(Absent: Judgemore Tshikomba)





Research and Development Tax Incentive Team
Front row: Gugulethu Zungu, Pamela Madula and Thabo Manyaka
Back row: Boitumelo Khutsoane, William Mabogoane and Strini Perumal
(Absent: Ms Nangula Mavhungu)

The Research and Development Tax Incentive Team received recognition for the major progress they made in processing the R&D tax incentive application backlog. The backlog in the evaluation and adjudication of applications resulted from the strong response from the business sector after the introduction of the new preapproval procedure. The team members all worked extremely hard to ensure that the backlog was significantly reduced, which was vital for both stakeholder impact and the Department's image.

A third group received a lunch voucher for their work on the Astana International Expo 2017 in Kazakhstan. The Department of International Relations and Cooperation requested the DST to lead in organising the South African part of the three-month expo, which was not a scheduled Programme 3 project. However, a successful outcome was ensured by the team, consisting of Mr François Davel, Ms Mirranda Mohapi, Ms Ntombi Mchuba, Ms Kediemetse Mnisi, Ms Mmabatho Ndwandwa, Ms Zintle Njikelana and Ms Johannah Moima.

NIPMO team
Front row: Ms Lungelwa Kula, Ms Paballo Phiri, Ms Lindiwe Mashimbye, Ms Hlamalani Khoza, Ms Mantwa Tshabalala
Back row: Ms Naomi Aphane, Ms Uzubenathi Nomawule
(Absent: Mr Sandile Khuzwayo, Mr Thabang Jase, Mr Pontsho Mampuru, Ms Naomi Ngoasheng, Dr Elmary Buis and Mr Wilson Mulihasi)

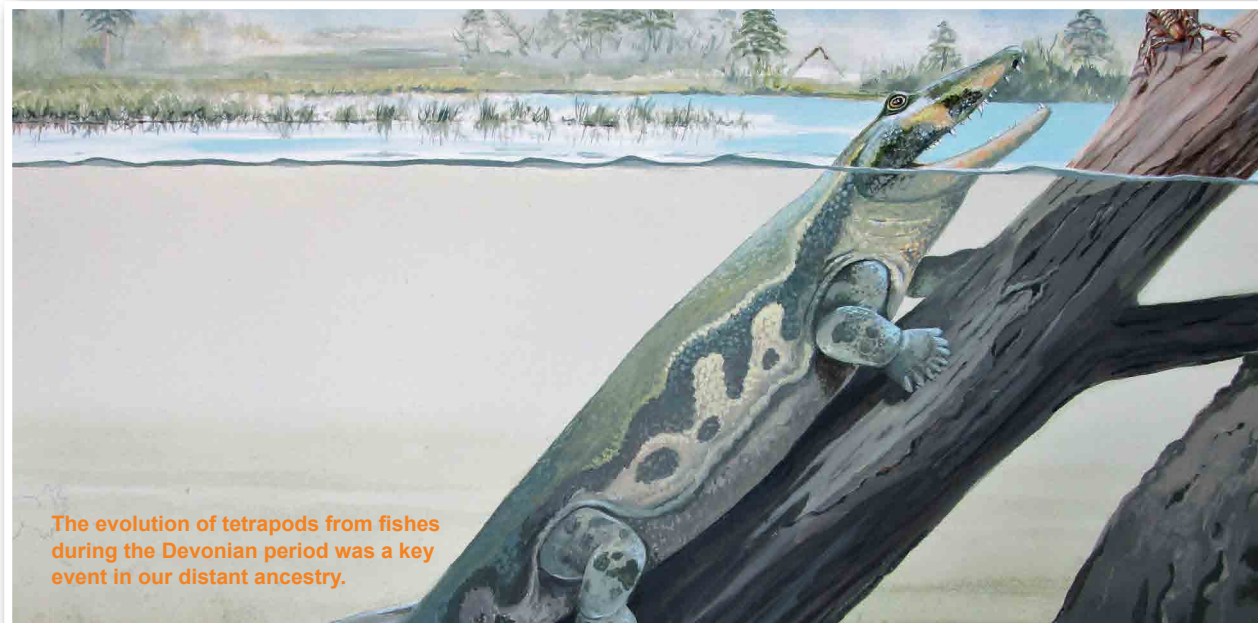


The NIPMO team received a recognition for their service excellence, project delivery, teamwork and commitment. The team was able to achieve targets with few staff members, and that the coherent teamwork was evident in the team's interest in their stakeholders' matters. The team received a January 2018 team-of-the-month bronze award for Programme 2 (Technology Innovation), which comes with a cash amount of R2 500, subject to tax, for each team member.

First tetrapods of Africa lived within the Devonian Antarctic Circle

By Veronica Mohapelo

The first African fossils of Devonian tetrapods (four-legged vertebrates) show these pioneers of land living within the Antarctic Circle 360 million years ago.



The evolution of tetrapods from fishes during the Devonian period was a key event in our distant ancestry. Recently discovered fossils from the latest Devonian Waterloo Farm locality near Grahamstown in the Eastern Cape, South Africa, published today in *Science*, force a major reassessment of this event.

“Whereas all previously found Devonian tetrapods came from localities which were in tropical regions during the Devonian, these specimens lived within the Antarctic circle”, explains lead author, Dr Robert Gess of the Albany Museum in Grahamstown, and co-author, Professor Per Ahlberg of Uppsala University in Sweden.

The research was supported by the South African Department of Science and Technology and National Research Foundation’s Centre of Excellence in Palaeosciences, based at the University of the Witwatersrand, and the Millennium Trust.

South Africa’s rich natural resources

The Minister of Science and Technology, Mmamoloko Kubayi-Ngubane, says South Africa is richly endowed with natural resources, and the country’s fossil wealth dates back more than three billion years.

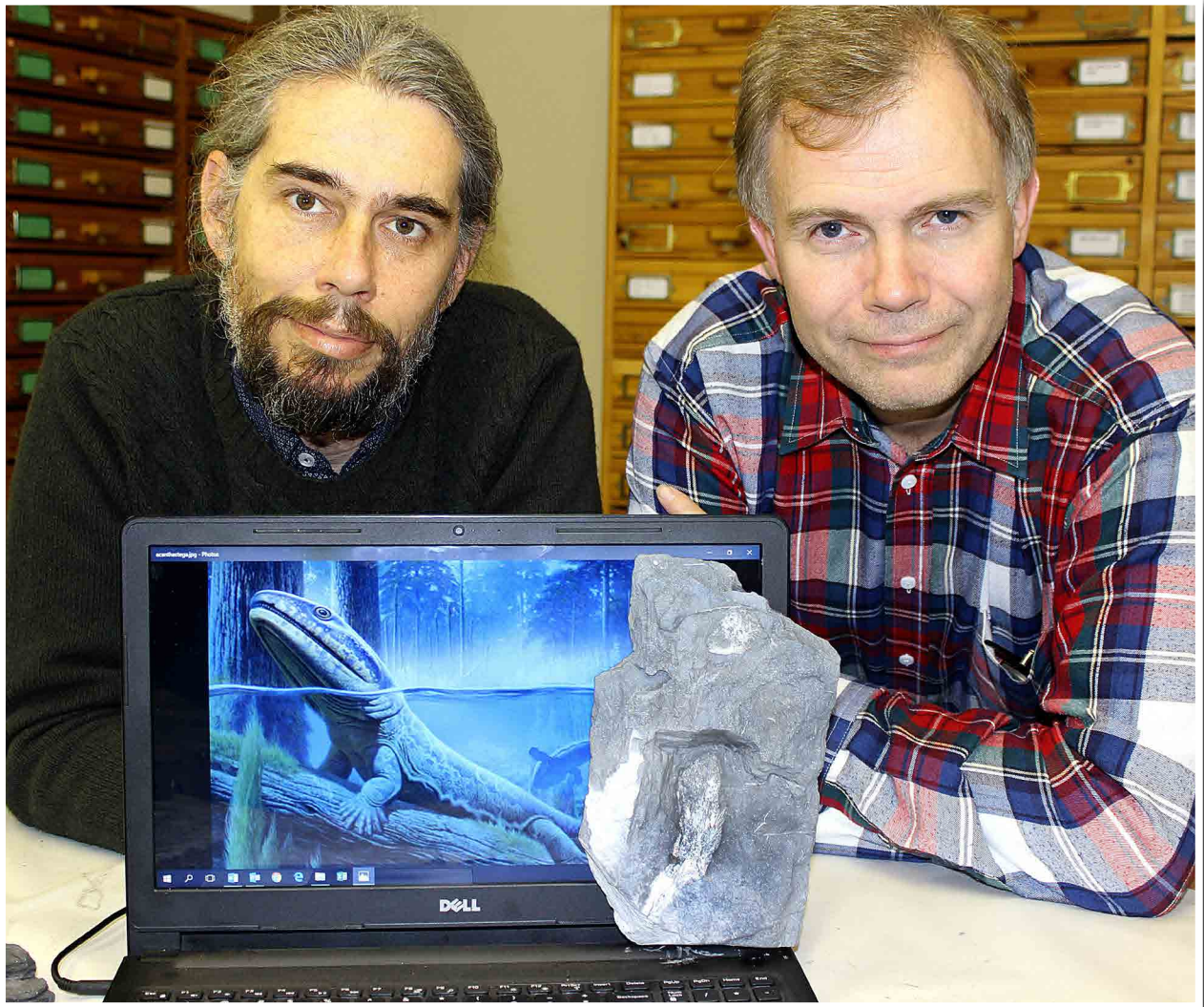
“It is uniquely expansive for any one country, and many internationally significant fossil discoveries have been made in our country and are stored in South African Museum collections,” says the Minister.

She says the country’s geographic advantage as a global provider of information on the evolution of life and humanity on Earth stands alongside the country’s biodiversity and geographic advantage in astronomy and the science of the southern oceans. Work on South African paleosciences is of crucial national and international importance, because it provides proof of our shared human origins, the mutual roots that bind all people within a common humanity. It also provides answers as to what occurred before humans existed, including the evolution of plant and animal life.

The Minister congratulated Dr Gess, saying this groundbreaking discovery places South Africa at the forefront of the study of the evolution of land-living vertebrate animals, including the ancestry of all the wildlife we see in the country’s game parks.

The first African Devonian tetrapods

Two new species, named *Tutusius* and *Umzantsia*, are Africa’s earliest known four legged vertebrates by a remarkable 70 million years. The approximately metre-long *Tutusius umlambo* (named in honour of Archbishop Emeritus Desmond Tutu) and the somewhat smaller *Umzantsia amazana* are both incomplete – *Tutusius* is represented by a single bone from the shoulder girdle, whereas *Umzantsia* is known from a greater number of bones – but they both appear similar to previously known Devonian tetrapods. Alive, they would have resembled a cross between a crocodile and a fish, with a crocodile-like head, stubby legs, and a tail with a fish-like fin.



Author and co-author, Rob Gess and Per Ahlberg led work on the discovery.

The Waterloo Farm locality is a roadcut that was first revealed in 2016 after controlled rock cutting explosions by the South African National Roads Agency along the N2 between Grahamstown and the Fish River.

This cutting exposed dark grey mudstones of the Witpoort Formation, representing an ancient environment of a brackish tidal river estuary, that contain abundant fossils of animals and plants.

The first tetrapod found outside of tropical regions

The real importance of *Tutusius* and *Umzantsia* lies in where they were found.

Devonian tetrapod fossils are found in widely scattered localities. However, if the continents are mapped back to their Devonian positions, it emerges that all previous finds are from rocks deposited in the palaeotropics – between 30 degrees north and south of the equator.

Almost all finds come from Laurussia, a supercontinent that later fragmented into North America, Greenland and Europe.

The much larger southern supercontinent, Gondwana, which incorporated present day Africa, South America, Australia, Antarctica and India, has hitherto yielded almost no Devonian tetrapods – only an isolated jaw (named *Metaxygnathus*) and footprints, both from eastern Australia.

Because Australia was the northernmost part of Gondwana, extending into the tropics, an assumption developed that tetrapods evolved in the tropics, most likely in Laurussia. By extension, it was assumed that the movement of vertebrates from water onto land (terrestrialisation) also occurred in the tropics.

Attempts to understand the causes of these major macro-evolutionary steps therefore focused on conditions prevalent in tropical water bodies.

The Waterloo Farm tetrapods not only come from Gondwana, but from its southernmost part – reconstructed to have been more than 70 degrees south, within the Antarctic circle. Abundant plant fossils show that forests grew nearby, so it wasn't frozen, but it was definitely not tropical, and during winter it would have experienced months of complete darkness.

This finding changes our understanding of the distribution of Devonian tetrapods. We now know that tetrapods occurred throughout the world by the Late Devonian and that their evolution and terrestrialisation could realistically have occurred anywhere.

South Africa now adds insights into the emergence of land animals to its incredible fossil record, which includes the transition from reptile-like ancestors to mammals and the evolution of humans.

There is probably not another country on the planet that so fully documents the long and dramatic evolutionary history of our own lineage.

Innovation is critical for prosperity across the spectrum

Julian Leshilo Sebake

Government, industry and non-profit organisations have equally important roles to play in ensuring a thriving culture of innovation in the country. This was the consensus that emerged from the Industry Associations Innovation Day held at the Riversands Incubation Hub in Midrand on 25 May 2018.

The event was organised by the Centre for Science, Technology and Innovation Indicators (CeSTII), under the theme, “Innovation, Government and Industry 4.0: Policies, Measures and Incentives.

CeSTII is a unit at the Human Sciences Research Council, an entity of the Department of Science and Technology.

Whether you’re starting out, scaling up or steaming ahead, innovation is the creative engine that powers the future success of your venture. It also helps to build communities, cities and countries.

Speakers at the event were unanimous that South Africa’s workforce needs upskilling if the country is to participate effectively in the Fourth Industrial Revolution. Imraan Patel, DST Deputy Director-General: Socio-economic Innovation Partnerships, said, “Transformative change is central to our discussions of Industry 4.0.”

While South Africa has not yet crafted a policy vision for Industry 4.0, Patel noted that President Cyril Ramaphosa had established an advisory council and that the policy vision was being worked on.

The DDG added that the DST was going through the process of drafting a new White Paper on Science, Technology and Innovation. “We need to strengthen the national system of innovation. We need a greater level of inclusion in the fruits of the innovation process,” Patel said.

“If people around the world don’t have access to decent incomes, there is something amiss with the models of disruption.”

Nonkululeko Shinga, Chief Director: Innovation and Technology in the Department of Trade and Industry, said the country has brilliant innovators. “We have the ability to innovate, but the challenges are at the level of absorption of innovation and the uptake of research.”

Shinga called for a culture of collaboration and information sharing. “We often say there is a gap between government and business, and there are trust issues. But seminars like this help us to identify and share our needs. Industry needs to input into policy,” the Chief Director said.

Patel echoed these sentiments, saying, “We cannot solve our problems alone, and the upcoming investment and jobs summit reflects the need to align”.

CeSTII Director, Dr Glenda Kruss, said whereas South Africa aims to invest 1,5% of GDP in research and development

(R&D), the latest estimates put this investment at 0,8%. She said industry associations and companies can use the country’s research, development and innovation datasets to inform their strategies and performance plans.

The Innovation Day event also formed part of a drive to promote the Business Innovation Survey 2014-2016, which is currently under way. The survey will examine the innovation activities of about 5 000 enterprises, from very small to very large, across a range of industries.

In the same way that a company’s financial statement is an essential tool for performance monitoring and planning, the Business Innovation Survey delivers a national picture of what innovations are taking place, how they occur at firm-level, and what can be done to enhance innovation capacity.

The South African Innovation Survey 2008, undertaken by CeSTII on behalf of the DST, found that 65,4% of South African businesses were innovation active – a higher percentage than in many European Union countries. The survey further revealed that the average business was spending 1,7% of its turnover on innovation.

And according to the South African National Survey of Research and Experimental Development, also conducted by CeSTII on behalf of the DST, businesses in the country devoted 82,9% of their R&D investment to natural sciences, technology and engineering research in 2015/16.



Speakers at the event were unanimous that South Africa’s workforce needs upskilling if the country is to participate effectively in the Fourth Industrial Revolution.

Hydrogen fuel cell technology brings power to rural school

By Veronica Mohapeloa and Thabang Setlhare

Learners at Poelano Secondary School in Ventersdorp are not only experiencing first-hand the benefits of hydrogen fuel cell technology (HFCT), but are also learning about the technology itself.

The Minister of Science and Technology, Mmamoloko Kubayi-Ngubane, launched the R10 million renewable energy system on Friday, 13 April 2018. The 2,5 kW HFCT system, installed last month, has enabled the school's 486 pupils to have access to low-cost, off-grid, primary clean energy for ICT and lighting needs.

Fuel cells produce electricity through a chemical reaction, using hydrogen as the basic fuel and platinum-based catalysts. The system uses solar photovoltaic panels, which convert energy from the sun into electricity. Since water is needed to produce the hydrogen for the fuel cells, and there are water shortages in Poelano, the Department of Science and Technology (DST) installed a borehole to ensure the successful implementation of the project. The school now has a reliable water supply as well as a reliable power supply.

HFCT standby power solutions are efficient, safe and quiet, ensuring a non-intrusive standby and potentially primary power solution. The project also provides an opportunity to demonstrate to learners, teachers and the community that science can solve socio-economic problems in rural areas.

The project was implemented through the Hydrogen South Africa (HySA) Programme, a DST initiative promoting the use of local platinum group metal (PGM) resources to create knowledge and skills, and enabling the development of high-value commercial activities in hydrogen and fuel cell technologies.

South Africa is endowed with about 75% of global PGM reserves, located in North West and Limpopo, and there are various initiatives aimed at beneficiating the resources.

Minister Kubayi-Ngubane, who addressed Friday's launch, said the HySA Programme had huge potential for local manufacturing and mineral beneficiation. The Minister said that the beneficiation of South Africa's natural resources was one way in which the country would be able to expand its industrial base, creating jobs and reducing poverty and inequality.

Friday's launch included an exhibition showcasing a wide variety of HFCT and solar energy products. Pupils from schools in the Ventersdorp area were able to learn about these alternative energy technologies, and had the opportunity to interact with the scientists involved in their development. They also received information about the value of studying science, and were encouraged by the Minister to consider the many career opportunities offered by science.

Learners Tshegofatso Motaung and Mantshonyane Keleabetswe, both in Grade 12, welcomed the technology, as it ensured that the school always had power.

Mantshonyane thanked the DST for the project. "I have learned that science and technology can help bring innovation to communities and this project has made life easier for all of us," she said.

The Minister appealed to parents to protect the infrastructure that government had brought into the community for their children's benefit.

The Principal of Poelano Secondary School, Gerald Mhlanga, echoed the Minister's sentiments. "The most important thing for us is to make sure we maintain the project and benefit many generations to come," he said.



Min Kubayi-Ngubane viewd the fuel cell technology at Poelano School



Learners participated in the HFCT exhibition

African region set to benefit from new Space Weather Warning Centre

By Zama Mthethwa

The African region is set to derive even greater benefit from the recent upgrade to the South African National Space Agency's (SANSA) Space Weather Regional Warning Centre located in Hermanus in the Western Cape.



Minister of Science and Technology, Mrs Mmamoloko Kubayi-Ngubane (right) and SANSA MD, De Lee-Anne McKinnell (left), holding the unveiled plaque for SANSA's newly upgraded Space Weather Regional Warning Centre in Hermanus. Dr McKinnell and the Minister are flanked on the left by Space Weather Scientist, Teboho Nxele, SANSA CEO, Dr Val Munsami, and on the right by Space Weather Researcher, Dr Rendani Nndanganeni, Space Weather Practitioner, Mpho Tshisaphungo and Space Weather Researcher, Dr Tshimangadzo Matamba.

Unveiled on 19 April by South Africa's Minister of Science and Technology, Ms Mmamoloko Kubayi-Ngubane, this state-of-the-art facility is the only regional warning centre for Africa and integral to protecting satellites and the continent's national power grids and communications and navigation systems from the harmful effects of space weather.

"Extreme space weather storms are a risk that could endanger the economy, costing South Africa billions of Rands if not mitigated effectively" said SANSA CEO, Dr Val Munsami. "Governments in several countries, including the USA and UK, have recently listed space weather on their National Risk Registers".

Acknowledging the vital role of the SANSA Space Weather Centre in mitigating the disruption of electricity blackouts, satellite communications failures and commercial aviation services, the Minister Kubayi-Ngubane highlighted the significant role of space science in building economic development and stimulating R&D cooperation in building a knowledge economy.

"Space weather is a global phenomenon with regional impact," said SANSA MD, Dr Lee-Anne McKinnell. "Severe space weather storms can negatively impact numerous sectors and our increasingly interconnected and interdependent technological systems today can cause a cascade of operational failures. The defence, communications, navigation, aviation and energy sectors are especially vulnerable to the effects of space weather."

Since its inception in 2010, SANSA has operated the Space Weather Regional Warning Centre under the auspices of the International Space Environment Service (ISES), which coordinates global space weather activities.

The Centre is mandated to develop South Africa's space weather capabilities, provide government, industry and the public with a space weather operations system and improve the understanding and awareness of space weather in Africa.

Its space weather information wall now consists of 15 high-definition 46-inch screens, each displaying live satellite images of the Sun in different wave-lengths and presenting real-time data from SANSA's space monitoring instruments positioned across southern Africa, Antarctica and Marion and Gough Island.

"The upgraded system provides our team with a superior platform to monitor the Sun and its activity in far greater detail for more accurate space weather forecasts, warnings and alerts, as well as environmental data on space weather conditions for use by governments and private-industry users in Africa," said McKinnell.

"This new facility will undoubtedly add significantly to our space weather service offerings, improve our understanding of our solar terrestrial environment and enable SANSA to further leverage the benefits of space science and technology for the African continent," McKinnell concluded.

WEF founder encourages business, government and civil society to embrace the 4th Industrial Revolution

By Veronica Mohapeloa

Founder and executive chairman of the World Economic Forum (WEF), Prof. Klaus Schwab, urged African leaders to put young people at the forefront of the 4th industrial revolution (4IR), saying that the world needed creative talent to shape the revolution.

Speaking at the Council for Scientific and Industrial Research (CSIR) 6th Emerging Researchers Symposium in Pretoria on June 28, Prof. Schwab said the world must embrace the 4IR as it would affect our lives for many years to come.

He encouraged governments, civil society and business to work together to ensure that the benefits of 4IR were distributed equally in society.

Prof. Schwab is in South Africa for a round-table discussion on investment with the Presidency. He has been at the centre of global affairs for decades and is convinced that the world is at the beginning of a revolution that is profoundly changing the way we live, work and relate to one another.

“It is just not enough to understand the 4IR. We all have to embrace it and that means we have to work together to jointly exploit new technologies for the future. Despite different opinions, the common interest should be to create strong, inclusive, and sustainable growth for the sake of the country,” said Prof. Schwab.

Prof. Schwab has written a book in which he explains how leaders and regulators need to act now to ensure that 4IR technologies help create jobs and not leave millions out in the cold. The book is a sequel to his bestselling 2016 book, *The Fourth Industrial Revolution*. The new publication guides our understanding of 12 sets of emerging technologies from a systems perspective, and enables a better appreciation of the rules, norms, institutions and values that shape their development and use.

He said artificial intelligence could be used to solve many social issues – to deploy drones to deliver medicine in remote communities, and to leap-frog people’s access to knowledge and health services, among many others.

The Minister of Science and Technology, Mmamoloko Kubayi-Ngubane, said the support for young scientists was one of the key objectives of the Department of Science and Technology (DST).

“This symposium plays a critical role in the development of human capital that South Africa needs in order to address poverty, unemployment and inequality in the country,” said the Minister.

The Minister said South Africa’s efforts should be focused on priorities such as enhancing the competitiveness of the economy through smart manufacturing, including supply chain, logistics and infrastructure development; as well as the improvement of service delivery.

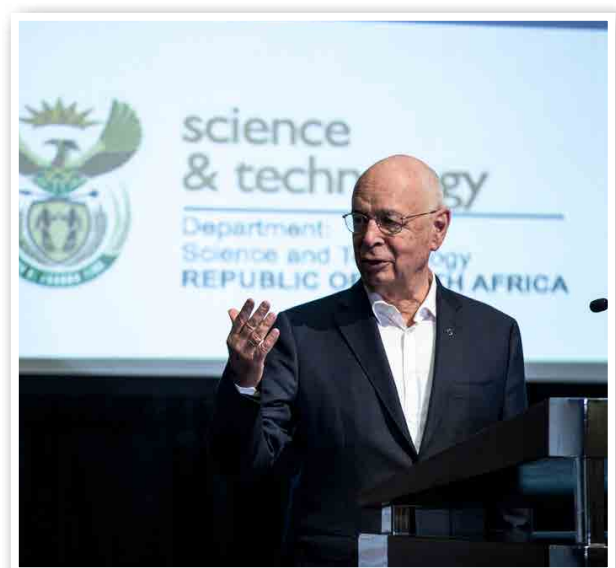
“Smart agriculture, drug development and testing, and precision medicine, as well as energy generation and storage, should be other priorities for technology investments,” said the Minister.

CSIR CEO Dr Thulani Dlamini said the symposium on emerging research was organised to encourage knowledge sharing among South Africa’s young scientists, engineers and technologists.

“It offers a platform to highlight the impact of their research through oral and poster presentations, as well as exhibitions,” said Dr Dlamini.

Over the next two days, some of the research to be presented by the young scientists will include network vulnerabilities. Cybersecurity specialist, Muyowa Mutemwa, will share his research on election hacking and give tips on how South African parties can protect themselves ahead of the 2019 general elections.

Dr Vhahangwele Masindi will showcase his research on the treatment of mine wastewater and how to recover minerals from acid mine drainage, and Dr Jerolen Naidoo will share her work on medication to treat cancer in South Africa.



Prof Klaus Schwab addressed CSIR 6th Emerging Researchers Symposium

Youth Science Journalism Programme creates science and technology awareness in communities

By Julian Leshilo-Sebake

For many learners across the country, mathematics and science continue to be difficult subjects to pass, and as a result they tend not to pursue them at post-matric level. Not so for Phelo Lakitika, who grew up in rural Mount Ayliff in the Eastern Cape.

A career in science was always on the cards for Lakitika, as his natural surroundings made a profound impact on him. "All science studies are based on nature and daily life events. Science is nothing more than an analysis of the world at large," says Lakitika.

His passion for the sciences saw him obtain a Bachelor of Science in Chemistry degree from Walter Sisulu University, and he is currently teaching mathematics, physical science and natural sciences at Tsolo High School near Mthatha.

For Lakitika, advocating a love for the sciences doesn't stop at learners. He is on a mission to enthuse all young South Africans about science, and is doing this through the Youth Science Journalism Programme. The Department of Science and Technology (DST) appointed its entity, the South African Agency for Science and Technology Advancement, to initiate the programme.

The programme is being implemented in municipalities targeted by the DST's Innovation Partnership for Rural Development Programme, which uses water, sanitation, energy and ICT technologies to help municipalities tackle their service delivery challenges.

Through the Youth Science Journalism Programme, the DST aims to give community media practitioners the skills they need to improve their coverage of science issues, particularly in indigenous languages.

As part of the programme, interns are hosted at various community media organisations. Lakitika was hosted by Alfred Nzo Community Radio as a journalist and news reader.

"The programme boosted my confidence in science," says Lakitika. "Now I am a better science communicator who simplifies every scientific concept to the local understanding."

Fellow intern Pumeza Mabusela is equally enthusiastic about science journalism. The 28-year-old said the programme gave her the opportunity to produce and present her own science show on Kumkani FM, where she was selected as one of the top four performing interns and the best news reader.

Mabusela is passionate about promoting African languages. Currently employed as a lecturer in journalism at Walter Sisulu University, Mabusela holds degrees in journalism and media studies and African languages. Her research focused on the representation of African languages, in particular isiXhosa, in the media.

Despite government support for the promotion and preservation of indigenous languages, Mabusela found that they continue to be overshadowed by English due to its dominance in the teaching and learning environment.

"A significant amount of media coverage in indigenous languages has been generated through the programme," she said.

Since its inception in 2016, the Youth Science Journalism Programme has produced a cohort of successful interns, including Mbalenhle Shandu and Godfrey Pandeka.

Shandu, of Nqubeko FM, was acknowledged at the 2017 Liberty Radio Awards as one of the bright stars of the radio industry. And Pandeka, who has worked at Malamulele FM and Sekhukhune Community Radio, has written science articles for national daily publications.

"The journalism industry is very competitive, it's survival of the fittest, but I am up for the challenge," says Pandeka, who was born in Nghezimani village outside Malumelele in Limpopo. Pandeka wants to write stories that will open doors for neglected children in villages who want to pursue careers in science and engineering.

"I see myself as an educational section editor one day," he adds. "I always wanted to see children have equal opportunities of learning. I will not give up on science journalism. It is part of who I am."



Godfrey Pandeka show during his internship



Pumeza Mabusela enthusiastic about science journalism

World Intellectual Property Day Celebrates Women's Accomplishments

By Thabang Setlhare

Women were listed in 31 percent of the 243,500 international patent applications published by World Intellectual Property Office in 2017, up from 23 percent a decade earlier, according to new data revealed by WIPO.

The fields of biotechnology, pharmaceuticals and chemistry show the highest rates of women named as inventors in international patent applications filed via WIPO, new figures indicate, as World IP Day 2018 celebrated women driving positive change across the globe.

In South Africa, World IP Day was celebrated in Polokwane during a two-day event which kicked off on Thursday 26 April. The occasion was hosted by the Departments of Science and Technology (DST) and Trade and Industry (DTI).

World IP Day is celebrated annually to disseminate information about the role that IP rights (patents, trademarks, industrial designs, copyright) play in encouraging innovation and creativity.

The local event was celebrated under the theme: "Powering change: Women in innovation and creativity" to celebrate the brilliance, ingenuity, curiosity and courage of the women who are driving change in the world.

The day highlighted the work done by the Companies and Intellectual Property Commission (CIPC), the National Intellectual Property Management Office (NIPMO), Technology Innovation Agency (TIA), the Limpopo Economic Development Agency (LEDA) and the University of Limpopo towards IP.

CIPC is the custodian of company and IP Law in South Africa and the organisation has a long standing relationship with National Intellectual Property Management Office, an entity of the DST.

NIPMO supports innovation development through Technology Transfer Offices (TTO) at various universities in the country. The aim is to provide for more effective utilisation of IP emanating from publicly financed research and development (R&D).

In line with the theme, the innovations of several brilliant female researchers were showcased. Among them, Prof Roumiana Nikolova from the University of Limpopo, who has invented a technology to reproduce a drought resistant and ornamental flower called *Strelitzia Juncea*. She currently holds the patent for her innovative approach in the propagation of this rare species of the *strelitzia* flower. This innovation is currently undergoing processes of protection in seven European countries.

Nikolova believes that the development of the in vitro technology (innovation to grow the plant) is what the horticulture and biodiversity sectors need to contribute largely to the country's gross domestic product and actively participate in the mainstream economy.

Dr Kgabo Moganedi, from Limpopo University, holds a doctorate in biotechnology. Her thesis focused on the genetic diversity



Roumiana Nikolova has led research that resulted in innovative technology to reproduce a drought resistant and ornamental flower called *Strelitzia Juncea*

of the Marula tree in Limpopo. She is now in the process to commercialise marula fruit by-products.

She said that breaking barriers to women's creativity and helping to nurture their innovative ideas was the first step towards powering change in the field of science, innovation and technology.

"Innovation is not just about a creative idea, but it is the implementation of creative ideas in such a way that they can be mass marketed to better the lives of other people," said Dr Moganedi.

Several women from around their country displayed their innovative ideas. Portia Refilwe Mavhungu's company PRD Logical Solutions, looks for forgotten gaps in the market that would make people's lives easier.

She and her partner have developed Para-Tube, a wheelchair seat that functions as a toilet seat to assist wheelchair users by eliminating difficulty of movement from the wheelchair to the toilet seat.



World IP Day: The local World IP day event attracted dozens of learners from schools in Limpopo who interacted with researchers and their innovations.

"We need more women and girls to consider a future in the field of technology, a future as creators of the solutions to the big challenges of our time," said Mavhungu

An Eastern Cape female entrepreneur- Sandiswa Qayi, who has won awards for creating an innovative energy-saving device for geysers, is on the verge of commercialisation her innovation.

The device can be fitted onto any geyser and saves energy by only boiling a certain amount of water instead of all the water in the geyser. This led to her launching her own business, Amahlathi Eco-Tech (AET) Africa, last year.

"AET Africa's primary goal is to get the product fitted to the existing seven million geysers on the power grid. We hope to improve energy efficiency to help South Africans who cannot afford to have hot water due to the high costs associated with operating an electric geyser," said Qayi.

The DST Deputy Director General: Technology Innovation, Mmboneni Muofhe urged more women play a bigger role in innovation.

"The biggest economic driver in Africa is actually farming and agriculture and whole lot of innovation is currently driven by women to improve farming."

He added that the essence of celebrating World IP Day was about celebrating creations but also making people aware that CIPC and NIPMO were available to help people understand how to protect their ideas

Director for Research Administration at Limpopo University, Thembinkosi Mabila, said the university was thrilled to be part of the World IP Day activities. The institutions also runs a tech transfer office which is responsible for IP management and commercialisation.

Dr Mabila said the university was changing the narrative from being a teaching university to a comprehensive institution that was greatly involved in research and innovation.

Writing Good Risk Statements

By Enterprise Risk Management

Risks need to be stated unambiguously to support and enable effective management and oversight of these risks. Thus, it is important that we know how to write risk statements that are impactful with regard to ensuring that goals and objectives are achieved as planned for.

The key to writing a good risk statement is to ensure that one has a good understanding of the risk components and their interrelationships. Vaguely articulated risk statements lead to poor risk response planning.

The Department uses the following format to articulate all of its risks:

Something may occur..., leading to..., caused by..., and controlled by...

In spite of this simplified format, we sometimes find it difficult to identify and articulate risks. When defining a risk, think about what might happen. Risks by definition are uncertain future events or conditions, not things that have already happened. To help you articulate risks in an unambiguous, impactful and actionable way, we provide the following:

Alternative simplified formats

1. There is a risk that..., because..., which could result in....
2. What could happen? Why could it happen? Why do we care?

Litmus test questions to ask yourself:

1. Is the risk tied to an appropriate goal and/or objective?
2. Does the risk statement focus on uncertain events or conditions?
3. Is the risk clearly defined and specific?
4. Does the risk statement drive clear response plans?

In conclusion, risk statements should be information-rich, relevant to the goals and objectives of the Department, and easily understood by all concerned, especially management, staff and other stakeholders that were not part of the risk assessment workshop. Action plans and tasks should be clear and outcome-focused, with appropriate and realistic timelines.

IMPORTANT NEWS FLASH: Management and staff are requested to note that the Enterprise Risk Management Committee (ERMC) requires the Department to table a first draft of the 2019/20 Strategic, Programme and Fraud Risk Profiles at its November 2018 meeting, and a final draft at its March 2019 meeting, as part of the process of improving its oversight on the formulation of risks, related information and action plans. This requirement will also apply to future financial years.

