A SELECTION OF HIGHLIGHTS FROM OUR RESEARCH AND TECHNOLOGICAL INNOVATION JOURNEY



Dr Basil Schonland, the leader of the group of scientists who developed A national research the first radar in South organisation, the Africa, becomes the Council for Scientific founding president of and Industrial Research, the CSIR. This positions is established in terms of the CSIR to play a the Scientific Research leading role in the Council Act (No. 33 of development of radar 1945) of the Parliament and electronic warfare of the Union of South measurement, test and evaluation facilities. Africa.



Dr Trevor Lloyd Wadley invents the first microwave electronic distance measurement equipment, the tellurometer. The tellurometer revolutionised land-surveying throughout the world. The company set up to manufacture the tellurometer maintained the market lead for this equipment for over 25 years.



A satellite tracking and data acquisition station is established at Hartebeesthoek as one of 14 ground stations of the USA's National Aeronautics and Space Administration (NASA). NASA ceased operation in 1975 and the CSIR then established the Satellite Remote Sensing Centre. Today the facility is part of the South African National Space

Agency, formed in 2010.



traffic can be determined

in a three-month period.

To date, the HVS has

earned more than

R200 million in foreign

revenue for South Africa.

Commissioning of the 'Meiring Naude' research vessel in support of the CSIR's multidisciplinary oceanographic research activities. The vessel is used to study the movement of sand and how it influences the

siltation of the Durban harbour

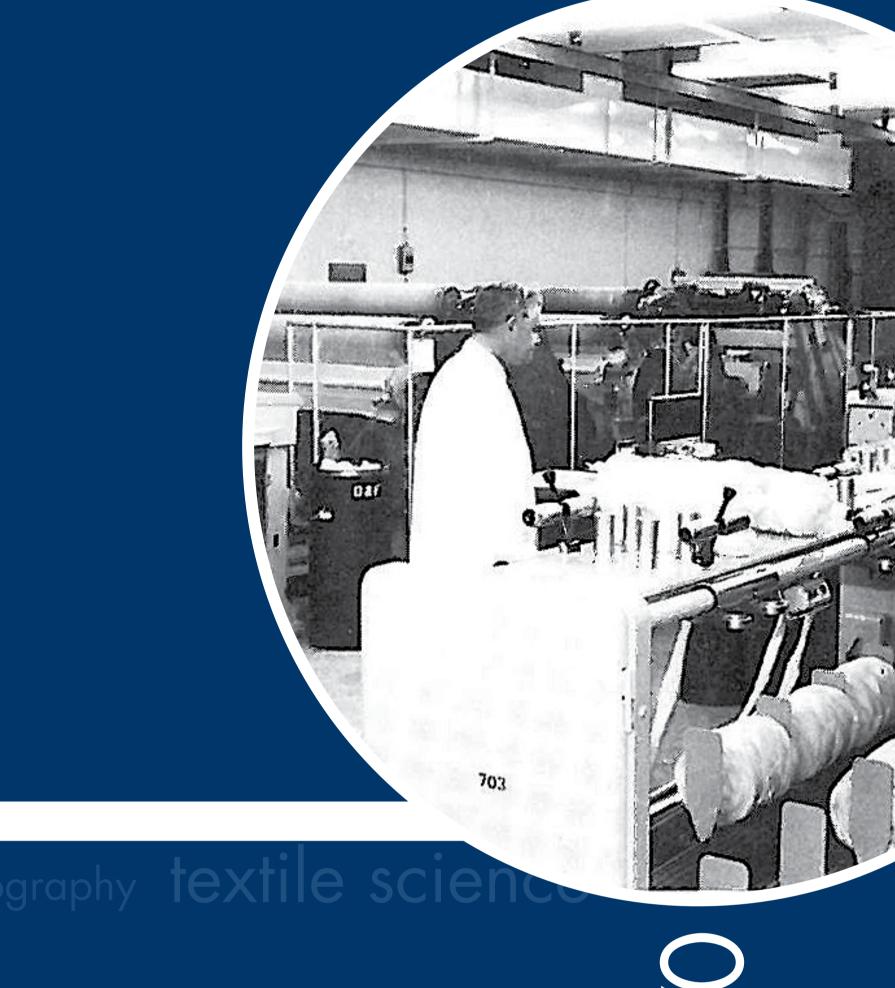
entrance. The demand for

applied research in coastal

engineering later led to the

establishment of a hydraulics

research unit.

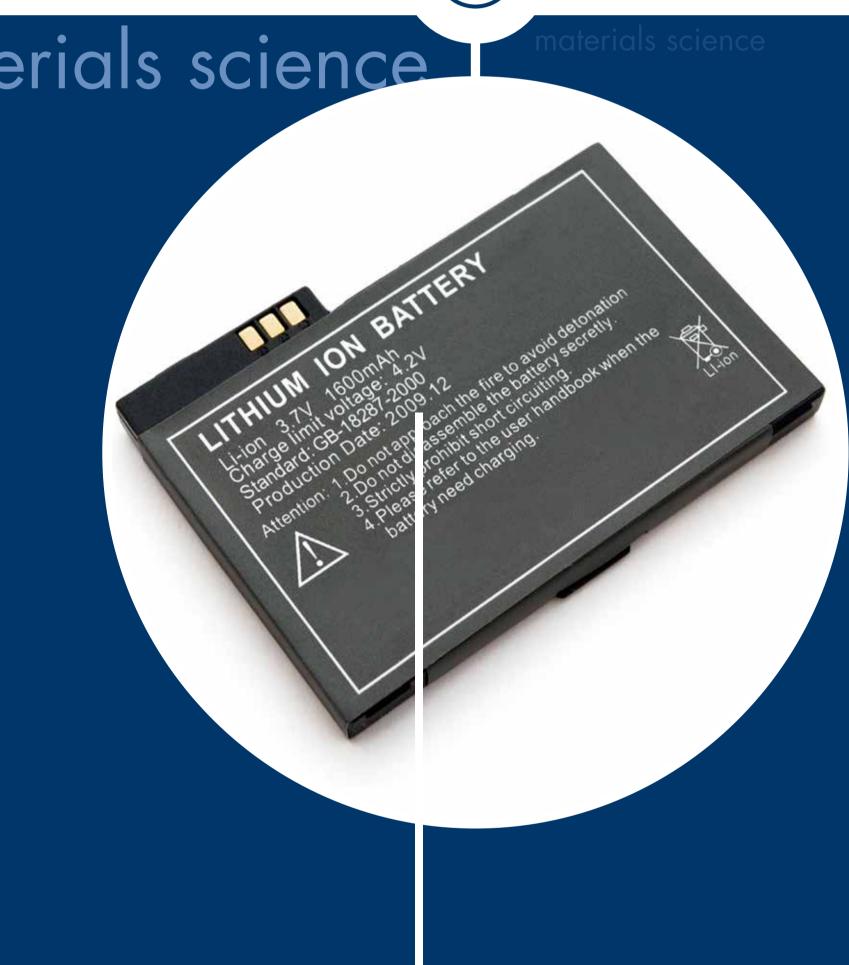


trained textile technologists complete their BSc (Textiles) degree at the (then) University of Port Elizabeth. The CSIR contributes to this milestone through its senior textile scientists who are also parttime lecturers at the university. Today the CSIR continues to collaborate with the Nelson Mandela Metropolitan University in the fields of textiles, natural resource management and information and communications technology.

South Africa's first fully

The Heavy Vehicle Simulator (HVS) is developed for accelerated pavement testing of road materials. The effect of 20 years of

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Through the discovery of lithium-metal-oxide electrode materials with a spinel-type structure, the CSIR contributes to lithium-ion battery research. Today, lithiumion batteries power our smart phones, laptop computers, electric vehicles, smart grids and even our homes.

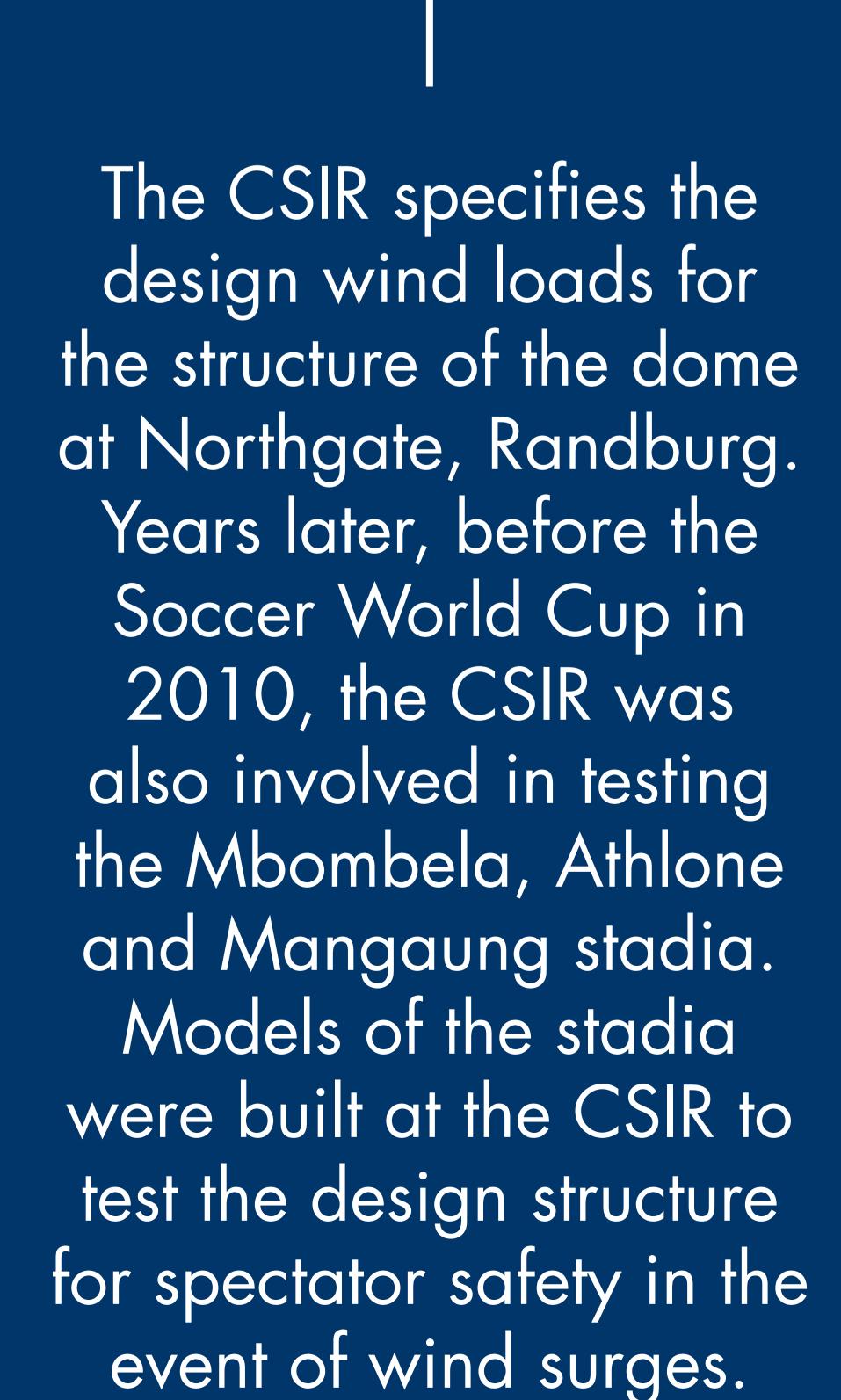
CSIR biomaterials research leads to the invention and development of the bollard, an implantable expanding rivet used in conjunction with a prosthetic ligament for repair of cruciate ligaments in the knee. More than 60 000 devices were sold over three decades.



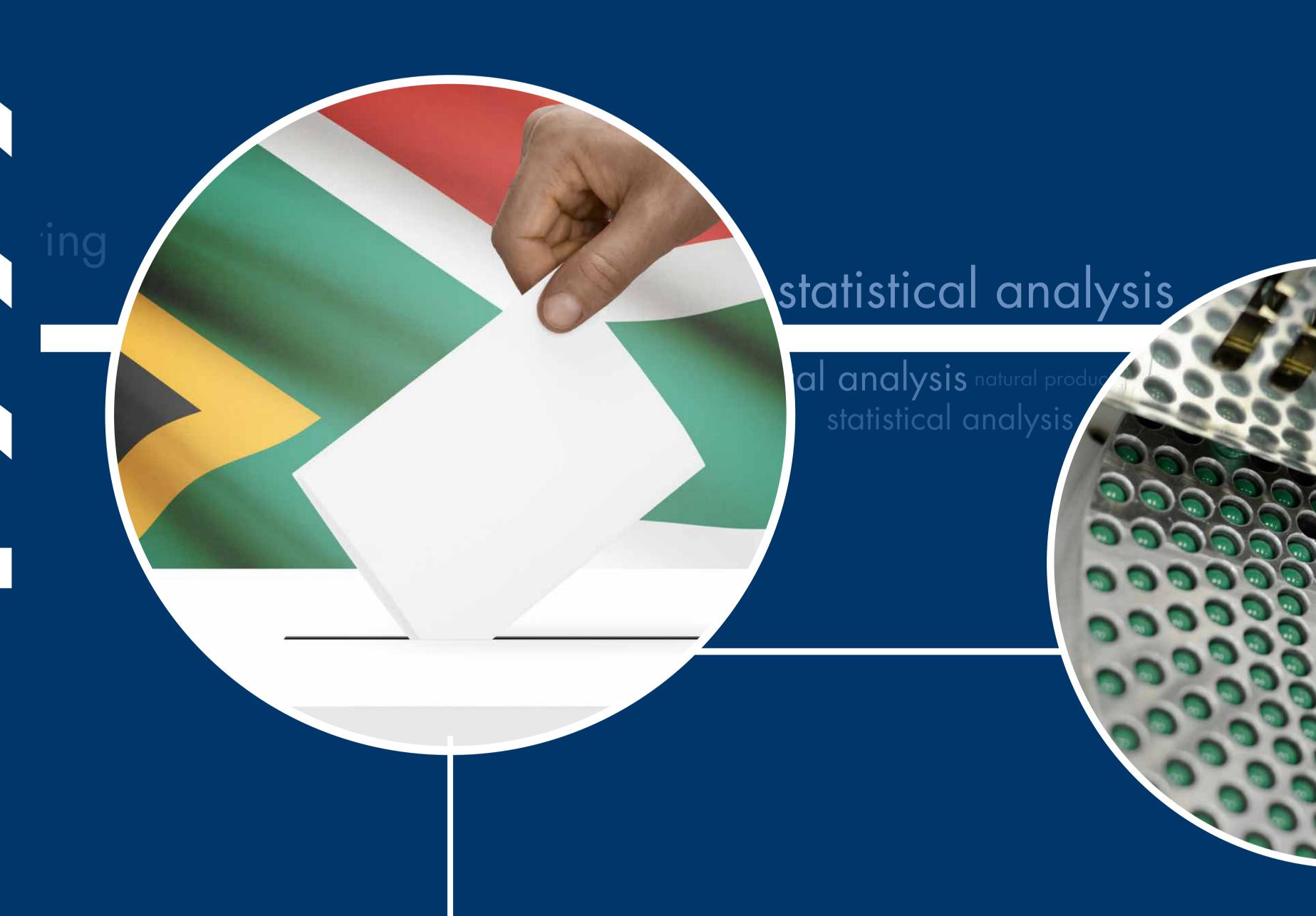
The construction of a medium-speed windtunnel expands the CSIR's aerodynamics research capability. Today, the CSIR's wind tunnels continue to be used in aerodynamic design tests and studies for local and international entities in the aeronautical sector.



The CSIR's online services, including Worldnet Africa and CompuServe, are sold to MIH Limited, to form MWEB. It marked the start of commercial Internet services in South Africa. Today, the company continues to take advantage of the demand for connectivity.



A forecasting model is developed to predict the outcome of the national elections, based on early voting results. The model has since been used to predict the results for all the national and local government elections.



The CSIR officially opens its clinical and botanical supplies unit. The facility is key in scientific studies that aim to add value to South Africa's rich biodiversity and indigenous knowledge. It helps bridge the gap between laboratory research and clinical trials through the production of pharmaceutical grade herbal products.

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## CSIR THROUGH THE YEARS

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The CSIR's water-soluble polymer gel technology is licenced to create innovative, cryogel eye treatment pads, called Eyeslices. The company raked in numerous awards, including a Technology Top 100 Award in 2007 and continues to do business

around the world.

The CSIR achieves

a world first in the

development of

techniques to genetically

engineer pearl millet,

with the technology

being applied as the

first stage in a process

to introduce downy

mildew resistance in

millet.



A benefit-sharing agreement is signed between the CSIR and owners of indigenous knowledge, leading to the development of a locally produced mosquito repellent candle using the oils of indigenous plants. A licensing agreement with Zollhaus International (Pty) Ltd later resulted in the candles being sold by major retailers in South Africa.



The CSIR develops the Advanced Fire Information System (AFIS), which uses satellite data to detect fires in real time and automatically sends warnings directly to users via cell phones and tablets. AFIS has since been adopted by Eskom, as well as local and international conservation and fire prevention and management organisations in Argentina, Portugal and across southern Africa.



The Centre for High Performance Computing is launched, affording local researchers the advantage of using massive computing power in their quest for new knowledge and application. In 2015, the centre provided a dedicated computing cluster to help the European Organization for Nuclear Research, CERN, with two particle detector experiments.



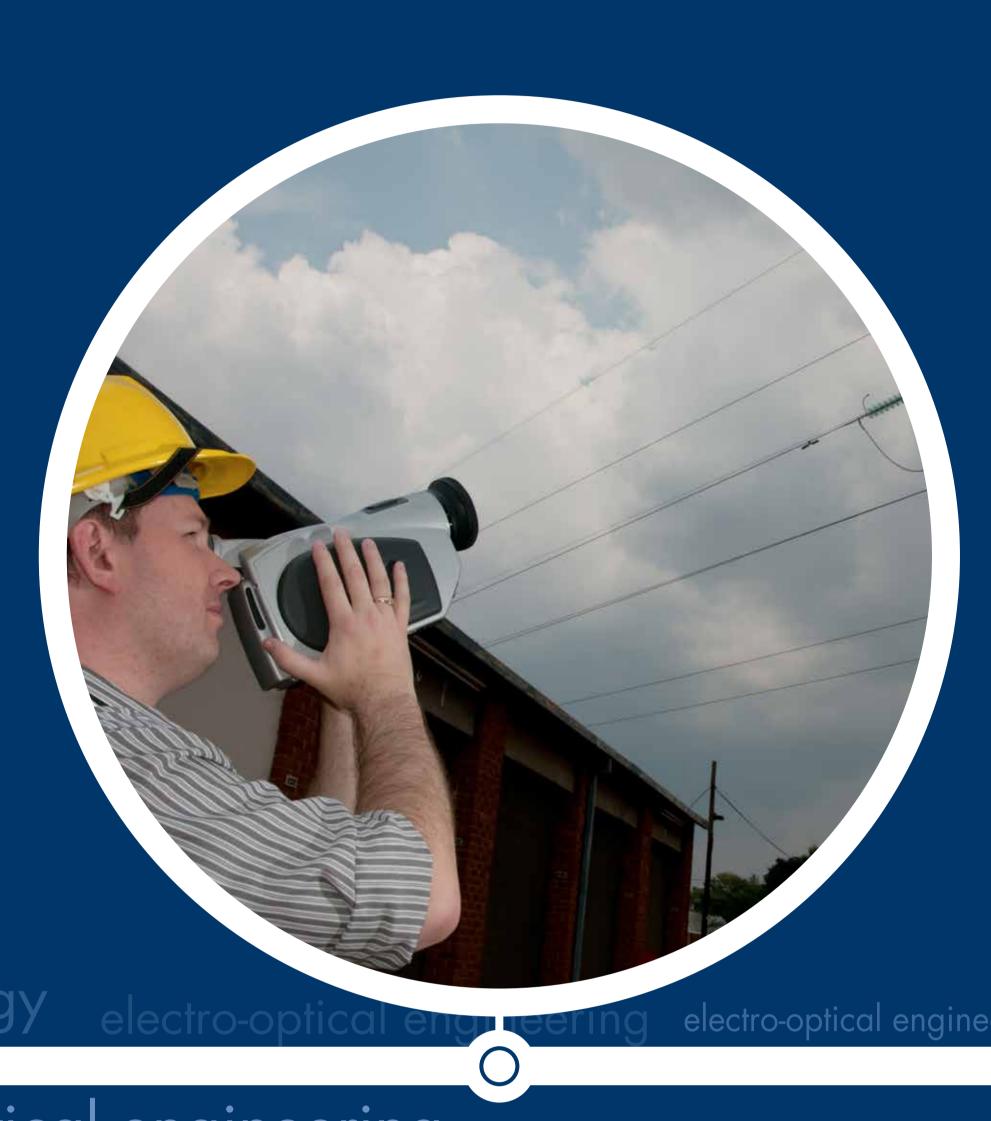
ten years later, a scale-up

facility would follow for the

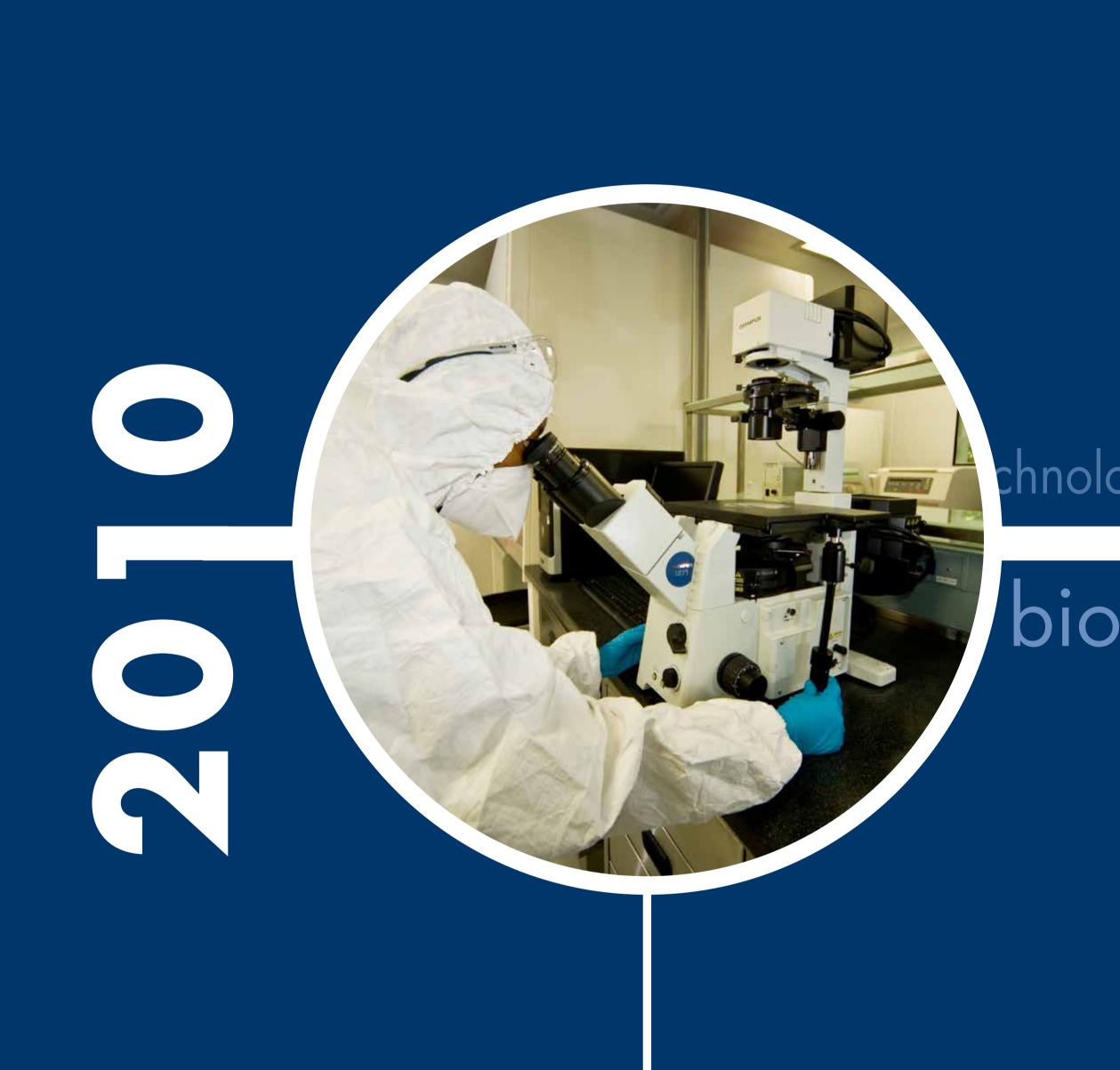
testing of nanomaterials on

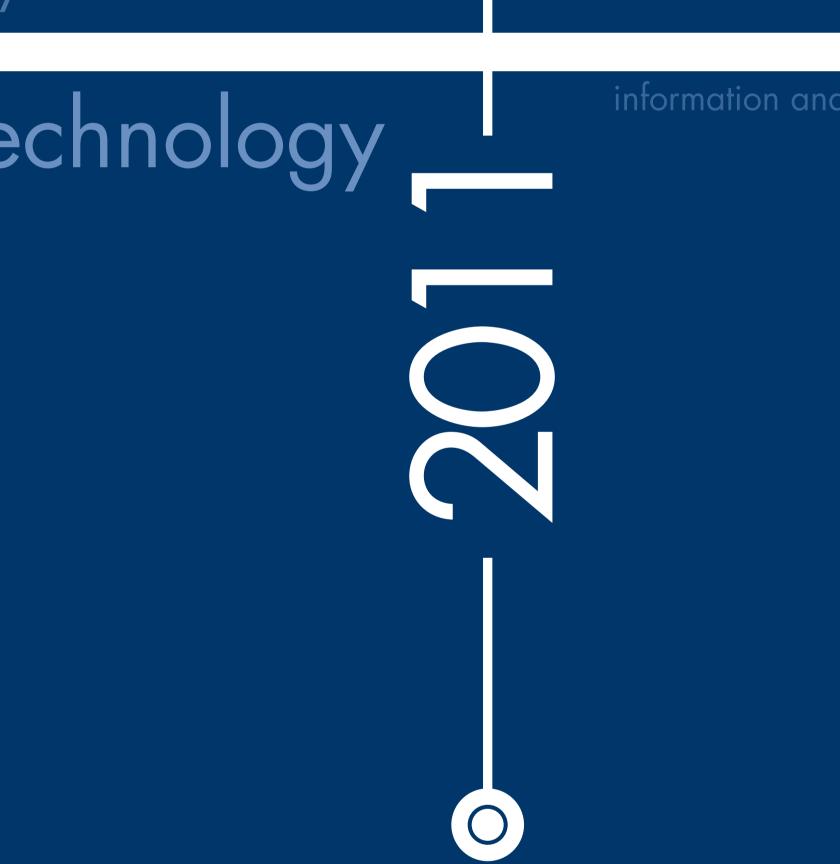
an industrial scale.

A range of cameras, which visually displays the corona discharge around a defective, high-voltage electrical installation, is licenced to UViRCO Technologies. The company goes on to capture some 50% of the world market and export high-tech camera inspection systems to 40 countries.



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The CSIR unveils The CSIR-developed its state-of-the-art Digital Doorway, a containment level computer terminal 3 laboratory for equipped with experiments involving educational games and HIV and TB pathogens. applications, design It enables researchers tunctions and access to to conduct research and the Internet, is named proof-of-concept studies one of the Top 50 for new HIV/Aids inventions in the world' and TB diagnostics or by Time Magazine. therapeutics.

A Eucalyptus clone developed by the CSIR and its collaborators is awarded the First Plant Breeders' Rights for Eucalyptus locally. New tree breeds with better pulping properties will help counter predicted shortfalls in the supply of wood.

The CSIR licenses its patented rubber mouthpiece, used in self-contained self-rescue breathing apparatus, to Afrox. These rescuers supply mine workers with oxygen during emergencies such as fires or explosions underground. Earlier, the CSIR also redesigned a nose clip that was distributed globally, with over half a million units sold worldwide.

The CSIR makes a breakthrough in biomedical stem cell technology by generating the first induced pluripotent stem cells in Africa. Scientists use these cells to study the interactions between pathogens and specific cell types in the context of African genetics.

The launch of a titanium pilot plant follows the development of a novel, CSIR-patented process to produce primary titanium metal. While South Africa has large reserves of titanium-bearing minerals, the ability to economically extract the mineral from the mineral concentrate, using the CSIR process, will help create a new downstream industry.

The CSIR and its collaborators show how 'gene-kissing' impacts gene activation, shedding light on how genes change from inactive to active states, and how different genes can coordinate their activity simultaneously. The research is published in the prestigious journal,



CSIR laser scientists demonstrate a digital laser that offers a method of controlling and altering the beam of a laser from within the unit. Traditionally, beams are altered as they leave the laser, or via a costly refit.

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To help combat rhino poaching, the South African National Parks takes a joint control centre in the Kruger National Park into use. A CSIR-developed tool for improved surveillance, called CMore, is used to provide intelligence to decision-makers. It integrates and processes data from different sensors and

communication devices.

Three CSIR-developed biotechnologies start their commercial journey. Persomics is founded and markets technology for the miniaturisation of genomics experiments that make it possible to investigate cells faster than previous possible. Resyn<sup>TM</sup> Biosciences offers products based on improved microsphere technology, targeting the life sciences research and development market. OptimusBio develops environmentally friendly products for the treatment of wastewater, aquaculture and agriculture.

To accelerate the translation of biotechnology research and development into market-ready products, a Biomanufacturing Industry Development Centre is established at the CSIR. The centre provides product and process development support to South African small- and medium-sized enterprises that intend to produce biologicals for industrial, veterinary and human applications.

Researchers demonstrate a large 3D printer for titanium parts, an advancement in additive manufacturing that is needed to manufacture parts for the aerospace industry. The printer is set to produce large, complex metal parts and large volumes of smaller parts for the aeronautical engineering and manufacturing industries.

Hydrogen research infrastructure that forms part of the Hydrogen South Africa (HySA) initiative is launched at the CSIR. The facilities pave the way for researchers to find a way to more easily store hydrogen, at ambient temperatures and without too much added weight or cost. Hydrogen has great potential as a clean energy alternative to fossil fuels.

CSIR researchers create the first highresolution, locally calibrated national map of woody cover for South Africa using satellite-based synthetic aperture radar (SAR) mapping with existing light detection and ranging (LIDAR) datasets derived from airborne surveys. It is valuable to manage forests, monitor biodiversity and plan clearing of alien plants.

The CSIR installed its first solar photovoltaic (PV) power plant at its Pretoria campus as part of investigations into technologies and policies to support the increased use of renewable energy in South Africa and to study aspects of distributed energy generation. It follows the earlier formation of the CSIR Energy Centre. It also marks the start of the journey to a carbon-neutral campus.