

PIONEERS

IN THE HEALTH TECH INDUSTRY

A CITY LEADING THE WAY

Cape Town and the
Western Cape is
the health tech hub
of Africa

Prof Glenda Gray
on local excellence

SA's own
mRNA vaccine hub

A world-first:
Cracking the code
of long COVID

Innovators leading
the fight against
the pandemic

WC universities
fostering innovation

Trailblazers

Prof Ntobeko Ntusi
Prof Maritha Kotze
Prof Anthea Rhoda

15

GROUNDBREAKING
HEALTH TECH COMPANIES

EDITION 5

+
Much more

Preface

In this, the fifth edition of *Pioneers*, we are celebrating trailblazers in the health tech industry in Cape Town and the Western Cape. The province is home to cutting-edge tech innovators, globally renowned thought leaders, and a collaborative, dynamic industry that has positioned it among the most celebrated health tech hubs in the world.

The health tech industry, which has always been a vital part of the local economy, was certainly thrust into the spotlight over the past two years, with the COVID-19 pandemic forcing the world to acknowledge the need for a vibrant, co-ordinated sector, capable of not only operating at a local level, but also as part of a globally responsive community.

In Cape Town and the Western Cape, the local industry again showed itself to be a global powerhouse in health tech, with local experts and companies driving a passionate, collaborative and innovative response to the pandemic. The local industry again proved why it is so highly regarded, as experts in a number of specialised fields used their combined knowledge to spearhead the fight, with groundbreaking discoveries that have been utilised globally.

In this edition, we have paid special attention to just some of these players, profiling the incredible work being done by Afrigen and Biovac in setting up the mRNA vaccine technology transfer hub in Cape Town, highlighting the groundbreaking, world-first discovery by Stellenbosch University's Prof Resia Pretorius and her team regarding long COVID, and featuring an in-depth interview with the president of the South African Medical Research Council, Prof Glenda Gray, who provides key insights into local responses to the pandemic and how it weighed up globally.

These features are testimony to the wealth of knowledge in Cape Town and the Western Cape's health tech industry, with the province also boasting top-notch universities, and state-of-the-art services to the life science and biotech communities in South Africa.

The world-class academic institutions based in the province are, of course, one of the lynchpins of the Western Cape health sector. The University of Cape Town, Stellenbosch University, University of the Western Cape and the Cape Peninsula University of Technology directly drive innovation in the local sector through their health science divisions, with direct links to the province's healthcare system via the academic hospitals as well.

Importantly, these universities play a vital role as incubators of innovation and excellence, playing a massive part in linking groundbreaking research to investors and guiding innovators on their journey from idea to pre-seed and beyond. They do this through their technology transfer offices, and all boast incredible success stories across the health tech ecosystem, both locally and internationally – another exciting space that we cover in this edition.

The Western Cape also hosts one of the highest concentrations of medical device and healthcare companies, research institutes and research groups in the country. South Africa is the only SADC member state that meets the World Health Organization's Good Manufacturing Practice standards.

From world-class digital health companies to businesses delivering cutting-edge medical devices, we profile some of the very best in the sector, with the likes of Biocode and BioCertica, Strove, NOOSi Health and LIQID Medical just some of the companies ensuring the local health tech industry continues to compete globally.

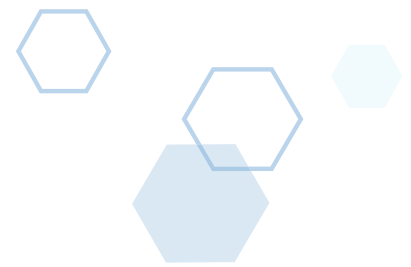
The successes and groundbreaking work featured in this edition of *Pioneers* are just some of the reasons why the Western Cape is considered to be Africa's tech capital.



Want to be featured in *Pioneers*? Email Jean Scheltema, Chief Marketing and Communications Officer of Wesgro, at Jean@wesgro.co.za.

Contents

Afrigen: Putting the Western Cape on the global biotech map	4
Biovac: Vaccines for Africa	6
Prof Glenda Gray: Addicted to the power of science	8
Prof Resia Pretorius: A world-first discovery	10
Prof Ntobeko Ntusi: On a mission to improve lives	12
Prof Maritha Kotze: Pioneering molecular genetics	13
Prof Anthea Rhoda: “We have a role in social innovation”	14
Impulse Biomedical: African solutions for global problems	16
South Africa Makes: 3D-printed medical devices for Africa	18
Scientia Products: Holistic health interventions	20
BioCertica: Unlocking your DNA for a healthier life	22
Biocode: Red-flag rapid test for early disease detection	24
InnoHealth Group: At the forefront of digital healthcare	26
LIQID Medical: Sight-saving ocular implants	28
LRS Implants: A leader in additive manufacturing of orthopaedic implants	31
Medical Diagnostech: High-quality rapid diagnostic test kits	34
NOOSi Health: Connecting nurses and at-home patients	36
Strove: Healthier people. Stronger businesses	38
The Health Hopper: Making quality medicine accessible	40
Western Cape universities: Incubators of innovation and excellence	42



Putting the Western Cape on the global biotech map



Founded in 2014 by the US Infectious Disease Research Institute, Afrigen focuses on product development, bulk adjuvant manufacturing, the supply and distribution of key biologicals – and since recently, mRNA vaccine research and development.

Based in the Western Cape, Afrigen is a significant player in the country's biotechnology ecosystem – but it is their work in bringing together the mRNA hub in Cape Town that has garnered such huge interest over the past year. The mRNA Vaccine Hub for Africa is an mRNA vaccine technology transfer hub that brings together Afrigen, Biovac (read more about them on page 6), and the South African Medical Research Council.

"We saw synergies between Afrigen and Biovac, and of course, the Medical Research Council – and we saw an opportunity for South Africa," explains Afrigen Managing Director Prof Petro Terblanche. The result was a proposal presented to

the World Health Organization (WHO), and Prof Terblanche believes it was the strength of the offering that saw it being given the green light.

"Firstly, Afrigen has a history of technology transfer in the vaccine space. Secondly, our platforms are formulation platforms. mRNA formulation is quite a challenge, so the WHO realised there's a knowledge base that would be valuable.

"Thirdly, Afrigen had just completed the facility, which is very suitable for mRNA clinical trials. Fourthly, Biovac was involved, so there was already a commercial partner that could take the vaccine and fast-track it to market.

"And fifthly, the South African Medical Research Council, as the research and development partner, brought the long-term sustainability element to the plan of action. So it really was a dream proposal."

The collaboration of all the stakeholders ensured this big win for South Africa. "The Western Cape is known for its biotech strength, capacity and capability," says Prof Terblanche, "so I think it all just came together very nicely for us."

Strong vaccine value chain

The vaccine value chain is one of the most complex, and while Afrigen sits in the design and development space,



Prof Terblanche is all too aware of how important collaboration is to ensure the value chain stays strong – and sustainable.

Beginning at the acquisition of highly specialised biological and chemical raw materials, the value chain moves into research and development, all the way through to production and distribution.

“All vaccines are cold-chain, but for the mRNA, you go to minus 20, which is quite challenging,” says Prof Terblanche. “Then you have raw materials, packaging, consumables, the syringes, the last mile, the logistics, and highly specialised manufacturing, so the ecosystem you bring together comprises complex processes – biological and chemical processes. And it is a highly regulated industry.”

The offshoots of this value chain are huge for the local ecosystem. “You have highly skilled workers,” Prof Terblanche explains. “And to sustain a value chain for vaccine manufacturing on the continent, you also need to feed it with R&D and skills development continuously. So it is a beautiful network web that straddles many disciplines and sectors.”

Biotechs rule the world

While the hub is still relatively new, the players are already driving positive change. By design, it is first and foremost about platform development, not product development. “We are building a platform that will allow us to do vaccine research and development, to design new vaccine candidates, and to take them through clinical development, and then transfer this to Biovac,” says Prof Terblanche.

She adds that the strength of the Western Cape biotech industry certainly helps. “When the founders of this company had to make a call on where to base it, everybody was up in Gauteng. Central to the discussion was that we needed to go to the place with the best facilities, the best skills, and the best universities in biotech. At that time, Biovac was also

a consideration because we had already partnered with them on the TB vaccine.

“The Western Cape offers that ecosystem. Just look at the capabilities of universities here – from sequencing right through to process development, with Biovac in manufacturing and Afrigen providing the GMP clinical trial facilities and the R&D labs to do vaccine discovery. Combined with the University of Cape Town, the University of the Western Cape and Stellenbosch University, you have all the disciplines and world-class facilities.”

It’s a huge positive for South Africa that this platform is being built, but there are more big moves coming. Afrigen recently signed an agreement with European companies Univercells, one of the world’s leading biotech companies, and mRNA specialist eTheRNA. Collectively they will tackle two major challenges that have hampered the roll-out of COVID-19 vaccines in Africa and other low- and middle-income countries: lack of local cost-effective production, and the need for cold or supercold chains.

“This agreement will actually allow us to make an mRNA vaccine that’s stable at four degrees. That is the dream that will revolutionise the cold chain requirements, and it’s something that is very much needed in low- and middle-income countries.

“The small biotech companies are coming together globally, and you know that biotechs rule this world,” Prof Terblanche laughs. “Big pharma picks up from the biotech companies – it takes the tech from the biotech, it takes the people from the biotech. So the biotechs are coming together now and saying: ‘Let’s work together.’ It’s really quite profound.”

Collaboration with the NIAID

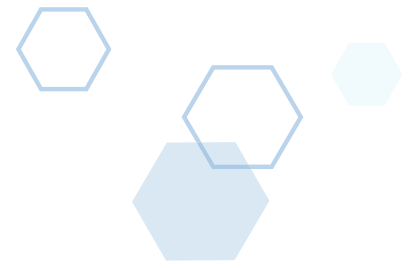
Also in the pipeline is the long-term research collaboration between Afrigen and the National Institute of Allergy and Infectious Diseases (NIAID) – part of the National Institutes of Health in the

United States. This collaboration will enable an exchange of scientific expertise that may be used to develop mRNA vaccines. The NIAID Vaccine Research Center has considerable experience in DNA production and mRNA vaccines. This sharing of technical skills and materials will expedite Afrigen’s goal of mRNA vaccine production and help the Vaccine Research Center to establish processes to make investigational mRNA vaccine products for early-stage clinical trials.

“We needed to go to the place with the best facilities, the best skills, and the best universities in biotech. The Western Cape offers that ecosystem.”

Prof Terblanche points out that this will allow for a close working relationship with the people who designed the mRNA vaccine, “the fathers of the modified mRNA vaccine”, such as the former Deputy Director of the NIAID Vaccine Research Center, Dr Barney Graham.

“We have the foremost health research entity in the world preparing to partner with Afrigen, and with our hub. It’s a hugely exciting collaboration,” Prof Terblanche concludes.



Vaccines for Africa



Biovac was established to manufacture vaccines in South Africa for Africa. The COVID-19 pandemic thrust the company into the public eye once again with its involvement in the fight to not only secure vaccines, but also help set up the country as a global producer.

Biovac's involvement in South Africa's response to COVID-19 was multifaceted. The company was contracted not only by the Department of Health to distribute all the vaccines they secured, but also by Pfizer to manufacture their COVID-19 vaccine – for South Africa as well as other African Union member states. "Biovac was the first company that Pfizer contracted to manufacture its vaccine in the developing world," remarks Biovac CEO Dr Morena Makhoana.

As one of only five vaccine manufacturers on the continent, Biovac is also involved in the mRNA Vaccine Hub for Africa, launched by the World Health Organization in July 2021. The objective of this mRNA vaccine technology transfer hub

is to build capacity in low- and middle-income countries to produce mRNA vaccines through this centre of excellence and training. The hub is located at Afrigen in Cape Town, and will work with a network of technology recipients in low- and middle-income countries.

Afrigen is kick-starting the project and at some point, the baton will be passed to Biovac. "It's important for South Africa, for Biovac, and everybody else, to go through the development value chain, because it's one thing getting a ready-made bicycle, but it's another to assemble a bicycle," says Dr Makhoana.

Biovac will be involved in the upstream activities of the mRNA hub, the manufacturing, which sits in the middle, and then the distribution, which constitutes the downstream of the value chain.

Dr Makhoana explains that the intention was for Biovac to get involved in as many facets as possible to ensure that their capabilities move beyond simply combatting the COVID-19 pandemic. With mRNA technology still very new, understanding it, and its myriad of capabilities, is crucial for the production of future vaccines.

"It's an important technology to get our hands on and learn as quickly as possible," he says. "For us, it's a real platform to develop other things. The technology has been proven effective, so we want to go deep into it."



Positioned as an international player

When Biovac entered into an agreement with Pfizer to manufacture their vaccine, it was a landmark due to the scope of the agreement, allowing for far greater reach outside South Africa. "This is very important – the ability to export and export significantly," says Dr Makhoana.

"Once the Hub's product is available – which will be within the next two years – the world will be our oyster. We won't be limited to Africa – we can send the product wherever it needs to go."

That has always been Biovac's aim, explains Dr Makhoana: to be home-grown and home-based, but for their products to go far and wide. "Our ability to export also means we have to meet the regulatory and technology standards globally, which positions us as an international player.

"It takes a long time to convince the world that South Africa can be serious players in the market, and what we are doing – what Afrigen is doing – will silence the sceptics, but more importantly, will convert those who have been sitting on the fence. So, when people want to set up a biotech company, they will look to Cape Town and the Western Cape. Prior to the pandemic, we were there, but now, I think, we are really there."

Biovac's role in the value chain has always been around product development, and Dr Makhoana says that the health tech ecosystem in Cape Town and the Western Cape has played a large part in ensuring the company always has people with the necessary skills.

"I am very happy to say that we have never been found wanting in terms of skills. We do, however, need time to convert the people to operate in our space. This conversion and time we spend on it, I think, is partly why we have been able to lure investors, because our people have really shone."

Partnerships, of course, are hugely important to ensure the industry continues to grow locally, while the local environment, in terms of both logistics and aesthetics, continues to establish the province as a global player.

"I cannot over-emphasise how important this is," says Dr Makhoana. "If you look at places like Silicon Valley, where there is a lot of venture capital available, you can essentially say 'I'm okay'. But we know that that's not the case here. The only way to get things going is to bring all the necessary things together, and they all have to be synchronised.

"Investors look at a number of things, including just being in Cape Town – seeing Table Mountain and the sunset over the ocean. People cannot wait to come down to us! So it goes from the technical things to just being in the Western Cape, and everything in between. It's all of those bubbles that need to work together in synchronicity."

However, Dr Makhoana warns that to take advantage of the current focus on vaccine manufacturing, the industry, and all its stakeholders, need to act fast.

"We need to sustain international attention. We need the highest regulations, but also an ease to use them – we do not want to get stuck in red tape.

expanded facilities and are aiming to grow to become a sophisticated, global manufacturer," says Dr Makhoana.

"We need to be a larger player and our facilities need to equal any in the world. This will not only require new buildings, but technology as well.



The local environment, in terms of both logistics and aesthetics, continues to establish the province as a global player.

If investors see that the regulatory framework is okay, that the network is running smoothly, we can take advantage of the opportunity we find ourselves in."

Biovac is firmly focused on future growth, in terms of both people and assets. "We are raising funding for new and

"We are aiming to get more export-driven projects and looking at growing by an additional 300 people, and by 2025, '26, we will have around 800 people working for us if all our plans come to fruition."

The future, for both Biovac and the industry, certainly looks bright.



Addicted to the power of science

Prof Glenda Gray, President of the South African Medical Research Council since 2014, has spent the better part of two decades searching for an HIV vaccine, and was appointed to the government's Medical Advisory Committee when COVID-19 hit the country's shores. Recognised as one of the 100 Most Influential People by *Time* in 2017, she believes South African scientists are main players on the global health stage.

South African-born Prof Glenda Gray began her career as a paediatrician at Baragwanath Hospital in Soweto in 1993, but the prevalence of HIV among the children being admitted compelled her to start doing research on how to prevent mother-to-child transmission. That initial research led to her shifting her focus to HIV medicine full-time after she became "addicted to the power of science".

"I realised that the data we were generating – even in Soweto – could change policy practice and the outcomes of children – not only in South Africa, but globally. And the kind of work we did in clinical research on HIV really did transform policy at a global level," Prof Gray says of those early years.

While her focus has since largely been on finding a vaccine for HIV, her attention shifted drastically with the onset of COVID-19. She believes that all the work that had been done on HIV, as well as on TB, helped the country to quickly pivot to dealing with the pandemic.

"We were doing genomic research looking at resistance in HIV and TB, and we had created laboratories looking at neutralisation immunogenicity, so we had a great infrastructure for clinical research," says Prof Gray.

With 40 clinical trial sites in South Africa, the local responders could immediately turn their attention to COVID. Prof Gray's role



as president of the South African Medical Research Council (SAMRC) also meant money could be freed up for COVID research, diagnostics, genomic research and vaccine support. "So just by already having done that research in health, HIV and TB, South Africa became a global player in COVID, and our scientists are now giving advice to governments all over the world on a regular basis."

"You need to make magic while you can."

Governments around the globe were heavily criticised for their response to the pandemic, and it was no different in South Africa, but while Prof Gray admits that mistakes were made, she maintains that "hindsight has always been an exact science".

Scientists pivoting expertise

So what about the next pandemic? Are we prepared?

"We have to be prepared," says Prof Gray. "We have to invest money in the relevant systems. But what often happens between crises is that you divert money from what could happen in the future to what is happening now. And you can't criticise poor countries for that, because investing in something that may happen in ten years' time as opposed to dealing with, for instance, a water shortage in a drought now, is not feasible.

"It's all about resources," she explains. "Current problems will always take precedence, and until we have more resources, that's going to continue happening."

However, she is quick to point to South Africa's proficiency in genomic

surveillance, and the implementation of wastewater surveillance to look for COVID-19. "Hopefully with the surveillance that's in place and the scientists we have in the country, and with the commitment to manufacturing, we will be in a great position in the future.

"What excites me is just how smart and clever our scientists are, how well they can pivot their expertise," she adds. "They're so well grounded, so well trained. People who were doing work in TB resistance, and those who were working in neutralisation in HIV, were all able to shift to COVID research. Their ability to adapt is really incredible.

"There are also a lot of people we can capacitate – unemployed graduates we could train in the manufacturing ecosystem, and people who could repurpose their careers. We have great scientists who can support them, and also a laboratory infrastructure that can be pivoted. South Africa is very nimble," she enthuses.

Making a difference

Prof Gray believes it is ultimately this ability of local scientists that will continue to drive investment in the local health technology sector – investments such as those of South African-born bioscientist and businessman Dr Patrick Soon-Shiong, and NantSA.

"The opportunity in South Africa is that you've got the disease burden, and you've got the potential capability to respond. That is something that excites potential collaborators and partner scientists. Everyone gets excited about working with South Africa, because there's so much to do, and you can do so much good if you find the TB vaccine and HIV vaccine, or start making vaccines for the whole of Africa.

"People want to see Africa as a success. They believe in South Africa, and in Africa, and we have an answer. I believe they

love the unbridled competitiveness and collegiality, and the willingness of our scientists to collaborate with and learn from others."

Prof Gray adds that public-private partnerships are essential for investment to continue. "If you want to invest in a country, you want to invest in one where the government itself is willing to put its money where its mouth is, and that's where South Africa is willing. That gives investors confidence, because without government money it'll never be sustainable."

"South Africa became a global player in COVID, and our scientists are now giving advice to governments all over the world."

Meanwhile, Prof Gray's future is linked to her past – in science.

"Obviously, I'll always be a scientist. I could never give that up. The SAMRC job doesn't last forever – you only get five years at a time – and you need to make magic while you can," she says.

"It is an honour being able to create opportunities for everybody else. But when I finish this job, I'm going to go back to science, because what gets me up in the morning is knowing that I am making a difference, and that I am working with other people who are making a difference."



A world-first discovery

Prof Resia Pretorius is Head of the Physiological Sciences Department at Stellenbosch University, a director of Biocode Technologies and a member of the Royal Society of South Africa. She is also the scientist who made a finding that gripped the attention of the health sector across the world.



In late 2020, reports began emerging from around the globe of the persistence of debilitating COVID-19 symptoms. Later termed “long COVID”, it is now estimated that close to 100 million people are suffering from the long-term after-effects of the disease.

Initially, many of these patients were not diagnosed with COVID, despite presenting with symptoms of the disease, but groundbreaking research by Prof Resia Pretorius led to a world-first discovery: There is significant microclot formation in the blood of both acute COVID-19 and long COVID patients.

Prof Pretorius has been working in the fields of blood clotting and inflammation since the early 2000s, and in 2020, clinical collaborators requested that she look at blood samples of acute COVID patients – which is what led to the discovery.

At that point, COVID was still seen as a pneumonia-type disease – a condition that was primarily attacking the lungs – but after looking at the blood samples, Prof Pretorius realised that clotting was present in all those patients.

As the year progressed, numerous papers, including those published locally, showed that people suffering from acute COVID were also suffering from a cardiovascular-type condition.

As reports of long COVID began emerging later that year, Prof Pretorius and her team began looking at blood samples of people with this syndrome. They were not only looking for microclots in the blood, but also systemic inflammation levels. What they discovered was that trapped inside the clots were inflammatory molecules, which were also preventing the breakdown of the clots.

The method the team used revealed that the presence of microclots in the circulation could be one of the diagnostics for long COVID. The method has since been patented and published, and is currently being standardised and validated so that it can be implemented in pathology laboratories worldwide.

The method is currently being standardised and validated so that it can be implemented in pathology laboratories worldwide.

“Currently, all diagnosis methods that a clinician would typically use may show that patients are within healthy levels. The reason we think that is the case is because all the inflammatory molecules that make the patients so sick are not in the soluble part of the plasma, or the soluble part of the blood, for that matter, that a typical pathology would test,” explains Prof Pretorius.

“But numerous inflammatory molecules are actually trapped inside these insoluble microclots, and this will perpetuate inflammation, resulting in a patient that will be inflammatory without any marker at a typical pathology laboratory.”

The result of local expertise and innovation, this was a massive finding, and it has led to negotiations to set up a personalised precision laboratory in South Africa. In addition, a licence agreement with Germany has already been signed for the method to be used there, while a licence agreement with the United States is in the process of being signed.

This is yet another example of how local experts are leading the way in the global health technology sector.



On a mission to improve lives

As the chair and head of the Department of Medicine at the University of Cape Town and Groote Schuur Hospital, Prof Ntobeko Ntusi is guiding global research in cardiology and medical sciences.

The University of Cape Town's Department of Medicine houses 18 divisions and 10 specialised research units with worldwide collaborative teams. Among its achievements is the contribution of the microbiology and biotechnology faculties to the development of the Centre for Proteomic and Genomic Research, which has partnered with global initiatives to lead the way in DNA sequencing in South Africa. The chemistry department has also established a footprint in tropical disease drug discovery and development.

As a tertiary institution, the university is therefore not only a global leader, but also plays a pivotal role in the local health tech ecosystem – both as a driver of innovation and a centre of excellence, training some of the leading minds in the health and sciences industries.

Heading the Department of Medicine, Prof Ntobeko Ntusi has contributed to improved understanding of cardiomyopathy, inflammatory heart disease and heart failure in South Africa and globally through his research. His extensive multidisciplinary experience also guides postgraduate students through their own studies and trials.

Although Prof Ntusi specialises in cardiology, his group has developed an interest in the clinical epidemiology and immunology of COVID-19 from SARS-CoV-2 infection. His holistic approach to specialised subjects provides further insight into research that impacts both local and international communities, fulfilling his mission to improve the lives of patients and their families.

Having leaders like Prof Ntusi, who provide inspiration for their students and colleagues, passes the baton of hope and innovation in South Africa, further improving the field and the quality of research as a whole.

The future of health technology is not just imagined, but created in the Western Cape.

Prof Ntusi's impact on the medical community has been acknowledged through multiple awards of scientific excellence from bodies such as the British Royal College of Physicians, the Royal Society of South Africa, the Academy of Science of South Africa and the South African Medical Research Council.

Under his guidance, the Department of Medicine continues to grow as a leader in the field, driving innovation, thought leadership and ethical practices, all while contributing significantly to the local, national and international health tech industry.

Scan the QR code to find out why the future of health technology is not just imagined, but created in the Western Cape.





Pioneering molecular genetics

Human geneticist Prof Maritha Kotze is a leader in gene sequencing, analytics and research translation. In 2020, the International Consortium for Personalised Medicine acknowledged her pathology-supported genetic testing framework as best practice. Motivated by the talent in the Western Cape, she reinvests her knowledge and time locally.

With over 150 peer-reviewed articles in academic journals and invited book chapters, Prof Maritha Kotze is a dynamic frontrunner in medical research. Her passion for human genetics and academia has served as the foundation of her work across several specialist biomedical disciplines for decades.

Inspired to bridge the gap between laboratory and clinic (knowledge gained through research and its application in practice), she founded Gknowmix in 2007, a global genetic testing service delivery system for the seamless conversion of research into pathology-supported genetic tests.

As a leader in the gene sequencing, analytics, interpretation and communication spaces, Prof Kotze's impact has echoed far and wide.

Since obtaining her PhD in 1990, she was a recipient of the Stellenbosch University Rector's Award for Research Excellence in 1999, received a patent incentive award for Research Innovation in 2005, was recognised by the US Institute for Scientific Information as one of the 20 highest ranking active publishers in the biomedical field in South Africa during the same time, and was appointed as medical scientist at the National Health Laboratory Services at Tygerberg Hospital in 2016. She is also a committee member of the Cape Town Breast Cancer Forum.

In addition to her many qualifications and titles, Prof Kotze is an innovation enabler. Apart from her own research yielding

innovative solutions in the health technology space, her training of others allows them to do the same. Postgraduate student and clinician education is paramount to her vision of making molecular genetics an integral part of everyday medicine.

"The Western Cape health tech ecosystem facilitates innovation in many, many ways."

"The Western Cape health tech ecosystem facilitates innovation in many, many ways. We have everything just in our backyard," says Prof Kotze.

She also relishes life outside the laboratory in the province. "Living in Cape Town and the Western Cape is an absolute joy, and there is no limit to the beauty – or the lifestyle," she says.



Scan the QR code to find out more about Prof Kotze's work, and life, in the Western Cape.



“We have a role in social innovation”

Prof Anthea Rhoda, Dean of the Faculty of Community and Health Sciences at the University of the Western Cape since 2017, is an established researcher in the field of stroke rehabilitation, and a firm believer in interprofessional education.

After two tumultuous years of COVID-19, the spotlight has been firmly placed on the medical industry. This has also served to highlight the significant research developments at the Faculty of Community and Health Sciences at the University of the Western Cape (UWC), led by Prof Anthea Rhoda.

Prof Rhoda studied at the UWC and Stellenbosch University, obtaining her PhD in Physiotherapy in 2010 for her study on the rehabilitation of stroke patients at community health centres in the metropole region of the Western Cape. Renowned for her work in stroke rehabilitation, she also holds a BSc Honours in Physiotherapy (Neurology), an MSc in Medical Sciences (Rehabilitation) and a PhD in Philosophy. She has published extensively on stroke patient outcomes in Africa, and in 2016, received a C2 National Research Foundation rating, recognising her as an established researcher.

Prof Rhoda’s current research involves a self-management programme for individuals recovering from a stroke in the South African context. She is also engaged in research on learning and teaching, and describes her teaching



philosophy as being based in “an authentic learning framework” that emphasises training and the development of skills and knowledge in a real-world setting.

“I always say very proudly that the UWC is one of the very few universities in Africa with a health sciences faculty that is called the Faculty of *Community* and Health Sciences. Community lies very close to my heart, and we engage quite a bit with the community.”

As more and more healthcare providers around the world offer to “see” patients via computer and smartphone, particularly in light of the recent pandemic, there has also been a shift to digital health at UWC, with telemedicine being one of the areas that the institution is particularly interested in.

Working on the understanding that 43% of South Africa’s population live in rural regions with little or no access

to healthcare facilities, the institution is implementing digital health programmes that will facilitate better health outcomes, thereby decreasing the reoccurrence of a stroke. The programme hopes to facilitate increased rehabilitation interventions to contribute to better health and functional outcomes for all, no matter where they are.

“Focusing particularly on promoting physical activity in individuals with strokes, as researchers, our role is to design, co-create and develop the programme and test its effectiveness and efficiency,” says Prof Rhoda.

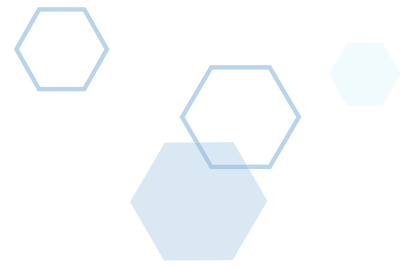
As far as the local health technology ecosystem is concerned, she is unambiguous: “The Western Cape is a good investment opportunity. It is an area that attracts top international researchers to come and partner with us. It is an ideal place for a scientist to come to, because we have the infrastructure to extend their research.”

“The Western Cape is an ideal place for a scientist to come to, because we have the infrastructure to extend their research.”



Scan the QR code to find out more about Prof Rhoda and what the Western Cape has to offer.





African solutions for global problems



Acknowledging unique issues in South Africa, and Africa as a whole, Impulse Biomedical is a multimedical device start-up that develops affordable healthcare technologies for emerging and developing markets.

Driven by a desire to ensure affordable and accessible healthcare, and the frustration that research outputs rarely reach markets, Impulse Biomedical co-founders Gokul Nair and Giancarlo Beukes have developed devices such as the ZiBiPen, the groundbreaking, first local innovation for the treatment of anaphylaxis. This adrenaline auto-injector delivers its dose in the form of a reloadable cartridge – at a fraction of the cost of the dominant device on the market.

The team has also developed the Easy Squeezy, a device that attaches to metered-dose asthma pumps to make it easier to activate the inhaler while suffering an asthma attack.

Impulse Biomedical continues to build on its success, with another round of funding recently secured, and more on the horizon.

“We have managed to secure our largest funding round to date, and we are excited to see more investors, team members and stakeholders joining our journey in making healthcare more affordable and accessible,” says Gokul.

“We have also signed various MOUs and agreements with local pharmaceutical companies and manufacturers, and are moving towards clinical trials in the next few months.”

Gokul and Giancarlo acknowledge that being based in Cape Town and the Western Cape has provided them with a unique mix of business and lifestyle opportunities, allowing



for an enviable base of operations. “It’s incredibly exciting to see how diverse the businesses and companies in Cape Town are,” says Giancarlo of the local health tech ecosystem.

The team is now focused on commercialising their devices internationally, while also looking to expand their product line. “Whatever we develop here, we know will work in the rest of the world,” says Gokul.

Despite their success, Gokul is quick to dismiss the “pioneers” tag.

“It’s important to highlight that there are no real pioneers – it’s a team of people working towards a common goal. It’s the team that’s rethinking medical devices. It’s the team that cares so deeply about making healthcare more affordable that they put in that extra effort to make sure that what they develop is something that will make a difference.”

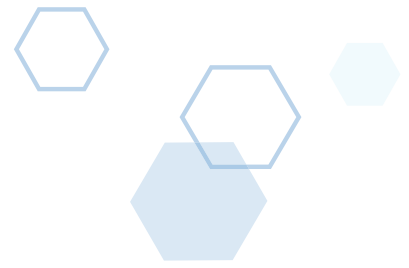
“We aim to help save lives and reduce the impact of illnesses and chronic diseases on daily life.”



Scan the QR code for more information about Impulse Biomedical.



SOUTH AFRICA MAKES



3D-printed point-of-care medical devices for Africa



Dr Cherise Dunn is co-founder and COO of South Africa Makes, a point-of-care medical device manufacturer with an ever-growing portfolio of 3D-printed products produced for the medical, dental and research industries in Africa.

“Growing up in a small town, I remember seeing challenges of children like me, who suffered from things like asthma, thinking, ‘imagine if those clinics’ facilities had the ability to 3D-print medical devices like asthma spacers’. That could really have helped a whole lot of young children to breathe a lot more easily,” Dr Cherise Dunn recalls.

After experiencing the effects of under-resourced clinics first-hand, she was inspired to fix the challenges of future generations by increasing access to higher quality health aid. As a global thought leader in 3D printing for development (3D4D), she is a believer that this Fourth Industrial Revolution technology will drive the future competitiveness of Africa in the global economy – further motivation for her mission to do good through technology.

“Since the pandemic, there is greater utilisation of technology, not only from a staff and patient management point of view, but also from lab, inventory and supply chain management. Technology is being used to improve system efficiencies, helping more patients,” says Dr Dunn.

This futurist approach, along with her academic background in the health sciences, provided the perfect foundation for a biotech start-up – and South Africa Makes was born.



From pre-operation surgical models to prosthetics and asthma spacers, 3D-printed products at the point of care provide sustainable solutions for the unique healthcare challenges faced across the continent.

Apart from attaining her doctorate in cancer research at the University of Cape Town, Dr Dunn's achievements have garnered much recognition, locally and abroad. In 2018, she was recognised by the United States Department of State as one of the leaders in her field in Africa and nominated for their premier cultural programme for female entrepreneurs, International Visitor Leadership Program.

In 2019, she was selected as one of the 50 most inspiring women in science, technology, engineering and mathematics (STEM) in South Africa by InspiringFifty SA, and as one of the top 200 Young South Africans in the category Business & entrepreneurship by the *Mail & Guardian*.

While her impact has been notable, Dr Dunn pays tribute to the support and opportunities found in the Western Cape. The culture of innovation and embedded entrepreneurial spirit, coupled with the multiple incubators and access to expertise across fields, have supported her vision's materialisation. From there, partnerships and collaborations have furthered the company's growth.

From local collaborations to supportive relationships built with international players such as the Kingdom of the Netherlands, Formlabs (a 3D printing technology developer and manufacturer in the US), Autodesk and, more recently, the Harvard University Center for African

3D-printed products provide sustainable solutions for the unique healthcare challenges faced across the continent.



Studies, there is a clear interest in the African health technology sector.

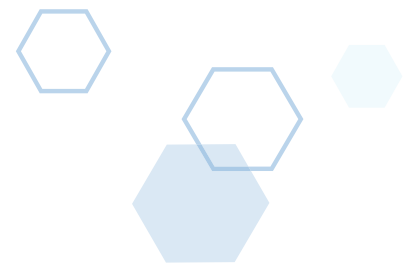
By playing in the global field, this Western Cape-founded company is transforming the biotech space through increased participation of minority groups in technology. It is laying the foundation for future Afrocentric tech start-ups to grow internationally.

"We plan on scaling our operations across the continent and securing further

international partnerships to mentor local talent who need space to develop their skills in this industry," says Dr Dunn.

Scan the QR code to find out more about Dr Dunn and South Africa Makes.





Holistic health interventions



Scientia is a phyto-pharmaceutical spin-out company specialising in natural products that are effective for optimal living to improve people's lives.

The COVID-19 pandemic contributed to a number of changes in the health technology sector, speeding up the development of vital products and highlighting the importance of the industry as a whole. For phytopharmaceutical company Scientia, the need for holistic products was also evident, with their market research

identifying a need for supplements that improve mental health and mood regulation, indicating a market gap.

"Since the start of the pandemic, a large number of people have reported an increase in stress, anxiety and depression," says Scientia CTO Kamano Mochoele. "This resulted in an increased demand for therapies for these psychological conditions, but there has also been an increase in the demand for natural products, as opposed to lab-developed synthetic products."

Based at Stellenbosch University (SU), Scientia has drawn on both the SU's incubator, LaunchLab, and its technology transfer division, Innovus, to help navigate their product development, the first round of funding and the commercialisation of their products. The company has recently secured pre-seed funding



from the University Technology Fund for its launch product, as well as a new anticancer adjuvant.

“Scientia’s business model is unique when compared to that of other phytopharmaceutical companies,” Kamano explains. “The majority of commercially available phytopharmaceutical products are not scientifically tested. Our products are extensively researched and validated, which distinguishes us from our competitors. In addition, our products are locally developed, and the plant materials used are indigenous to South Africa.”

“We also believe in giving back to the community, so we have established collaborations and will continue to work with our benefit-sharing partners – the communities who have contributed their indigenous knowledge to our products.”

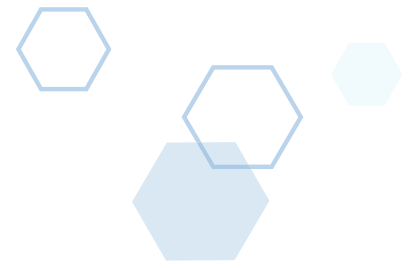
Over the next five years, the company will focus on the release of a mood, stress and anxiety daytime product and an anxiety and sleep night-time product. The team is also committed to further research into phytotherapeutic anticancer adjuvants and the identification of bioactive small molecules responsible for desirable bioactivities.

Conscious of health and wellness as well as the environment, Scientia is set to keep developing sustainable, ecofriendly practices that promote individual well-being.

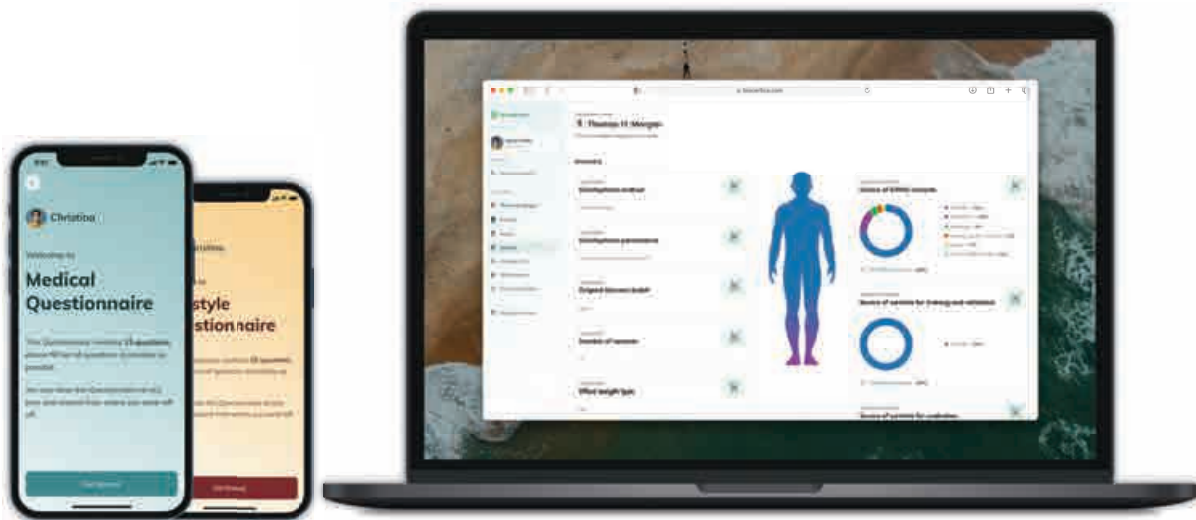
Scan the QR code for more information about Scientia.



“Our products are extensively researched and validated, which distinguishes us from our competitors.”



Unlocking your DNA for a healthier life



Local biotechnology company BioCertica has combined advanced genetic testing with encryption technology to provide their clients with personalised biomedical information that is just a login away.

Unlocking your genetics is far more than mapping your ancestry – it is translating your DNA into actionable results, providing you with information for a healthier, happier life. Knowing what your polygenic risk factors are, for example, can help you make the right decisions about nutrition, skincare and your exercise regime, among many other things. It's the next step in better understanding what makes you you.

BioCertica, based in Paarl in the Western Cape, is the first direct-to-consumer genetics company in Africa to introduce cutting-edge polygenic risk scoring to generate DNA test results. And as a client, you have access to this information through your secure digital bio-identity.

Most providers of this kind of information supply clients with a mountain of information to trawl through. In contrast, BioCertica

provides you with actionable insights via a tech-based platform that lives on your cellphone.

“Our polygenic risk-scoring methodology is one of our biggest selling points,” says BioCertica CEO Gert van Wyk. “The type of information provided at present could be likened to a box TV, with 1-3 snips of information telling you, for example, that you have a vitamin B deficiency. But what we’re doing through our back-end technology is creating a high-resolution focus where we are using 50-150, and sometimes more, of these snips to provide you with an answer. You’re essentially upgrading that box TV to a 4 k smart-TV.”

BioCertica’s in-depth analyses of the test results provide their clients with answers to big questions and, perhaps more importantly, what can be done about any risks.

“Highlighting something like a vitamin B deficiency is good because you can see where you’re lacking in nutrition,” explains BioCertica CPO Arno Smit. “But from a polygenic risk score perspective, you’re getting answers to some of the more burning questions that are really affecting our lives, like are you prone to getting cancer, or Alzheimer’s. It’s very complicated information that we try to unlock into actionable insights.”

This technological advancement will also enable South African healthcare practitioners to gain deeper insight into their patients’ genetics, advancing preventative care and precision medicine.



Seamless cutting-edge technology

A titanic effort was needed to build a genetics company that not only meets international standards, but also has a fully functional digital identity company merged with it. Within the last 18 months, the BioCertica team has not only achieved this, but also created a seamless user journey.

Once a test kit is ordered, there is very little left for the client to do other than wait for it to arrive, register on the system, send back a saliva sample, and then sit back and wait for the results. The whole process is automated on the BioCertica app, and the client is kept updated throughout: when the sample arrives at the lab, when testing begins, and finally, when your results are ready.

But it doesn't stop there. The app offers clients a wealth of knowledge to help them make sense of the results, and should there be a potential red flag, such as cancer or Alzheimer's, there are practical support structures in place to manage it. However, it is key to remember that while your genetics can carry a risk factor, it is not a prognosis.

"If the test highlights a serious disease, you would need to go through our practitioners network," Gert explains. "This is for somebody to sit you down and explain that this is a predisposition: There is a risk – a polygenic risk marker – that you can quantify through your ancestral heritage. For instance, a European-based risk of Alzheimer's is very different from African descent, and it's important to understand this.

"At the end of the day, prevention is better than cure, and knowing you're prone to something means you can act to mitigate it, even if it's just going for a test that you never would have gone for before."

With most companies, you pay for one test, wait 3-4 weeks to get the results back, and if you need a different test, you need to go through it all again. BioCertica

offers their clients a one-sample solution, with which you can instantly unlock other test results, as and when you need to. "Everything is technology-based, so it's stored on your cellphone, and we can provide ongoing services, update results, and the information contained in those results, without additional costs," Gert explains.

Privacy is paramount

The protection of this highly personal information is paramount to BioCertica, which is why they use bank-grade technology to ensure the data cannot be accessed by anybody other than the client.

"Overseas, people are starting to question these genetic companies, with some of the larger players on-selling their databases, and the user has essentially consented to this because they wouldn't have considered this to ever be an issue," Gert explains. "The BioCertica Vault, which is a secure platform where the

to being a company focused on privacy, we need to be a privacy-first company. So not even we have access to it. The key to unlock the data sits with the client, not us."

A hyper-personalised experience

BioCertica has already enjoyed great success, including raising US\$650 000 in a pre-seed round, with an equity partner in Ministry of Programming (MOP), one of the fastest growing companies in Europe.

Much of the future lies in the digital identity side of the business, with, in time, endless possibilities available to their clients. Gert aims to have the BioCertica app linked to partner businesses to allow BioCertica members to choose the best products and/or services based on their genetic make-up.

"Imagine being in a restaurant and able to scan a QR code on the menu so that it highlights which of the meals work for you nutrition-wise according to

BioCertica provides you with actionable insights via a tech-based platform that lives on your cellphone.

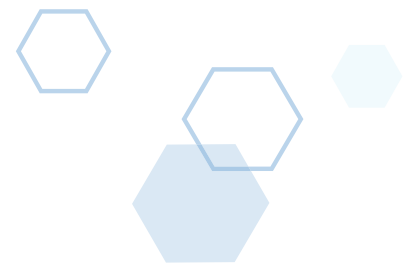
genetic information is stored, puts the control of people's personal data back into their own hands."

The security is so tight that not even BioCertica has access to the information, giving their clients true peace of mind.

"We've built the business in a very secure way, so that even from an internal metrics perspective, we cannot tap into any personal information," Arno explains. "We can identify and understand what the metrics are – how often people are using it, what they are using, what products they are interested in – but it's totally anonymised, because if we want to live up

your genetics," he says. "Or going onto a skincare website and being able to understand which is best for your skin out of the 50-plus products.

"A hyper-personalised experience is what we are working towards," stresses Gert. "That is why we have gone this onerous route of combing your digital ID and genetics. Yes, it is a citizen and ID verification tool, but it's more than that – it creates a hyper-personalised experience on certain sites and in certain places, and you can only do that if you have this bank-encrypted type tech that we use to store your data."



Red-flag rapid test for early disease detection



Stellenbosch University start-up Biocode has developed a rapid test that can detect and monitor inflammation, an underlying issue in all major modern diseases, and is set to shake up how we manage some of modern society's major health threats.

The brainchild of a collaboration between the physiology and electronic engineering departments at Stellenbosch University, Biocode is based in a town that is a hotbed of technology start-ups and a hub of innovation in the health technology sector.

At the beginning of 2020, Biocode received seed funding to develop a product that detects inflammation, which is present during the very early stages of major diseases. They explored different types of technologies before securing Series A funding in 2021, allowing them to move forward with the development of their inflammation rapid test.

While similar to rapid tests for COVID-19 and pregnancy, where the technology allows for mostly qualitative results, Biocode was attempting to create a test that is more quantitative in its findings.

"We are creating a semiquantitative rapid test that will be able to measure your systemic inflammation levels," explains Este Burger, Biocode's operations and product development lead. "The rapid test consists of a small cassette that takes a finger-prick blood sample, and a smartphone app that scans and quantifies the result. The app also provides a platform for tracking and monitoring results."

Biocode's goal is for this rapid test to be used as an affordable screening and monitoring tool for inflammation and inflammatory conditions. Their work is set to make great strides in combatting some of the major modern diseases as the test can act as a "red flag" system to pick up issues early on.

"The reason why we started with a focus on inflammation is because it is such a global issue," says Biocode's lead research and development scientist, Simoné Turner. "It's the underlying issue of all major modern diseases, which kill more than 70% of the global population."



"If you think diabetes, cancer, Alzheimer's, cardiovascular disease – the underlying golden thread is inflammation, and this is due to inflammatory factors that are inherent in our modern lifestyle."

A tool that can screen for and monitor your inflammation status is hugely beneficial.

"The premise is that if an individual does not catch systemic inflammation early on and continues to have the inflammation over the long term, the chances of them developing these inflammatory diseases will increase. So we see the test as a disease risk detection tool, and then a management tool to decrease inflammation. It's not diagnosing a specific disease – it's diagnosing whether you have inflammation or not," Simoné explains.

Accessible and affordable

Biocode is currently at the end of their prototype development phase, with the next step being external validation from Synexa (a company that specialises

in biomarker services), after which the company will be ready to move towards commercialisation of the test.

"This would, of course, include approval from the South African health products regulatory body," says Este. "We hope to launch Biocheck Inflammation early in 2023."

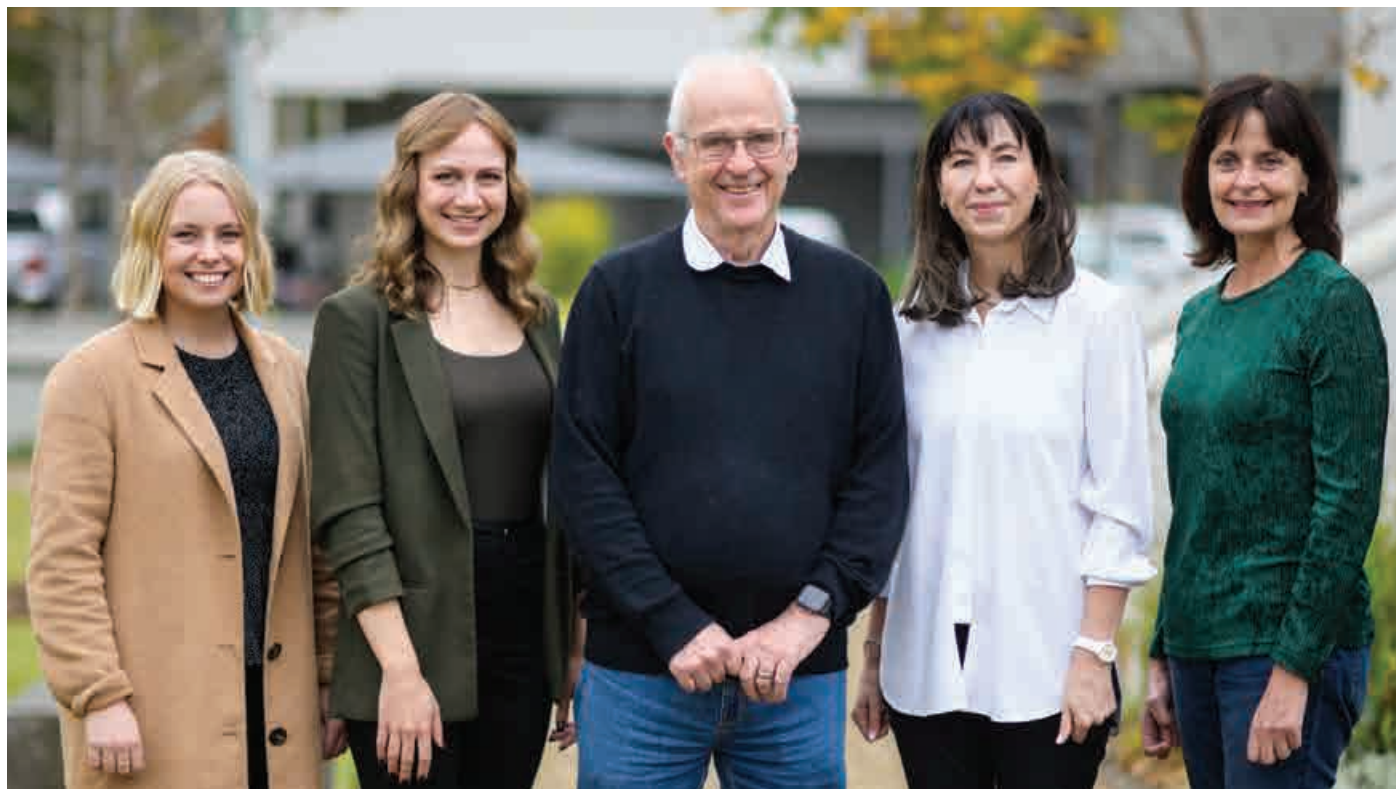
The team at Biocode sees a lot of potential in areas such as medical aids, precision medicine and the field of sports. "For the medical aid market, it's all about risk, so it would make sense to incorporate the Biocheck Inflammation test into their current health screening programmes," Este explains.

"We also aim to sell the product directly to consumers, but with a strong link to professional medical support – for example, having someone monitor inflammation at home, but with a connection to a medical professional who can advise them.

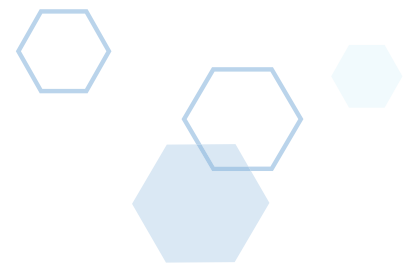
Their work is set to make great strides in combatting some of the major modern diseases.

"We also see it being used in the precision medicine field – by dieticians, in clinical set-ups and at practices. And we are exploring its use in the sport industry as a tool to track and manage inflammation due to overtraining."

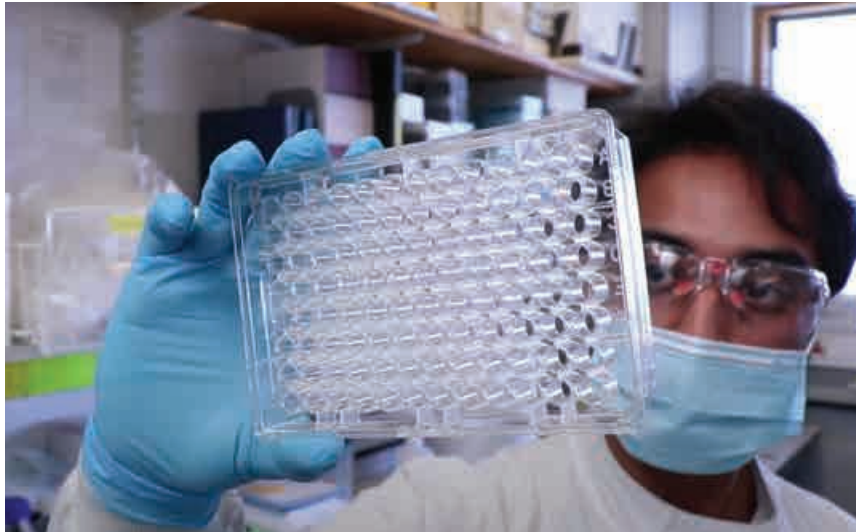
It is vitally important to the Biocode team that their technology be accessible and affordable for the majority of people who need it. "We have a collective passion to develop technology and solutions that empower people," says Este. "It's important to us to have that kind of impact in the healthcare space."



Left to right: Simoné Turner, Este Burger, Prof Willem Perold, Prof Resia Pretorius and Prof Anna-Mart Engelbrecht



At the forefront of digital healthcare



Cape Town-based health tech start-up InnoHealth is determined to provide solutions for quality, affordable healthcare to everyone in Africa.

Aging populations, increasing patient demands and the rise in lifestyle diseases, coupled with pressure on the costs of delivering care, are forcing healthcare providers to improve the quality of their services and lower their prices. Employing a wealth of digital information, InnoHealth Group is harnessing powerful technologies to create healthcare products and services that benefit patients and providers alike.

InnoHealth Group is a medtech-focused holding company that was founded in 2020. The health tech disruptor aims to provide solutions for quality, affordable and equitable healthcare to everyone in Africa, pioneer innovations that address healthcare inaccessibility and inequality, and provide comfort and empowerment to users by increasing access through preventative care.

At present, InnoHealth Group houses three companies: InnoHealth Technology Solutions, U-Image Africa and AI Biologics Africa.

InnoHealth Technology Solutions

InnoHealth Technology Solutions is a company focused on providing healthcare solutions by leveraging technology and the funders' intimate knowledge of the healthcare industry to overcome barriers to accessing healthcare services from a location, resource and financial point of view.

Over the past two years, virtualised medical treatment has grown exponentially as patients continued to seek medical care under lockdown restrictions and doctors exercised caution to minimise COVID-19 infections. Before the pandemic, telemedicine was largely used to provide healthcare services to rural populations and for teaching purposes.

Besides giving telemedicine a boost, the pandemic has also fostered the rise of innovative medical services. One of the tech innovations in South Africa is InnoHealth Group's MyPocketHealth, an artificial intelligence-based app set to provide virtual medical care to patients at a fraction of the cost of face-to-face consultation.

The app allows anyone from the lowest to highest LSM to access virtual medical advice and scripts, and facilitates the exchange of medical records between doctors and patients without having to visit the doctor's rooms or clinic. The intention is to provide a wellness ecosystem that provides low-cost healthcare and financial wellness by bringing the healthcare the patient needs to the device they have.



According to InnoHealth Group co-founder Dr Chad Marthinussen, the increased burden on the public health system in the wake of the pandemic makes this app an essential healthcare management tool. The MyPocketHealth platform reduces the need for in-person medical consultations, allowing patients to access the best, most affordable medical advice and care from their smartphones.

“Our mission and vision at InnoHealth is ‘doctors and technology, partners in care’. This platform is a full-service offering that provides users with access to low-cost medical care, and allows you to get your script and to have control of your medical records, your scans and blood results, creating a holistic experience,” says Dr Marthinussen.

U-Image Africa

This is Africa’s first wireless “ultrasound platform as a service”, which the team has been working on for the last two years. It is a SAHPRA-approved ultrasound probe and a proudly South African brand aimed at decentralising imaging while empowering the healthcare provider. It is also aimed at improving patient care by creating the stethoscope of the future while simultaneously changing the way imaging is taught.

This product’s unique selling proposition is the fact that it was developed with the South African/African market in mind, with an understanding of the shortcomings within our healthcare system. Another key element is that the funders are directly linked to a medical university (the University of Cape Town), which allows them to develop alongside an academic institution that is looking to form part of creating the future of medical education. This unique platform model also allows them to remove cost as a barrier to entry.

AI Biologics Africa

This is a platform that combines AI models that identify hotspots and a bioengineered scaffold to develop

efficient outputs for the biotechnology space. It is particularly useful in vaccine development and antibody test development in both human and non-human specimens.

A good case study was the development of the Epitogen COVID-19 antibody test, which has been hailed as a game changer. This was done by using AI to identify hotspots and then expressing these hotspots on a scaffold, which then allows for more accurate outputs. The test was deemed more accurate than any other test of its kind.

The AI model used has a broad application spectrum, which allows this platform to be truly scalable. The Epitope Predikt platform is being patented, and is currently the only platform of its

management team to drive the next phase of scaling the group. We also understand that scale at pace comes through collaboration and have enjoyed engaging many visionaries in this space and will continue to do so as we evolve,” says Dr Marthinussen.

“We have plotted our road map to achieve the next phase of our vision, and our aim is to transform the use of technology in the industry by all its stakeholders, which include the patient, practitioner and payer,” adds co-founder Abdul-Malick Salie. “We are in a consolidation phase, but continue to welcome engagement with local and international stakeholders who have shown interest in facilitating the scale and expansion of our vision.

“Our aim is to transform the use of technology in the industry by all its stakeholders, which include the patient, practitioner and payer.”

kind in the world. The scaffold, which was developed internally by the InnoHealth team, is a crucial element of the platform and hasn’t been replicated anywhere else in the world.

Transforming the use of technology

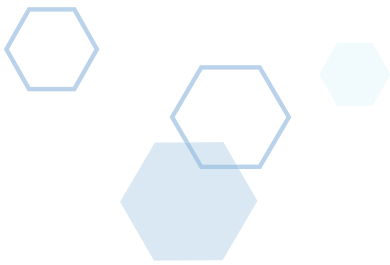
There has been growing interest in the start-up’s healthcare, which has led to the business securing an undisclosed eight-figure investment from Hong Kong as well as Dublin-based funds.

“As a team we are pleased to mention that over the past year, we were able to meet and exceed all performance metrics set by investors and the board when we started our journey. These included commercialising our initial innovations and bedding down an excellent

“We want to move South Africa away from telemedicine to virtual care,” he concludes. “We want our offerings to assist in elevating care in South Africa with the aim of serving the masses with affordable, quality solutions.

“We also use the government’s vision of the NHI and have incorporated the objectives in our offerings, so if and when it is rolled out, we can assist the communities where needed. We want integration into the NHI, as well as to become a digital care provider across African countries in need of tech solutions, products and services.”





LIQID Medical

Sight-saving ocular implants





LIQID Medical is a clinical-stage medical technology company pioneering a new class of highly effective glaucoma devices, with their patented ocular implant offering the first hope of a definitive cure for the condition.

During his community service in rural Northern Cape, Dr Daemon McClunan treated many young patients with severe cases of glaucoma, the leading cause of irreversible blindness worldwide. Typically, this is due to damage to the eye's optic nerve as a result of a build-up of pressure inside the eye. When the intraocular pressure increases and further damages the optic nerve, it can lead to a permanent complete loss of vision.

While there is a common surgical procedure to deal with this condition, the results are highly unpredictable. In the successful cases, patients require multiple check-ups and

medications, making the process both unreliable and costly. (It is estimated that the direct cost of glaucoma care globally is around R200 billion per year.)

Having experienced this variability first-hand, coupled with the fact that 3% of the global adult population suffer from the condition, and 48% of patients progress to blindness, Dr McClunan found a market in need of not only a cure, but also a cost-effective form of treatment.

Motivated by his experience in the Northern Cape, he focused his doctorate research on finding preventions for the leading cause of irreversible blindness. During this time, he was able to shift the perspective on treatment and find a new avenue for preventing vision loss by developing the OptiShunt – a device that creates “shunt communication” between the fluid chamber inside the eye and another fluid chamber located directly behind the eye.

By leveraging this naturally occurring fluid reservoir, the device creates highly effective intraocular pressure control, without the costs and complications associated with traditional devices. Having a success rate that is 50% higher than that of traditional treatments, this patented ocular implant is the flagship device of LIQID Medical.



From here, two spin-off devices were developed, broadening the company's device portfolio and widening the spectrum of patients considered. Each of LIQID Medical's three core devices is designed with the goal of creating the most clinically effective, cost-saving and quality-of-life-improving solutions for severe and refractory glaucoma.

Adding value to the global ecosystem

One of this new technology's benefits is the avoidance of bleb formation. Blebs are blister-like fluid collections found on the surface of the eye following traditional glaucoma surgery.

Given that the body's inclination is to scar down the bleb as part of the natural healing process, traditional surgery can cause the intraocular pressure to rise and cause further loss of vision. As a result, this would require monitoring and maintenance after the surgery. However, with the new technology, the post-procedure period is more manageable: After insertion, patients do not require as many medications, clinical visits or procedures as post the traditional treatment, providing them unmatched cost-saving for the next decade of vision.

LIQID Medical's vision of innovation and creating greater accessibility shows their commitment to lead in the local health tech industry, and add value to the global ecosystem. While they have contributed significantly in the fight against global blindness, their success is also credited to the network's support from the beginning stages.

"The take-home message, for me, through this experience of mine, is that we can be really proud of what we can achieve here in South Africa," says Dr McClunan. "We have all the potential to become a global innovation hub: We have really amazing universities and hospitals, access to patients from all walks of life, and the professionals and specialists to match. There is no reason

why we shouldn't be a global innovation hub in the health tech sector."

A paradigm shift in the industry

While boasting a number of academic and funding awards, one of Dr McClunan's greatest achievements stems from the streamlined process of clinical trials.

To give context, most American and European medical product development cases require around seven years and US\$37 million to achieve clinical trials. However, due to the working relationships with local institutions, such as the association with the University of Cape Town, LIQID Medical was able to run clinical trials at Groote Schuur Hospital, minimising costs and optimising time.

50% more effective than the current "gold standard" treatments, LIQID Medical's treatments are breaking ground in the fight against glaucoma.

With this kind of partnership, they were able to leapfrog, achieving first-in-man clinical trials 40% faster and 90% more cost-effective than their first-world counterparts. This also helped securing 11 patents for products and technology. In other words, the local network was a catalyst in the innovations' development and allowed for a paradigm shift in the industry.

This is arguably an inherent quality of the health tech industry in the province. Innovations in the ophthalmology space in Cape Town are not new: In 1966, Prof Anthony Molteno invented the world's first glaucoma drainage implant. Over the next few decades, this University of Cape Town medical graduate further refined the device to improve patient

outcomes. And while this device provided a monumental step in solving the threat of blindness resulting from glaucoma, there were still many issues that needed improving.

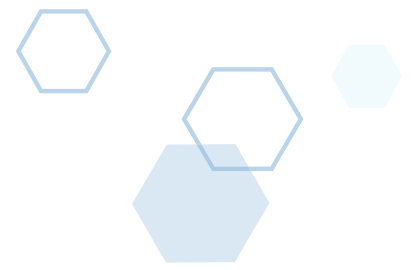
If anything, the industry, and its history of innovation, paved the way for future pioneers and collaboration. Past solutions, with their shortfalls, continued to welcome problem-solvers and technological developments, as seen with LIQID Medical and their partnership with the University of Cape Town.

Reflecting on the uniqueness of the company, Dr McClunan remarks that the cutting-edge technology, matched with the highly specialised multidisciplinary team, is what provided

the perfect dynamic to create a truly lean and innovative start-up company "fighting blindness".

When asked about the future of LIQID Medical, he expressed two main focuses for the next five years: to expand the team and their expertise, and push the process of commercialisation, taking the devices to market worldwide.

With a social impact vision, these priorities fundamentally support the goal of acting as an innovation hub that produces a positive impact on the global population.



A leader in additive manufacturing of orthopaedic implants



LRS Implants, one of South Africa's most innovative orthopaedic companies, possesses the ideal combination of tools, expertise and experience to create solutions for challenges in this field.

LRS Implants designs and manufactures titanium implants that are used in the treatment of bone tumours, infection, severe trauma, and implant revisions. The company provides a full suite of solutions for both upper and lower limb salvage and prides itself on being able to find solutions for almost any orthopaedic problem.

Headquartered in Cape Town, the company enjoys the privilege of being surrounded by world-class tertiary institutions that are actively involved in the health tech industry. This gives LRS ample space for collaboration and research activities.

The Western Cape also has an excellent healthcare system, with a lot of interaction between private and government sectors,

which enabled businesses such as LRS to collaborate closely with both private and government surgeons in the development of their implants. Importantly, with the Western Cape's rapidly expanding medtech space, more and more services are becoming readily available, which provides an excellent support structure that brings everything together and creates opportunities in the sector.

LRS Implants is highly focused in the niche market that they serve and has built up a thorough understanding of the market, in particular surgeons' needs. This, coupled with the fact that they are involved with an implant from manufacturing right through to implantation, is what sets the company apart.

In addition, the business has an industry-leading turnaround time for custom implant designs. This is particularly relevant to bone cancer patients, who only have a small window in which their operations can take place. This turnaround time is possible due to the company's in-house design workflow, as well as a ready-to-go manufacturing service.

"Custom implants are a major growth market in the orthopaedic sector. We provide both modular implant systems and custom implants, which are designed specifically for a particular patient. Our implants are manufactured using the latest milling and titanium 3D printing technologies.



We are proud to be ISO 13485-certified," says Neil Campbell, CEO of LRS Implants, who is known in the medical implant fraternity for being passionate about finding solutions for any orthopaedic case.

Neil has spent over 10 years in the industry, working closely with leading international orthopaedic surgeons, both in the field of limb salvage and general orthopaedics. He holds an honours degree in Mechanical Engineering and a master's degree in Biomedical Engineering, both from the University of Cape Town.

Custom-made

LRS Implants prides itself on making a difference in the lives of patients who

LRS provides a full suite of solutions for both upper and lower limb salvage and prides itself on being able to find solutions for almost any orthopaedic problem.

would otherwise have no real option. According to Neil, they consider any operation in which they have helped the patient and the surgeon as a major success. To date, the company has helped over 800 patients, and this number is rising rapidly.

LRS's custom implant offering is also gaining significant traction, and the business is expanding into the foot and ankle market as it seems to be an underserved space.

Some of their key successes include designing and manufacturing an innovative custom solution to assist a surgeon with a pathological fracture of the sacrum. The case involved using the patient's computed tomography (CT) data to design two custom plates to fit onto the left and right ilia. These plates were then connected by a threaded rod to ensure sufficient compression and stability of the sacroiliac joints. The plates were 3D-printed in Ti-6Al-4V (a titanium alloy), incorporating trabecular mesh to ensure good bone ingrowth. Plastic models and guides were provided to assist the surgeon with the positioning of the implant.

Another key success involved designing and manufacturing a custom titanium truss cage to bridge a 75-mm mid-shaft femoral defect. The cage was used for the treatment of a pathological fracture following osteitis of the femur.

The case was planned in close collaboration with Prof Maritz Laubscher (Groote Schuur Hospital and Life Vincent Pallotti Hospital, Cape Town), who also performed the surgery. The patient's CT data was used for the design, and this implant was also 3D-printed in Ti-6Al-4V. The business sees great potential in these truss cages as a treatment option in cases of segmental bone loss, and for joint fusions.

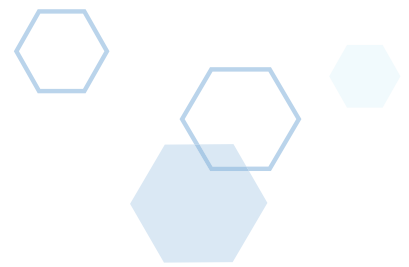
LRS Implants continues to make its contribution to the medical device ecosystem by presenting annually at local and international congresses, and supports vacation work and job shadowing for university students.

At present, the business supplies the South African market. Looking ahead, it will be embarking on a mission to break into the export market. "We have done some exports, but very limited," says Neil. "Europe presents some legislative hurdles, which we are currently working on.

"Africa is severely underserved in this market, so we are also investigating ways to make these implants available and affordable for this market."







High-quality rapid diagnostic test kits



Back, from left: Dr Armand Peeters, Dr Lyndon Mungur, Ashley Uys, Desiree Uys, Darryl Uys, Dr Charlene Kimar and Joshua Uys
Front, from left: Johan Maree, Natalie Nayman, Zaahira Kootbodien and Tyrone Uys

Medical Diagnostech develops and manufactures a wide range of rapid diagnostic products with the aim to assist in fighting diseases and epidemics.

Understanding the African continent's unique problems and its desperate need for medical diagnostics, Ashley Uys established Medical Diagnostech in 2010, localising the development and manufacturing of lateral flow rapid diagnostic test kits. What started as a team of one has since evolved into a hub of medical research and product development, with a production capacity of 20 million units per year – an average of 38 units per minute, every minute, non-stop. From HIV, drug, syphilis and malaria to fertility and pregnancy tests, Medical Diagnostech develops a wide range of products, with their latest being COVID-19 (antigen and antibody) tests.

Apart from scalability, the company prides itself on the rapid diagnostic test kits' high quality and the unique methodology used for increased sensitivity and early detection. In addition, this methodology optimises their products to withstand extreme storage conditions for up to 24 months, making them robust in results and logistics.





A whale in the industry

When asked about their SARS-nCoV-2 antigen test, Ashley explained that one of the biggest obstacles was in the research and development stage: The low number of cases meant that he was scouting for samples from homes to hospitals to develop a prototype product. By the end of the optimisation stage, the tests could produce reliable results with 100% specificity and 90% sensitivity.

This dedication to high-quality diagnostic products was recognised: Their innovation was the first COVID-19 test kit manufactured on the continent to be approved by the South African Health Products Regulatory Authority (SAHPRA).

As a whale in the industry, Medical Diagnostech carries influence and esteem. With its dedication to accessible diagnostic tests, the company has influenced the economics of the testing market: A simple media statement condemning the inflated market price of COVID-19 test kits influenced the product's market price in the public's interest. Essentially, this Western Cape-based company has made high-quality medical tests accessible and affordable for the population.

Growing exponentially

Medical Diagnostech holds its people at the core of its being. This can be seen in the dynamics within the company: Although they have developed an incredible product range in the health tech ecosystem, Ashley credits the business's unique attributes to the team – a diverse collection of highly qualified scientists, supplemented by unskilled labour, making these 40 individuals a dynamic mix.

With the priority to complement their technological innovations with employing more people, rather than automating the manufacturing process, the company's plan is to leverage a new partnership with a well-known health insurance company. Ashley forecasts a 600% growth in the business and its staff capacity, providing more job opportunities locally.

While their base remains in the Western Cape, there are plans to establish more branches throughout the rest of the continent.

One of their latest expansions is a partnership with Audere, a South African-founded Seattle-based digital health non-profit that develops software to

improve global health. This partnership will link HealthPulse DxA (an app serving as a diagnostic aide) with Medical Diagnostech's COVID-19 antigen test, which will allow individuals to test and receive digitalised reporting on their results, making the process easier, unbiased and comprehensive. The project is said to trial at the end of 2022.

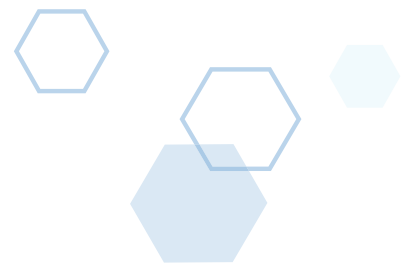
Medical Diagnostech has made high-quality medical tests accessible and affordable for the population.

Apart from their own products, Medical Diagnostech offers development and manufacturing services for new lateral flow components and test kits, as well as other medical-related products.

The process consists of an optimisation stage, where the prototype is further developed to minimise variability, followed by a feasibility study to test the product in the desired format and report on the findings. Finally, the validation phase includes studies to ensure that the final product meets specifications and is suitable for its intended use.

All in all, this specialised team helps others' innovations materialise in the market too, providing their customers with the necessary tools to add value to diagnostic processes and the fight against epidemics.





Connecting nurses and at-home patients



Top, from left: Caitlin Nash, Whitney Tennant and Catherine Williams
 Bottom, from left: Dr Erin Jones, Lizanne Joubert and Jo Griffiths Far right: Dr Sumarie Roodt

The NOOSi digital platform was created with a dual purpose: to provide all communities with affordable quality healthcare in their homes, and empower the nursing workforce to improve their opportunities.

Like many innovations, NOOSi Health started with a conversation. In this case, it was a discussion between co-founders Dr Sumarie Roodt and Catherine Williams about the lack of access to affordable quality healthcare, and in particular the state of nursing, in South Africa.

By combining Dr Roodt’s knowledge of tech innovation and Williams’s decades of experience in nursing, they set out to use technology to bring quality healthcare by professional nurses into people’s homes, thereby making it more accessible, more convenient, and more affordable – in South Africa and beyond.

“Through the NOOSi digital platform, we want to build an ecosystem that provides clients with value-based healthcare

services, either in person or virtually, in the comfort of their homes, and at the same time empowers professional nurses to offer private nursing in their local communities,” Dr Roodt explains.

Changing the face of nursing services

As most existing models for nursing labour either entail operating on an hourly rate for a permanent employer or are agency-based, Dr Roodt and Williams looked to the gig economy and locally founded platforms like SweepSouth (an online platform for home-cleaning services) to create one that allows clients to find nurses and nurses to find clients without a middleman involved.

“This is how tech is being used to make things scalable,” says Dr Roodt. “If we can create something that nobody else is offering, then we will have created a solution for an all-encompassing problem.”

Understanding the many barriers to starting your own business, NOOSi provides professional nurses with a real opportunity to take control of their lives by becoming self-sufficient and financially independent, and as such, the platform is ready to act as a real disruptor to the industry. NOOSi allows professional nurses to keep their day job, focus on the services they wish to provide, and have the opportunity to earn directly from their



labour. While NOOSi does charge the client a small service fee, unlike traditional agencies, they do not take a cut from the money earned by the professional.

“Our business model doesn’t create a pyramid with nurse labour at the bottom,” Williams explains. “It is location-based, so it gives nurses the scope to decide how far away from their base they want to work, and the hours they want to put in.”

Providing users with a complete end-to-end solution, the platform connects care requests with nurses, and offers booking functions, the opportunity for feedback, and the processing of payments.

Ultimately, the platform serves nurses looking to take control of how they operate, as well as clients who are in need of specific healthcare services, in the right area, at an affordable rate.

“Everybody can see how beneficial it is to find a nurse that does home visits,” Dr Roodt stresses. “If you need a nurse to see your parents who live a distance from you, or one to provide treatment to a child at home, this is the platform that provides that.”

A human-centred approach

While NOOSi puts plenty of emphasis on the tech, Dr Roodt and Williams are both very clear about keeping the human element front and centre. This is, after all, a key component of nursing, while responsible and equitable practices are also a linchpin of the business.

Collaborating with the Fairwork project – a global project that acts as an oversight research mechanism looking at all gig economy platforms – NOOSi has aligned itself with two key principles: fair conditions and fair pay.

“We are following a human-centred design approach, which is meant to be directed by the needs of the users – in this case, the nurses and the clients. What’s wonderful about that is that we’re actually creating an easy, effective way of solving

everyday problems for both the nurse and the client,” says Williams.

Nursing is seen as a service-orientated profession as opposed to a business-orientated one. This means the law restricts nursing professionals from canvassing, targeting or advertising their services, unlike others in the healthcare industry. Nurses registered on the NOOSi platform will be connected as individual practitioners to a whole community, which increases the community’s access to on-demand services, thereby disrupting the traditional model.

Space, a venture acceleration programme, in 2021, being invited to participate at Slush in Helsinki, being accepted into Wesgro’s Health Tech Accelerator programme, and being named Country Winner in the Global Startup Awards Africa competition.

The team is now firmly focused on building on these initial successes by expanding across South Africa, and at the same time identifying other African markets with the goal of creating a footprint in Middle Eastern and other countries in the northern hemisphere.

The platform serves nurses looking to take control of how they operate, as well as clients who are in need of specific healthcare services, in the right area, at an affordable rate.

“The nursing practice is fundamentally orientated to empower patients by supporting them with informed decisions and providing direct services when they’re needed. All these things will be possible if we create a system that connects the nurse and the patient,” says Dr Roodt.

A viable opportunity for a new generation

Fully female-founded and -led, NOOSi boasts a leadership team made up of trailblazers and industry leaders like Caitlin Nash (co-founder and managing partner of The Loudhailer), Whitney Tennant (founder of Brave Orbit), Jo Griffiths (co-founder of the Global Innovation Initiative Group) and Dr Erin Jones (founder of The Health Hopper – see page 40).

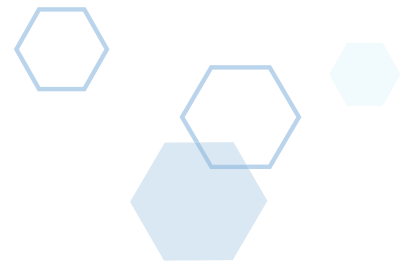
The company also boasts plenty of successes, including being selected to participate in the University of Cape Town Graduate School of Business Solution

Having engaged with stakeholders to best understand what is needed, NOOSi has already received pre-seed funding to finalise the minimum viable product.

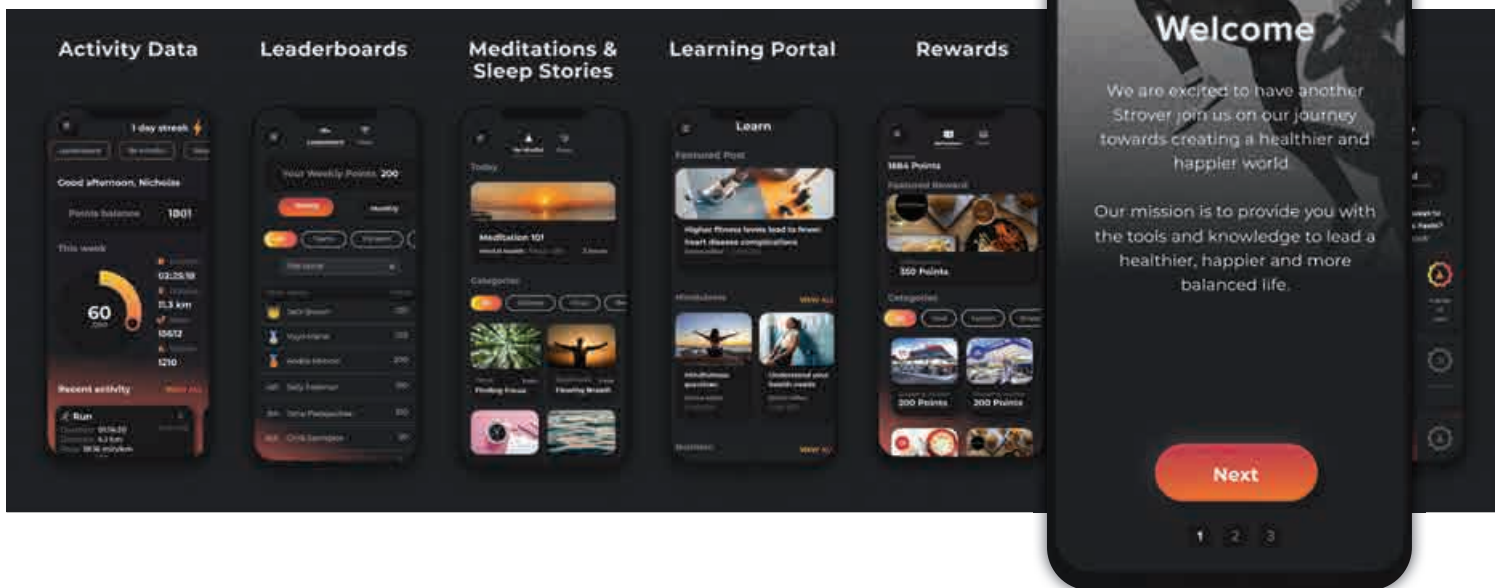
“2022 is the year when we essentially move from a pre-seed to a seed stage,”

says Dr Roodt. “One of our aspirations – and it’s a very ambitious one, but we’re all about being ambitious – is to be one of Africa’s first female unicorns.”

The NOOSi team not only sees the platform as helping current professionals maintain their career longevity and building on their current income, but also providing a new generation with a viable career opportunity that gives them the power to choose their path.



Healthier people. Stronger businesses.



Chris Bruchhausen realised the way the world's workforce works, isn't working, so he created an app with the aim to prevent physical and mental ill health from occurring in the first place. And it's gaining track.

The COVID-19 pandemic had a huge impact on organisations globally, with operational requirements shifting considerably. From taking processes online to remote work and hybrid models, the ability to pivot was key to survival. But this shift has had a lasting impact on the well-being of employees, particularly from a mental health point of view. The wellness market had already been growing before the pandemic, but with employees worldwide forced to work under increasingly stressful conditions, their well-being became even more topical.

Locally based company Strove was ideated on the back of this need. "Four, five months into lockdown, we had an idea that

because of COVID-19, there would be increased pressure on companies to provide their employees with support for their physical and mental well-being," says Strove founder and CEO Chris Bruchhausen. "We felt that there was going to be a need for employers to incorporate services and products into their companies that assist on the well-being front."

Looking at the wellness market, specifically in South Africa, the team discovered that from a tech perspective, these services and products were not very well developed, and that the few digital platforms that did exist were not very advanced or user-friendly.

Chris saw an opportunity to create a platform that would not only deliver similar benefits, but also be proactive in nature – and create sustainable behaviour over time.

"A lot of the existing platforms are very reactive," Chris explains. "They provide beneficial services that cater to staff's emotional or physical well-being. But our platform aims to provide services that deal with concerns before they take root."

"There is no point in providing a product that incentivises an employee to look after their mental and physical well-being, but keeps them engaged for only a month before they drop off and find themselves back at square one."



Rapid growth and expansion

In February 2021, Strove launched the first basic platform: a mobile app that was linked to a fitness app, Strava, and a rewards marketplace line-up that employees could access with the points they had earned via their activities through Strava.

Three months later, the first round of seed funding was raised, and the team continued developing the product by incorporating mental health features, and also expanding the capabilities of the app on the physical health side by building more integrations with different activity trackers, such as those from Apple Health and Fitbit.

"We also expanded the reward offerings, and gamification elements such as company leaderboards, departmental leaderboards, badges and challenges – those typical features that drive user engagement," says Chris.

"On the mental health side, we started bringing in things like in-app meditation, sleep stories, soundscapes, mental health screening tools for employees to self-report across a range of mental well-being indicators, and then we aggregate and anonymise that information in order to present it to the employer."

Strove has also ensured that the app does not only work for very active people – users can sync a wide range of exercise activities, from indoor cycling to step data, and are rewarded for doing so. There are also non-physical-based rewards, such as users getting points for listening to content on the app.

Since raising seed funding, Strove has not only expanded its client base to include some of South Africa's largest corporates, but also secured UK-based clients. To manage the client base and additional offerings, the team has also grown and now includes a chief medical officer and additional software developers.

"People who buy into what we are doing are going to their companies to motivate for the product."

Strove has also just launched an offering of behavioural/life coaching sessions for employees, with an eye on expanding this into therapy and counselling.

Embodying their values

The Strove team members themselves have a strong focus on physical and mental well-being. "It happened by chance, but the people in our team are all very fit and healthy. We didn't look for this in our hiring process, but it just always seemed to be a natural fit," says Chris.

This, of course, leads to a competitive in-house leaderboard, which is further fueled by being based in Cape Town and the Western Cape – a place that offers an ideal lifestyle for those who love the outdoors. "Cape Town is a very attractive place for people to want to live in," says Chris. "As a team, we are constantly doing things together outdoors. Being based here certainly helps."

It also helps that the Western Cape is home to exceptional tertiary institutions,

with the University of Cape Town, Stellenbosch University, Cape Peninsula University of Technology and the University of the Western Cape providing an enviable talent pool.

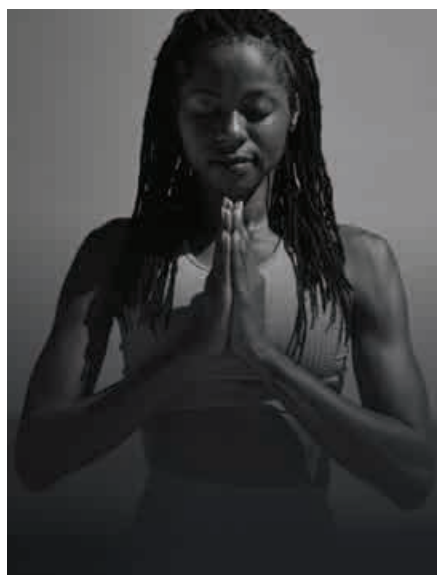
"The talent that comes out of the universities is quite incredible," says Chris. "Not to say that other universities are not producing top talent, but the institutions in the Western Cape are definitely providing us with incredibly skilled people. Most of our team have studied locally."

Apart from a vital product, top-class talent, and a home base tailor-made for healthy living, Chris attributes a lot of Strove's success to being true to their values and what they are selling.

"We made a decision from the beginning to be very open about what we value," he explains. "We try to make it clear that our team embodies the values that we are selling – the benefits of being outdoors and being healthy, for example – and we do that through initiatives such as running community events that involve people getting together for activities such as morning hikes, runs and swims, to name a few."

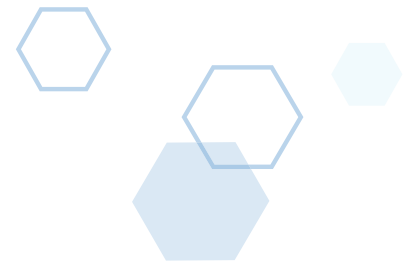
"By doing this incrementally over time, we have seen that people come to us, as opposed to us going to them. This goes for both prospective employees and potential clients. People who buy into what we are doing are going to their companies to motivate for the product."

Strove's success is testimony to the importance of a company living its values, while the product itself could not have come at a better time.





THE HEALTH
HOPPER



Making quality medicine accessible



What started as a virtual and mobile general practitioner service has since merged with online platform NOOSi Health to provide affordable at-home healthcare.

In early 2020, shortly after returning home from a stint in the Bahamas, Dr Erin Jones's parents fell ill with COVID-19, requiring her immediate attention. Fortunately, she managed to nurse her parents back to health, but the experience made her aware of the dire need for accessible and convenient medical care in the country.

This inspired Dr Jones to start The Health Hopper, a company providing virtual as well as mobile consultations to patients in the comfort of their homes. However, in her efforts to provide easy access to healthcare, such as for the elderly, disabled and immobile patients, she became aware of the barriers to technological interaction. Whether patients lacked





technological literacy, or the digital infrastructure that was used was poorly designed, there was a need to improve the virtual component.

"I am a medical doctor – I am here to ensure that our patients are being looked after and that the patient journey, virtually, makes sense," Dr Jones explains.

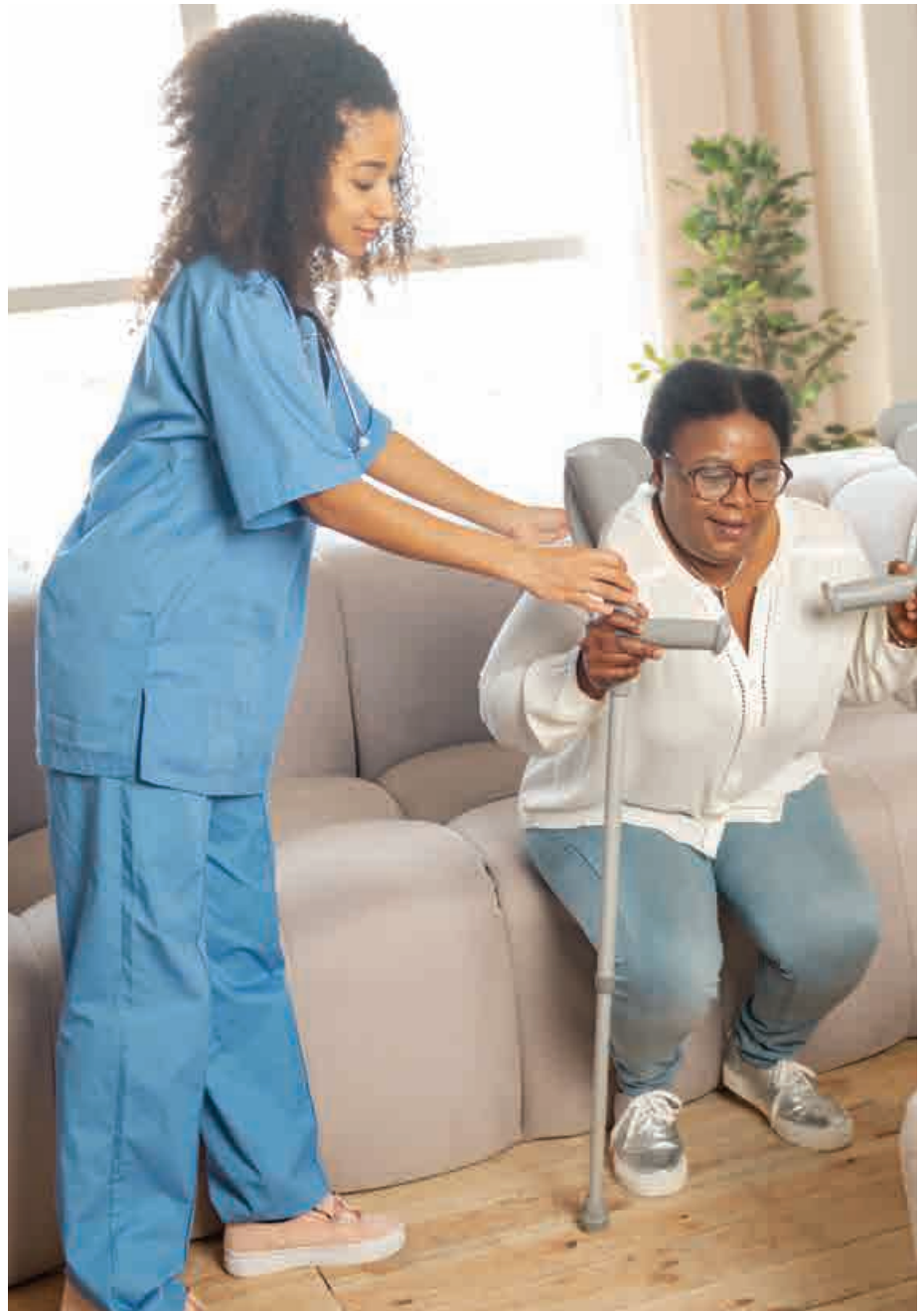
While facing the obstacles of improving the virtual patient journey, she also struggled to find doctors who were willing and able to commute for mobile consultations.

Enter Dr Sumarie Roodt, co-founder of NOOSi Health, an online platform for at-home professional nursing care (see page 36). After hearing about Dr Jones's story, Sumarie contacted her and proposed working together to create a stronger, more efficient platform.

"When NOOSi approached me, I was looking for alternative carers or nurses who were able to go out and fulfil the mobile consultation aspect, because I knew my doctors were happy to fulfil the virtual part. That's how our two teams collided," says Dr Jones.

Now, with The Health Hopper's absorption into NOOSi Health, clients can use this digital platform to book and manage virtual appointments. By sending professional nurses to people's homes, they are able to provide the tactile element of healthcare, while also offering doctors' advice virtually, if needed.

Locally, the concept of remote consultation is still relatively new and requires a "culture" to be built. Together, The Health Hopper and NOOSi Health strive to teach new behaviour through a union of healthcare and technology. They have opened a door for alternative access to healthcare, hoping to provide more people with affordable professional medical care that continues to be patient-centred.



With The Health Hopper's absorption into NOOSi Health, they are able to provide the tactile element of healthcare as well as doctors' advice virtually.



Western Cape universities: Incubators of innovation and excellence

The academic institutions of the Western Cape continue to deliver world-class professionals who drive the health technology industry forward, expanding its footprint globally – ensuring the province continues to be a hotspot of innovation.

One of the lynchpins of the Western Cape health sector is the world-class academic institutions based in the province, with the University of Cape Town, Stellenbosch University, University of the Western Cape and the Cape Peninsula University of Technology providing the region with some of the leading minds in the industry.

All four institutions are driving innovation in the local sector through their health science divisions, with direct links to the province's healthcare system via the academic hospitals as well.

The University of Cape Town's Department of Medicine, in the Faculty of Health Sciences, is the largest department of the university and home to 18 divisions and 10 specialised research units, with worldwide collaborative teams. The microbiology and biotechnology faculties have contributed to the further development of the Centre for Proteomic and Genomic Research. This centre has partnered with global initiatives to lead the way in DNA sequencing in South Africa. The chemistry department has also established a footprint in tropical disease drug discovery and development.

The Faculty of Applied Sciences at the Cape Peninsula University of Technology is leading the way in indigenous medicine research in the region. Developments in nanotechnology, food supplements and nutraceuticals, such as a rooibos extract capsule, are exciting contributors globally.

The University of the Western Cape's Faculty of Natural Sciences is an important centre of research in South Africa, with a spin-out company now marrying information with digital sequencing to get faster identification of treatment resistance in TB and HIV patients.

Stellenbosch University is currently establishing a billion-rand state-of-the-art biomedical research institute at its Faculty of Medicine and Health Sciences. The aim is to investigate diseases with the greatest impact in South Africa and the rest of Africa, and to improve the prevention, diagnosis and treatment of illnesses such as tuberculosis, HIV, diabetes and heart disease, among others.

On top of this, these universities play a vital role as incubators of innovation and excellence, linking groundbreaking research to investors and guiding innovators from idea to pre-seed and beyond. They do this through their technology transfer offices, and all boast incredible success stories across the health tech ecosystem, both locally and internationally.

Research Contracts and Innovation

Research Contracts and Innovation (RC&I), a department of the University of Cape Town (UCT), has two main functions: responsibility for all the contracts associated with research conducted at the university, and the identification and protection of intellectual property arising from the research and, importantly, the management of innovations en route to market.



RC&I further supports the Faculty of Health Sciences at UCT to bring more than R700 million per year into the Western Cape for various research and development activities. RC&I played an important role in many innovations being transferred from UCT to local and international companies in the health ecosystem. RC&I also supported the start-up of several companies to commercialise health tech innovations.

RC&I has fostered a number of spin-off companies, some of which have been featured in previous editions of *Pioneers*, such as Cape Bio Pharms, which produces plant-based recombination proteins for medical research, and CapeRay, whose innovative Aceso system has revolutionised breast imaging and the ability to detect breast cancer.

Innovation and Commercialisation

As a division of Stellenbosch University, the office of Innovation and Commercialisation manages the university's technology transfer, short courses, trademarks, copyright and a large number of other commercial initiatives. It also provides support to a broad spectrum of entrepreneurs through its LaunchLab business incubator.

The Innovus Technology Transfer Office manages the university's innovation portfolio. This is done through identifying and protecting intellectual property emanating from research activities, providing assistance with the development thereof, and commercialisation through licensing or the creation of a start-up company. Innovus also helps researchers and entrepreneurs to raise funds for the various stages of development of their projects with commercial potential.

University of Stellenbosch Enterprises (Pty) Ltd

University of Stellenbosch Enterprises, a wholly-owned subsidiary of Stellenbosch University, holds shares on behalf of the institution in its group of spin-out companies.

Since establishing Stellenbosch University's group of companies in 1998, more than 30 companies have been established, some of which have been paying dividends to their shareholders and achieving profit margins year-on-year. Many of these companies were incubated from scientific breakthroughs in various phases of development towards becoming commercially viable innovations.

From 2011 to 2021, Innovus has received 472 ideas from Stellenbosch University researchers, for which nearly 175 provisional patent applications and over 132 PCT patent applications

IP disclosure and protecting IP with the potential to create socioeconomic value, facilitating the commercialisation of UWC's IP through licensing, sales or spin-outs, raising awareness of relevant national and institutional policies and regulations, and promoting a culture of entrepreneurship and innovation.

It has been responsible for spin-outs such as Hyrax Biosciences, a South African company that specialises in bioinformatics. Their leading innovation, Exatype, takes DNA data and quickly and accurately detects mutations that cause disease.

The technology transfer offices have contributed to establishing Cape Town and the Western Cape as a region of enviable innovation and breakthrough research and technology.

have been filed. This is more innovations than from any other private or public entity in South Africa.

These ideas and patents have been commercialised through more than 131 licence agreements with industry and the creation of more than 30 spin-out companies. While most of these companies are still in the start-up phase, their combined turnover was nearly R290 million in 2021, and approximately 307 people are employed by them.

Two of these companies, Scientia and Biocode, are featured in this edition of *Pioneers*.

University of the Western Cape

The technology transfer office of the University of the Western Cape (UWC) supports and facilitates the protection and commercialisation of UWC's intellectual property (IP) by managing

Technology transfer offices

While established technology transfer offices (TTOs) differ in various ways, they all play a huge role in fast-tracking innovation in the sector. Not only do they manage and protect the intellectual property of the universities and the research done under their guidance, but they also facilitate the commercialisation of intellectual property gathered by research-based results through licensing, patenting, or management of spin-off creations.

TTOs are vital to the sector, and as individual institutions, boast incredible success. Combined, they have nurtured a groundswell of innovation in the health tech sector and contributed to establishing Cape Town and the Western Cape as a region of enviable innovation and breakthrough research and technology.

