

TECHNOLOGY INNOVATION AGENCY

TECHNOLOGY PLATFORMS PROGRAMME



science, technology
& innovation

Department:
Science, Technology and Innovation
REPUBLIC OF SOUTH AFRICA





technology innovation
AGENCY
Innovating Tomorrow Together



OVERVIEW

TIA established the Technology Platforms Programme (TPP) aimed at facilitating access to cutting-edge technological capabilities by investing in and supporting entities to acquire appropriate technologies and expertise that lower the barriers to innovation.

OBJECTIVES:

-  Optimisation of public investment in technology platforms, for technology development and innovation
-  Use of platform capabilities to support human capacity and skills development
-  Use TIA funds as leverage to attract other sources of funding and co-investment to enhance programme activities

Through the Technology Platforms Programme, TIA has established capabilities in various biotechnology focus areas nationally.



African Medicines Innovations and Technology Development (AMITD) Platform



Biosafety South Africa (BSA)



Cape Universities Body Imaging Centre (CUBIC)



Centre for Proteomic and Genomic Research (CPGR)



Holistic Drug Discovery and Development (H3D) Platform



National Metabolomics Platform (NMP)



Kwazulu-Natal Research Innovation and Sequencing Platform (KRISP)



TIA Bioprocessing Platform (TBP)










AFRICAN MEDICINES INNOVATIONS AND TECHNOLOGIES DEVELOPMENT (AMITD)

AMITD was established to stimulate economic growth in the pharmaceutical industry by providing science-based solutions and developing technologies utilising indigenous knowledge (IK) and South African biodiversity.

The IK based technologies will be used to produce high-quality African Traditional Medicine based proprietary pharmaceutical products, focusing on priority diseases. The platform will ensure the meaningful participation of knowledge-holders throughout the product development value chain.



FOCUS AREAS

-  Research and development in the pharmacology of traditional herbal medicines
-  Create innovations and Intellectual property based on Indigenous medical knowledge
-  Drug discovery, formulation and product development, including local medical cannabis
-  Community research and grassroots innovations value addition
-  Produce extracts and concentrates for further development
-  Clinical research and clinical trials of herbal products
-  Analytical method development for industry
-  Stability testing of prototype and finished products
-  Pharmaceutical business development and partnerships

KEY PROJECTS

Health teas & infusions



This project is based on the use of indigenous plants that have been used in traditional medicines as health beverages. The project is involved in the scientific value addition to support the safety and health benefits of the teas and infusions such as diabetes, high blood, respiratory benefits, skin toning, and memory enhancement. The teas are being developed in partnership with knowledge holders in the Eastern Cape and North West.



Cardiovascular disease - Heart failure

The project is studying select medicinal plants used in the treatment of heart failure. Various scientific tests, aimed at dissolving blood clots, reduce fat formation, blood vessel relaxation and regeneration of regrowth of new blood vessels, are conducted to confirm their effect on the heart, and the reversal and treatment of heart failure.

BIOSAFETY SOUTH AFRICA (BSA)

BSA provides guidance and assistance to stakeholders in the GMO product value chain to ensure compliance with the regulatory and biosafety requirements across all the stages of GMO research and development such as, contained use, field trials and commercial release. The platform aims to increase awareness and confidence in the national biotechnology innovation system, including the relevant governance systems.



FOCUS AREAS

BSA's core business is to provide value-added services, support, and investments, aimed at enabling sustainable bio-innovation. These can be grouped into four distinct offerings:



Biosafety/sustainability and risk analysis consultation, guidance, support, and capacity development offered to all stakeholders, to improve bio-innovation efficiency and compliance across all stages of bio-innovation research, development, and commercialisation, including contained use, confined field trials and commercial release.



Identification, commissioning, and funding of strategic biosafety/sustainability research and development projects to help ensure the sustainability of biotechnology research, development, and innovation in South Africa. This includes compliance consultation and development of regulatory dossiers to help ensure sustainability, compliance, and innovation success.



Enabling sustainable bio-innovation through thought leadership, facilitation, advocacy, and policy support, including critical analysis, the establishment of enabling platforms, facilitating communication and collaboration, and advocating for locally relevant, fit-for-purpose policies and regulatory frameworks.



Communication and engagement regarding all aspects of the biosafety, risk analysis, sustainable development and use of biotech products/GMOs in South Africa and addressing the knowledge requirements of all stakeholders, including researchers, technology developers, regulators, and the end-consumer.

KEY PROJECT

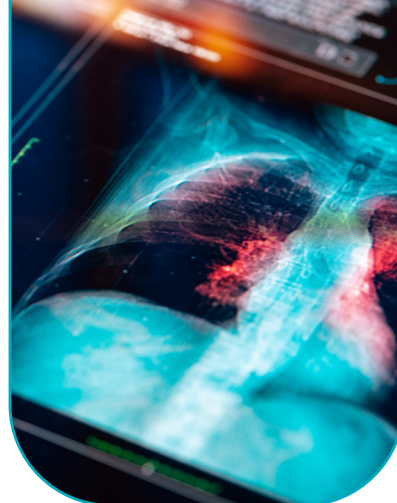


Bioeconomy SA Portal

BSA established and maintains the Bioeconomy SA Portal. The web based portal is a repository of information from different sources and integrated into a secure user-friendly interface. The portal aims to improve access and facilitate the exchange of information among bio-innovation stakeholders to stimulate communication, improve cohesion and promote functional integration and collaboration. The portal leverages the available pool of expertise and resources, offering valuable information, services, and resources to stakeholders, facilitating strategic decision making and developing visibility and credibility for the South African bioeconomy.

CAPE UNIVERSITIES BODY IMAGING CENTRE (CUBIC)

The platform provides access to a high resolution, 3T Siemens Skyra full-body magnetic resonance imaging scanner (MRI) and related expertise to support research, development and innovation that will lead to useful biomedical applications. The Centre supports R&D and innovation for improved diagnosis and treatment monitoring across a range of diseases. These include tuberculosis, oncology, neurology, and cardiovascular diseases. The facility also provides training on the use of MRI technologies.



FOCUS AREAS



Prenatal alcohol and drug exposure



Long-term sequelae of living with HIV



Cardiac diseases prevalent in Africa



Neurodevelopment and trauma

KEY PROJECTS



Neural Bases of Cognitive and Behavioral Effects of FASD

The study uses neuroimaging to examine neural correlates of reading impairment in children with Fetal Alcohol Spectrum Disorders (FASD). Preschool children and adolescents (14-15 years) are the subjects of this study.



Combative Craving with Contingency Management

The study correlates MA-abstinence (methamphetamine abuse) outcomes from an 8-week contingency management (CM) program of voucher-based incentives using an escalating schedule that has been successfully implemented as an adjunct to MA treatment by our collaborators in the United States. Pre- and post- treatment neuroimaging and neurocognitive assessments will assist in identifying structures and/or processes that may represent targets for development of novel behavioral and/or medication therapies.



Cognitive Training in Patients with Obsessive-Compulsive Disorder

The project involves an intervention consisting of 8 weeks of cognitive training. Working memory, neuropsychological functioning and OCD symptomatology will be assessed pre- and post-treatment. Furthermore, neuroimaging using sMRI and fMRI will be conducted at baseline as well as at the end of the 8-week period. The scan will show any structural or functional changes in the frontostriatal area involved with working memory.

CENTRE FOR PROTEOMIC AND GENOMIC RESEARCH (CPGR)

The CPGR provides integrated high-throughput genomic and proteomic technologies with bio-computational pipelines to create fit-for-purpose offerings for users in academia and industry. This assists in the development of unique solutions for biological challenges in the human health and agricultural biotech sectors. The CPGR Platform provides capacity development via joint projects to empower researchers in the use of cutting-edge technologies for the development of market-driven products and services.



FOCUS AREAS

The Platform provides state-of-the-art technologies with bio-computational pipelines to render services and support projects in the life science and biomedical sectors. The CPGR processes are run under a defined quality management system, ISO 9001:2015 certified.

The CPGR is equipped to conduct standardised or bespoke training and development in Proteomics and Genomics through various media platforms by our very own CPGR's OMICS specialists. Furthermore, the CPGR also hosts an Academy and one of the main courses that is offered through the Academy is the Foundation in Omics (FIO) course. The FIO course is conducted either physically or on an online platform in partnership with LabVine.

KEY PROJECTS



Mediclinic Precise

Mediclinic Precise, formerly Artisan Biomed, aims to implement three distinct solutions: the provision of precision disease and health management services, translational research services and the development of tailored medical solutions for people of African descent. This is achieved by aggregating data and using AI-based means to create further value. Artisan Biomed gained investment in 2022, through a subscription agreement with Mediclinic International plc. The CPGR as the minor shareholder of the newly named "Mediclinic Precise" is the service laboratory of choice.



H3Africa-iScan

The H3Africa is the biggest Genomics research program on the African continent.

H3A procured the Illumina iScan, placed at CPGR, the iScan is a high-end microarray platform. The iScan was placed at CPGR in February 2018 to run microarrays for H3A and other African scientists. Through support from Illumina, the CPGR can offer the service at a lower cost than Illumina's service pricing, thus providing access to more array projects on the African continent as possible. The interest for the H3Africa array is continuously growing and the organisation has increased its throughput on the iScan with improved scheduling and higher throughput automation. The CPGR is running approximately 10 000 samples on arrays per annum on the iScan.



BO2BU

Spread across the human genome, are patterns of genetic variation that represent different human populations, these ancestry informative markers (AIMs) can be used to determine an individual's relation to specific populations. The BO2BU (Be Happy to be you) genetic ancestry test screens more than 600,000 markers found in different population groups to date. Mapping an individual's ancestry becomes more accurate as the amount of genetic information available about these diverse populations increases. The CPGR and now Mediclinic Precise can capture a client's information, formal consent and payment for the ancestry test using an online ordering system. The BO2BU ancestry test was launched on the takealot e-commerce platform in September 2020, which has resulted in an increase in both brand awareness and sales.

HOLISTIC DRUG DISCOVERY AND DEVELOPMENT (H3D) CENTRE

H3D, Africa's first and only integrated drug discovery and development centre, aims to translate scientific discoveries into potentially life-saving medicines in areas such as tuberculosis, malaria, and anti-microbial resistance. The centre aims to fast track the discovery and development of new antibiotics to limit Anti-Microbial Resistance (AMR). Precision antibiotics to treat multi-resistant Gram-negative bacteria will be the focus of the newly formed J&J satellite centre at H3D.



FOCUS AREAS



Disease areas: Malaria, tuberculosis (TB), antimicrobial resistance (AMR) and HIV



AMR, TB and Malaria Biology, including target based and phenotypic screening



ADMET (Absorption, Distribution, Metabolism, Excretion, Toxicity) and DMPK (drug metabolism and pharmacokinetics) assays



Medicinal chemistry



Process chemistry



Computer aided drug discovery and Artificial Intelligence/Machine Learning

KEY PROJECTS



H3D Capacity Building

The H3D Capacity Building platform has been instrumental in supporting other institutions across the country and continent. Most notably, H3D has been a technical partner for the Grand Challenges Africa drug discovery cohort of 16 grantees from South Africa, Zimbabwe, Cameroon, Ghana, Mali, Kenya and Nigeria. H3D has supported these projects by providing access to the TIA funded technology platforms by testing samples in the various assays (biology screening and ADMET assays) offered by the platform. This has enabled clients to enrich their data and progress their projects from basic research to more translational research with the aim of building the drug discovery knowledge and capabilities on the continent. Furthermore, the centre has recently partnered with University of Limpopo and University of Venda to support the establishment of TB drug discovery capacity within these institutions.



H3D Johnson & Johnson Satellite

H3D is one of three Johnson & Johnson satellite Centres for Global Health Discovery. The first J&J satellite centre is hosted at the London School of Hygiene & Tropical Medicine and H3D is the second satellite centre. The aim is for H3D to develop precision antibiotics to treat multi-resistant Gram-negative bacteria. Gram-negative bacteria cause infections such as pneumonia, bloodstream infections, wound or surgical site infections, and meningitis.

KWAZULU-NATAL RESEARCH INNOVATION AND SEQUENCING PLATFORM (KRISP)

KRISP aims to challenge the status quo and establish one of the world's most advanced and respected genetic sequencing platforms, to enable and support world-class genomics research and diagnostics services in Africa.

The platform contributes knowledge, scientific evidence and informs policy regarding interventions to address different pandemics in South Africa. Emerging and re-emerging pathogens occurring internationally, suggest that humanity will continue to face a future burden of pandemics. KRISP is amongst the centres that are driving pandemic preparedness for South Africa. This entails, amongst other aspects, establishing capacity for genomic data generation and undertaking bioinformatics analysis of that data. The platform has demonstrated exceptional capacity using of genomics to support the response to some of the biggest health problems.



FOCUS AREAS



Omics, genomics, bioinformatics, and epigenetics enabler: focus on providing services to academic and R&D clients. This generates scientific publications, innovations and intellectual property (IP).



Next Generation Diagnostics: focus on providing diagnostic testing to commercial (pathology laboratories, pharma companies and clinicians) and academic clients. KRISP uses the latest and most accurate technologies in the market, including next generation sequencers Illumina and Oxford Nanopore.



Training and capacity building: focus on offering short courses (< 5 days) on genomics, bioinformatics, and epigenetics, to researchers, technicians, and commercial clients.

KEY PROJECTS

Genomic surveillance of SARS-CoV-2



KRISP was instrumental in South Africa setting up and rolling out the latest technologies for cost-effective sequencing of SARS-CoV-2. The key outputs included the rapid identification of Beta, Omicron and other variants that were circulating in Southern Africa. The detection of these variants provided a crucial early warning to the rest of the world.

Genomic data from KRISP and other network laboratories was used in epidemiological investigations, resolving local outbreaks in communities, hospitals and business establishments. The scientific evidence produced was used to inform the government's efforts to curb the spread of COVID-19. Policy-wise, the discovery of Omicron sparked an uptick in booster vaccinations, renewed restrictions, and travel bans.



Antimicrobial resistance

Sequencing data from the platform is used in research studies to characterize clinically important resistance mechanisms of HIV and TB. One of these is the International epidemiology Databases to Evaluate AIDS (IeDEA) – an international consortium addressing resistance to antiretroviral treatment Dolutegravir which KRISP is part of.

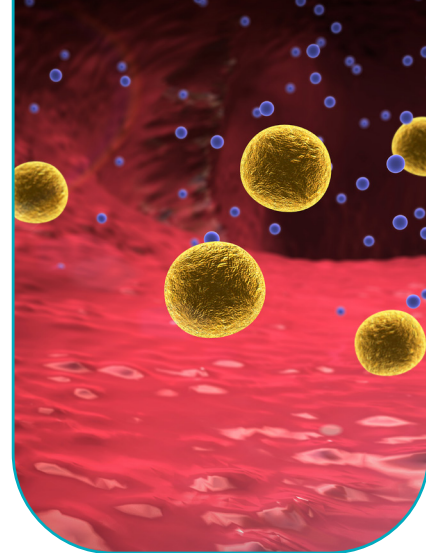


CLIMATE

KRISP is part of CLIMATE initiative, a consortium established to respond to climate amplified diseases and epidemics.

NATIONAL METABOLOMICS PLATFORM (NMP)

The Platform exploits the application of metabolomics techniques and modelling to alleviate inherited health disorders and disorders due to infectious diseases that plague the South African society. The Platform is part of North West University's Centre for Human Metabolomics Programme.



FOCUS AREAS



Diagnostic services:

- Newborn screening
- Metabolic screening
- Precision medicine



Contract research services



Rare metabolic disease biobanking

KEY PROJECT

Rare Diseases Biobank



The Biobank for rare metabolic diseases is intended to be a national asset and has already attracted national and international interest – with several research projects already registered. The first of its kind on the African Continent, the rare metabolic diseases Biobank was established in 2019. The Biobank stores and provides access to biological samples and clinical data from patients with rare metabolic diseases which will help researchers to develop new diagnostic tests and treatments for these conditions.

TIA BIOPROCESSING PLATFORM (TBP)

The Bioprocessing Platform is a biotechnology facility that support projects that aim to exploit biotechnology in developing products and processes with commercial value and application.

The Platform supports technology development by providing a conducive technical and business environment to entrepreneurs and researchers, allowing the development of new biotechnology products and processes through fermentation bioprocess or bioproduct development, as well as antibody development for diagnostic innovations within South Africa, Africa and beyond.



FOCUS AREAS



Flexible bioprocessing technology configurations to scale up processes from 500ml to 20L



Analytical chemistry services



Process development within a quality assurance environment and statutory regulations



Diagnostics: monoclonal antibody development and low volume precision dispensing technology



COVID-19 and other Infectious Disease Rapid Diagnostic Testing



Sound data management protocols and protection of user IP



Molecular – based research



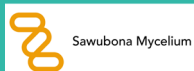
Physical laboratory and administration space



Provide hands-on training for professional development in bioprocessing techniques

KEY PROJECTS

Sawubona Mycelium



The Bioprocessing Platform is currently supporting client, Sawubona Mycelium, a company that produces various mycelial bioactives through a fermentation bioprocess and of extraction particularly of β -glucans. The Sawubona process development has resulted in two product streams (filtrate and biomass) that have been tested to confirm efficacy as key additives for formulated skincare products. Sawubona Mycelium has since launched its own skin-care products, the Bluberyl hydration serum with microbiome support; and Bluberyl age-control serum.

Afrobodies



Afrobodies™, is an emerging and privately held biotechnology company that is producing recombinant nanobodies for the African and global life-sciences, agricultural, immunodiagnostic and therapeutic markets, which are a first for Africa. The nanobodies developed by AfroBodies played a role in the COVID-19 pandemic response as they were able to target the spike protein of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) hence could be deployed for use as a potential therapeutic in patients with COVID-19. The nanobodies were shown to neutralise the live novel coronavirus as well as the South African variant in external laboratories.

TokaBio Diagnostics



TokaBIO partnered with the Bioprocessing Platform to design and commission a mobile diagnostic facility to support the government response to COVID-19. The initial focus of the diagnostic facility was designing assays for COVID-19, however due to the recent decline in the COVID-19 cases, the facility has shifted its mission to target the current most prevalent infectious diseases affecting the general population and posing a public threat. TokaBIO and the platform are now working towards accrediting the facility for HIV drug resistance testing methods using next-generation sequencing (NGS). The mobile facility which is hosted at the Platform was funded by Toyota South Africa.



PARTNERSHIPS AND COLLABORATIONS

The Platforms derive value from strategic partnerships which include local and international collaborations to undertake technology development activities and commercialisation of products and services. The Platforms collaborate with technology developers, commercial entities, funders of technology development, Higher Education Institutions, Science Councils, Government Departments, Researchers and Innovators, SMMEs and Cooperatives.



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