

## Summary Report of Centre for Proteomic and Genomic Research - 2012



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### CPGR background

The CPGR is based on an initiative by the South African Department of Science and Technology (DST), and funded by the Technology Innovation Agency (TIA), to support the development of an internationally competitive bio-economy in South Africa (SA).

Created in 2006, the organisation's vision is to establish a modern, world-class facility that serves the needs of the scientific community in SA by providing state-of-the-art services, technical expertise and collaborative research capabilities in the genomics and proteomics arena.

Based in Cape Town, the CPGR was established as a not-for-profit, contract research organisation to provide support and services to the life science and biotech communities. To this end, it combines state-of-the-art, information-rich genomic and proteomic ('omics') technologies with bio-computational pipelines to create unique solutions for biological problems.

By applying principles of network orchestration, the CPGR combines internal and external resources to create the economies of scale and scope necessary for delivering genomic, proteomic and bioinformatic support in a high-quality, cost-effective fashion<sup>1</sup>. Orchestrating capacity in a networked way allows the CPGR to make agile responses to a wide range of needs and render fit-for-purpose solutions; this

approach also facilitates the creation and diffusion of knowledge, a pre-requisite for innovation in any sector, and a must in the rapidly evolving 'omics' arena. Ultimately, our aim is to create an eco-system conducive to stimulating life science innovation in Africa!

The CPGR's vision is to be a key driver in SA's effort to become one of the leading bio-economies of the 21<sup>st</sup> century. Our mission is to be an 'omics' technology platform that provides solutions to innovation gaps and identified opportunities in the development of SA's modern biotech sector!

### CPGR offering

Highly skilled laboratory staff maintain and run the key pieces of genomic and proteomic equipment that provide critical service and project support to clients. The organisation can handle samples and isolates from most biological sources, including human, animal, plant, yeast, bacteria and viruses, in a secure Biohazard Class II (BSL II) environment. To create effective solutions in complex biological projects, the CPGR employs a wide range of validated genomic, proteomic and bioinformatic workflows. These include array-based RNA expression profiling and DNA genotyping using Affymetrix cartridge- and GeneTitan-arrays; whole-genome, exome and transcriptome sequencing on a variety of high-throughput sequencing platforms (Illumina, LifeTech, 454); quantitative DNA and RNA detection on digital and qRT-PCR platforms; protein identification and biomarker discovery using a suite of state-of-the-art mass spectrometers (MALDI-ToF/ToF, Q-Exactive, TSQ Vantage, Q-ToF, amongst others); and multiplex biomarker profiling using solid protein arrays and bead-based suspension arrays. Computational workflows for high-throughput analysis of genomic and proteomic data-sets, including standard DNA and next-generation sequencing data analysis complete the portfolio.

### Complete Genomics & Proteomics services

The efficient integration of a range of technologies and workflows allows us to render complete genomics and proteomics services. The value we add to scientists is based on the fact that we can choose from a range of options and devise custom solutions that meet diverse requirements, such as throughput, coverage, depth, and costs

<sup>1</sup> For a detailed discussion of the approach, visit <http://www.cpgr.org.za/blogspot/?p=367>



Figure 1. Jo McBride, Affymetrix platform manager doing the QC which is part of all the Affymetrix workflow implemented at the CPGR.

in genomic and proteomic projects. In response to clients' needs, we can assemble available know-how and resources into fit-for-purpose value propositions.

Through the flexible combination of technologies, and adherence to stage-specific quality management principles, we have the ability to render support and services across the entire genomic and proteomic innovation chain.

Quality is an intrinsic part of all of the organisation's endeavours; it pervades our service processes, product development, and all of our communication. In support of generating good quality outputs, the CPGR employs a modular approach to quality assurance and control. Overall, the organisation is based on the International Organization for Standardization (ISO) approach to quality management, while in projects we adhere to good clinical laboratory practice (G(C)LP) principles. During 2013, the CPGR is preparing for certification according to ISO 9001:2008, building the foundation for the accreditation of individual workflows, as needed. Relevant CPGR staff are trained in G(C)LP and in lean management principles, amongst others.

### Project management in support of life science innovation

Technological versatility is relevant in projects aimed at the development of biomarkers for

diagnosis and treatment of human diseases. Biomarker development is a lengthy process, unfolding over three essential stages: analytical validity, clinical validity and clinical utility. Often, initially promising discoveries fail to pass later development hurdles, owing to problems in the design, execution or reporting of genomic and proteomic projects. Frequently, 'omics'-driven innovation does not occur for lack of validation of research outputs<sup>2</sup>.

We believe that genuine capacity development in the modern life sciences, aimed at genomics- and proteomics-driven innovation on the African continent, rests on the triple pillars of access to world-class infrastructure, provision of high-quality affordable services, and empowerment through training, in particular in the field of data-analysis and interpretation (bioinformatics).

In order to facilitate a seamless conversion of project ideas into robust project plans, the CPGR has devised an integrated framework for the design and management of genomic and proteomic projects<sup>2</sup>. The framework was developed by taking into account CPGR expertise and inputs from external experts in the field of genomic and proteomic biomarker development. Ultimately, it is a risk-mitigation framework developed to facilitate a more effective migration of early-stage research outputs into downstream development, and translation into products and services.



Figure 2. Jo McBride, Affymetrix platform manager loading arrays into Affymetrix hybridization oven.

<sup>2</sup> For a discussion of the corresponding problems, visit <http://www.cpgr.org.za/blogspot/?p=201>