

## Cracking the 'code of life'

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Twenty bioinformatics specialists met in Cape Town last month to advance the tools critical to cracking the code of life.

Electric Genetics, Africa's first and only genome informatics company, cohosted a first for Africa – an international biohackathon.

At the two-stage event, which began last month in Arizona, US, open source bioinformatics developers from around the world met face-to-face for the first time, after months and even years of communicating electronically, in a hands-on programming event.

Results from the first half of the meeting include a new method of accessing biological sequence databases across multiple programming languages and platforms.

"This is an amazing feat," says Electric Genetics cofounder Tania Broveak Hide.

Up until now small groups of people have worked on software programs that are shared.

These tend to be libraries of 'tools' or modules that can be used when creating a larger program.

They are also centred around specific programming languages – Perl, Python or Java for example.

Researchers in the general community can see the work these small groups have done and use the modules when creating their own programs.

"Because these small groups operate independently, the programs don't talk to each other very well and that is what we were aiming to fix at the hackathon," says Broveak Hide.

The programs are used to analyse the mass of data produced by the Human Genome Project – the full complement of DNA inside every one of our cells – as well as the genome sequences of other organisms, such as mice and fruit-flies.

There are large data repositories where researchers from around the world store and publish this DNA sequence information.

This repository has no language barriers because it is the raw information that the programs analyse.

"While this new development will be a mechanism for interpreting between the major open source informatics programs, it is also giving rise to new projects, such as BioSQL, a database querying language," says Broveak Hide.

It will speed up the attempt to organise, annotate and mine the – literally – largest data set ever encountered in nature.

This will mean a reduction in time-to-discovery for academic research organisations and a reduction in time-to-market for pharmaceutical and other research-intensive organisations.

"By understanding a person's gene profile, their health can be improved and a better quality of life can be provided," says Broveak Hide.

"Already we are starting to understand how to diagnose better, by knowing that certain genes, if expressed, characterise a particular disease.

"We are also able to manufacture and administer drugs that are more likely to solve a problem for a particular patient with fewer side effects.

"Although in its infancy, we ultimately hope to be able to use gene therapy to modify a person's genes to make them better," she says.

Electric Genetics was originally founded to commercialise the technologies developed at the South African Bioinformatics Institute (SANBI) at the University of the Western Cape.

The two entities have created a fast and rare open-source development process whereby tools are designed and rapidly prototyped for SANBI scientists and their research projects.

Once the prototypes are scientifically validated, they are built in to robust systems, that can be distributed commercially.

"SANBI is using these novel bioinformatics techniques and applying them to African pathogens," says Broveak Hide.

They have identified double the number of known genes in malaria and are involved in one of several competing efforts in South Africa to develop an HIV vaccine.

Team member Junaid Gamielien has discovered that, during its evolution, the TB pathogen has stolen a number of genes from higher organisms, which it uses to blunt the host's immune response, leading to prolonged infection.

"We are in negotiations with a major multinational pharmaceutical company to sign a large collaborative research and development deal based on this technology," says Broveak Hide.

Department of Arts, Culture, Science and technology director-general Dr Rob Adam says that Electric Genetics clearly demonstrates that a South African firm is able to be distinguished as an internationally-recognised leader on biotechnology developed in South Africa, while remaining on the cutting edge in relation to worldwide software trends (open source), thus furthering research in this country and abroad.

"This creates a solid export revenue stream for a startup company in Cape Town, helping to attract much-needed investment from the international community," he says.