



Australian Government research priorities in Food and Health

RDS Omics Project, \$1m from NCRIS to VicNode, Intersect and QCIF, 2016-2017

## Strengthening our biology backbone

*Building upon three existing NCRIS-funded capabilities, the Nectar Research Cloud, RDS data services and the Genomics Virtual Laboratory (GVL), RDS Omics empowers the modern biologist to go from raw data to complex, collaborative, downstream analyses without the need to purchase expensive compute or pay for scarce bioinformaticians.*

Modern biology is being revolutionised by high-throughput molecular techniques, such as DNA sequencing and other 'omics' technologies. RDS Omics is the first Australian platform to allow genomics (DNA), transcriptomics (RNA), proteomics (proteins) and metabolomics (small molecules) data to be efficiently co-analysed, stored, shared and published from one common interface.

### Some of the research and teaching we want to do

Finding samples containing an antibiotic resistance gene

*As a biologist, I want to find all bacterial samples containing the gene conferring antibiotic resistance to methicillin.*

Teaching genomic methods – getting an overview

*As a bench scientist, I want to understand the methods behind genome assembly and annotation, to better comprehend the research objective.*

Teaching genomic methods – more advanced

*As a biologist, I want to be exposed to best-practice workflows for assembling genomic data from the latest sequencing technologies (such as long sequencing reads), and test the effect of workflow options and settings on genome assembly outcomes.*

Uploading project data to an international repository

*As a bioinformatician, I want to upload my data to the Platform and use its tool for easily submitting data subsets (with already-populated metadata) to international repositories.*

Finding differences between two genome assemblies

*As a researcher, I want to compare whole genome assemblies of two bacterial strains to find the genomic location of antibiotic-resistance genes to better understand outbreak potential.*

## What's been built so far?

A structured data environment, as well as tools and workflows encompassing genomics, transcriptomics, proteomics and metabolomics - and cross-omics systems biology, have now been incorporated into the Platform and deployed on RDS storage and the Nectar Research Cloud.

An online suite of self-directed training materials has already been used in a series of workshops to introduce users to the full capabilities of the platform.

## What's next?

Data from the national Antibiotic Resistant Pathogens Initiative (funded by Bioplatforms Australia) is being uploaded to the Platform through 2017. This will enable timely research on infectious blood pathogens responsible for antibiotic resistant sepsis (blood poisoning). The reference data can then be: co-analysed and stored in one system; managed through a common data management system; have bioinformatics analysis performed on it via a common interface; made accessible to biology researchers in Australia and internationally; and, published to international repositories.

*FUTURE RELEASES OF THE PLATFORM ARE SCHEDULED THROUGHOUT 2017.*

## Assessing our impact

The RDS-Omics project is an excellent example of the collective impact\* arising from strategic and collaborative actions by key leaders of backbone organisations.

***Would this work be carried out by individual organisations/researchers in the same time frame?***

NO. World-class Australian researchers who are not usually funded to build such tools, have been co-opted to the project – sharing their expertise across the research community.

***Has the vision of the project now shifted to see a developing role for it in the future?***

YES. This will be an easily-accessible portal for new Omics data sets of national research importance such as the Koala Genome, Oz Mammals and other Bioplatforms Australia reference data. Plans are underway for Australian Genome Research Facility (AGRF) transcriptomic data to be saved directly to an online data repository for collaborative access on the Nectar Research Cloud.

***Is there a role for the project in feeding back to users' data from the project which in turn aids further community development?***

YES. The next phase of the project is to carry out user testing and evaluation to determine what is most useful, what could be improved and what might be customised to meet other needs. It will evolve according to that community exchange.

***Can the project be used as an example to explain to the public the value of investment in these, often, invisible processes?***

YES. For example, severe sepsis and septic shock affects tens of thousands of people every year in Australia and causes the loss of millions of health dollars. Antibiotic resistance is rising and new solutions need to be found. Australia needs to contribute to this effort if we are to maintain our strong collaborations with our international public health counterparts.

*\* Refer Turner et al (FSG Consulting), Understanding the value of backbone organisations in collective impact, Stanford Social Innovation Review, July 2012.*

