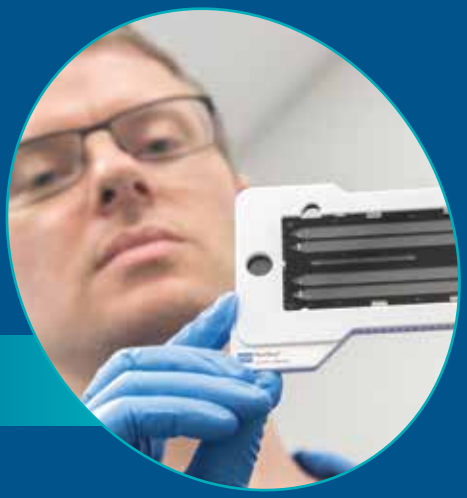
GENOMICS



TRANSCRIPTOMICS

UNSW AUSTRALIA

Ramaciotti Centre for Genomics

Annual Report 2016

Never Stand Still | Science | Ramaciotti Centre for Genomics

METAGENOMICS

EPIGENETICS

SINGLE CELL

Ramaciotti Centre for Genomics

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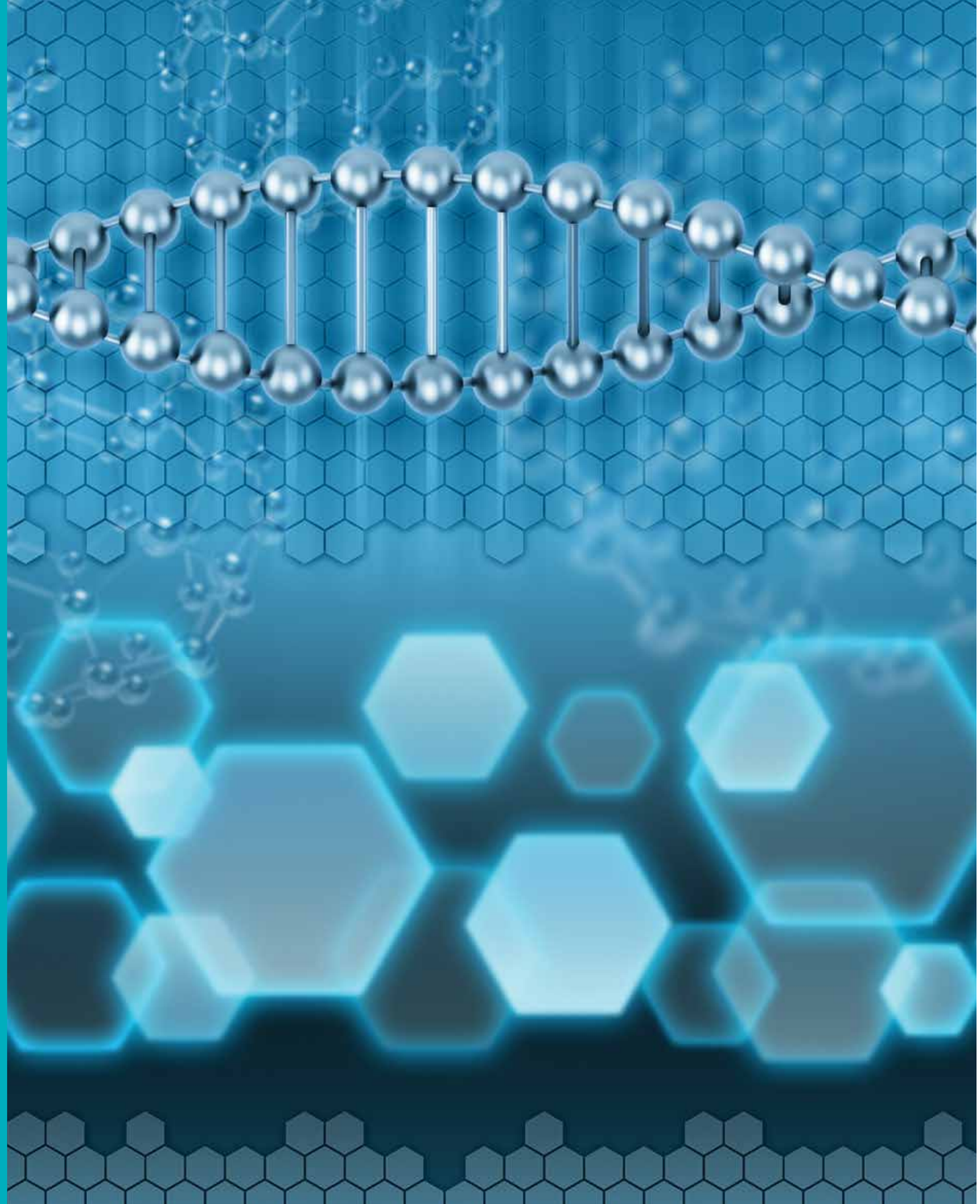


The **Ramaciotti Centre for Genomics** supports research at UNSW and Australia-wide by offering genomic services to academic and industry based research groups.

Mission

To deliver internationally competitive genomic services to the Australian Research Community.

Objectives

The Ramaciotti Centre for Genomics aims to:

- Provide our users with enabling technology and services, to facilitate internationally competitive research
- Provide genomics and related services to the highest possible quality
- Provide support for bespoke and niche projects
- Provide services at competitive rates
- Build the genomics community in the state of NSW and beyond

Partners

The Ramaciotti Centre exists as a collaboration between major universities and research institutes in New South Wales.

Supported by

Member of

CONTENTS

Professor Marc Wilkins, Director

DIRECTOR'S REPORT

It's been another exciting year at the Ramaciotti Centre for Genomics. The koala genome project was finished, having been entirely sequenced by long-read technology at the Centre, and now represents the highest quality marsupial genome. In 2016, more than 110 research papers were published that acknowledged the Centre's support. We introduced the new Nanostring service, in collaboration with the UNSW School of Women's and Children's Health, and, installed a 10X Genomics Chromium system. We also signed off on plans for our new custom-built facility, which we will move into in 2017.

In 2016, demand for the Centre's technology and services has continued to grow. We served over 500 researchers this year, from universities, medical research institutes, publicly funded research agencies and from industry. Remarkably, a total of 53,714 samples were analysed in 2016. This included a dramatic increase in use of short-read and long-read next-generation sequencing: we analysed 16,644 samples on our Illumina and PacBio platforms, representing a 45% increase on 2015. Our Sanger sequencing service continued to be popular, sequencing almost 30,000 user samples, and almost 4,000 other samples were analysed by microarray or on the Fluidigm qPCR platform. To help meet the increased demand, we continued our adoption of robotics and a Centre-wide LIMS (laboratory information management system). Our unsung IT hero, Robin Heron, managed a seamless transition to the Centre's new and expanded computer cluster and data storage system. The Centre also adopted Illumina Base Space as part of its data management solution.

We have had continued success in 2016 with external funding. A total of $2M was awarded to Bioplatforms Australia, from the NCRIS Agility fund, for new genomics infrastructure at the Ramaciotti Centre and at AGRF. A special $300k grant from the NSW State Government was also secured to help with the acquisition of new technology. This was via the Research Attraction and Acceleration Program (RAAP). We continued to receive operational support from Federal Government NCRIS and from the University of New South Wales. Together with the ongoing success of the Centre's fee-for-service work, which covers the majority of the Centre's activities, the financial position of the Centre remains very sound.

The Centre's activity and ongoing success has only been possible because of its dedicated, good humored and skillful staff. I warmly congratulate them for the pride they take in their work, their efforts to tirelessly support the community and the professionalism they show in everything they do. We were happy to have Dr Zena Kassir, Dr Stefano Vecchiarelli and Dr Angela Chilton join the Centre in 2016, to help meet the growing demand for next-generation sequencing. We were also proud that Dr Helena Mangs, who co-manages the Illumina service, was selected by UNSW for the prestigious PWIL (Professional Women in Leadership) program. However we were sad to say goodbye to Dr Kylie Cairns, who moved on to continue with her research in conservation genetics. We wish her the very best for her future.

Last but by no means least, I'd like to thank Dr Helen Speirs. Helen's remarkable energy, enthusiasm, business acumen and management skill have again been a driving force in the Centre. In 2016, I was delighted that Helen not only continued as Centre Manager, but was appointed as the Deputy Director. She replaced Dr Kevin Morris in the role, who stepped down from the Steering Committee when he moved back to the USA. Institutional representation is critical to the Centre's governance, and I thank the representatives from other Universities and Medical Research Institutes for their ongoing contributions to the Steering Committee. I also thank the Committee's chair, Prof Ian Dawes and the acting Dean of Science Prof Peter Lovibond, for their input and sage advice in 2016.

We look forward to further supporting the genomics research community in 2017.

Professor Marc Wilkins
Director

STEERING COMMITTEE

Independent Chair
Professor Ian Dawes

Director
Professor Marc Wilkins
UNSW Sydney

Deputy Director
Dr Helen Speirs
UNSW Sydney

A/Professor Aaron Darling
University of Technology, Sydney

Professor Edward Holmes
University of Sydney

Professor Peter Lovibond
UNSW Sydney

Professor John Mattick
Garvan Institute for Medical Research

A/Professor Debbie Marsh
Kolling Institute of Medical Research

Professor Ian Paulsen
Macquarie University

Professor Rodney Scott
University of Newcastle

Dr Catherine Suter
Victor Chang Cardiac Research Institute

Alternates

Professor Steven Djordjevic
for Professor Ian Charles

Professor Nicki Packer
for Professor Ian Paulsen

Professor Claire Wade
for Professor Edward Holmes

CENTRE STAFF

Back row (L–R): Jackie Chan, Kristin North, Alper Yasar, Darshi Ramesh, Zena Kassir
Front row (L–R): Stefano Vecchiarelli, Marc Wilkins, Helen Speirs, Helena Mangs, Tonia Russell, Erika Becker, Jason Koval, Carolina Correa Ospina

The Ramaciotti Centre Team

Our professional team of scientists have many years of experience delivering genomic services. 70% of our staff are PhD qualified and bring experience from a variety of research disciplines including biomedical, environmental and biotechnology.

This year we welcomed three new staff members to the team, Angela Chilton, Zena Kassir and Stefano Vecchiarelli. We also said farewell to Kylie Cairns in July. Kylie leaves us to pursue a career in research in the field of conservation.

Centre Manager
Helen Speirs

Illumina Next Generation Sequencing Specialists
Jason Koval
Helena Mangs
Kylie Cairns
Angela Chilton
Zena Kassir
Caitriona Murray
Darshi Ramesh
Stefano Vecchiarelli
Alper Yasar

PacBio Sequencing Specialists
Tonia Russell
Carolina Correa Ospina

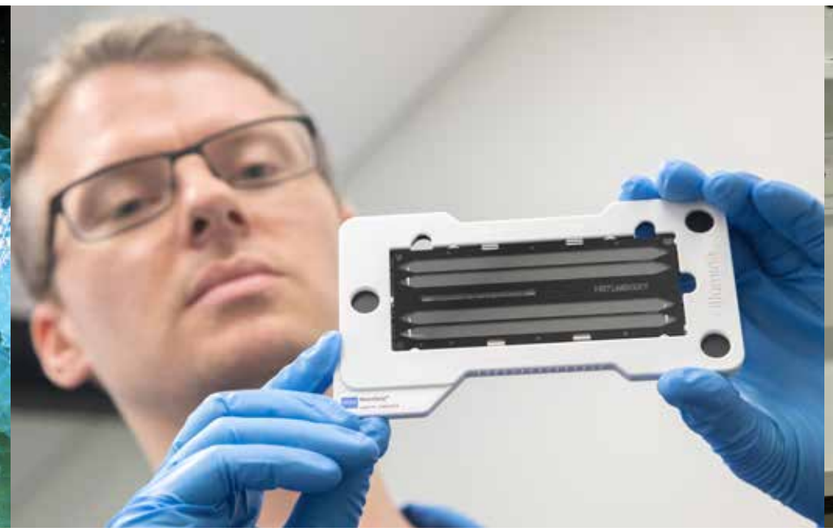
Microarray Specialist
Erika Becker

Sanger Sequencing Specialist
Jackie Chan

qPCR & Single Cell Genomics Specialist
Kristin North

IT Support
Robin Heron

CENTRE SERVICES



The Ramaciotti Centre for Genomics is committed to building world-class genomic research capability and capacity. As a National Collaborative Research Infrastructure (NCRIS) funded facility we provide access to state-of-the-art technologies and deliver data of the highest quality to the research community. The Centre supports basic research in the biomedical sciences, agriculture and the environment and applied research in biotechnology and the food sciences.

In 2016 it provided services to more than 500 research groups. It has a comprehensive suite of technology, including short- and long-read next generation sequencers, platforms for single cell analysis and for high throughput genetic screening of populations. It analysed more than 16,000 samples on next generation sequencing platforms, and undertook more than 37,000 other analyses.

Our ongoing commitment to delivering high quality data is demonstrated in our Illumina Certified Service Provider (CSPro), PacBio Certified Service Provider and Authorised Affymetrix Service Provider status.

next generation sequencing
microarray genotpying and qPCR
single cell analysis Sanger sequencing
quality control service bioinformatics

Next Generation Sequencing

The Ramaciotti Centre delivers next-generation sequencing services using a range of technologies, allowing us to support a broad range of sequencing projects.

Sequencing Services

- Whole genome
- Exome
- Targeted/panel sequencing
- RNA and small RNA seq
- ChIP and methyl seq
- Single cell sequencing
- Metagneomics
- Microbial profiling – amplicon

Sequencing Technology

- Pacific Biosciences RSII
- Illumina HiSeq 2500
- Illumina NextSeq 500
- Illumina MiSeq
- 10X Genomics Chromium

Microarray

We provide a comprehensive range of services on three different microarray technology platforms. We have access to an extensive portfolio of arrays for RNA and DNA analysis for a diverse range of species.

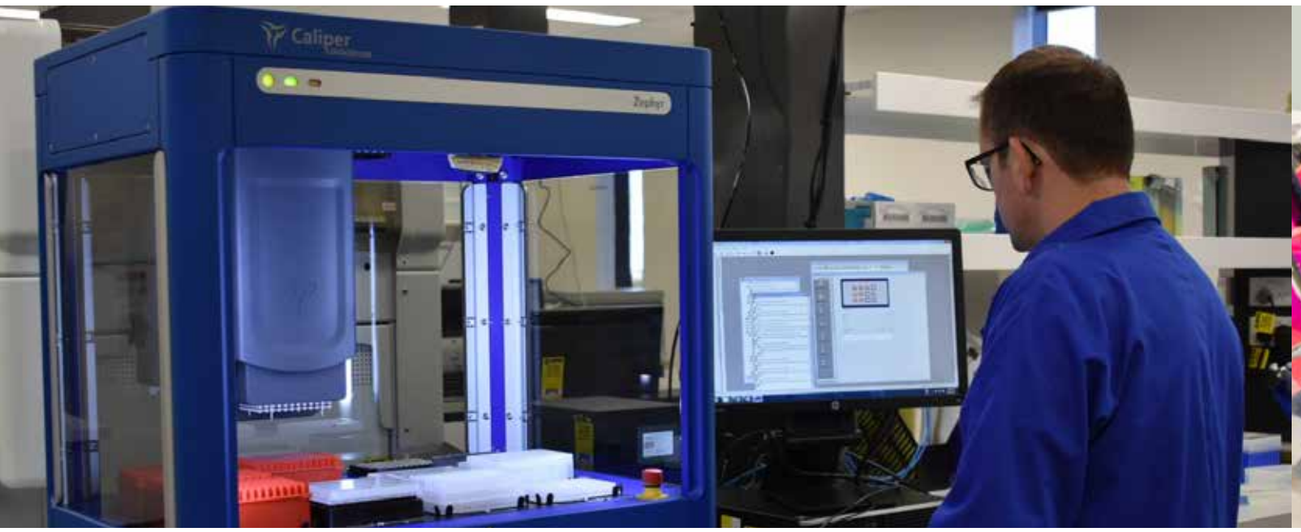
Services

- Gene expression
- Transcriptome
- miRNA analysis
- SNP, CGH and CNV
- FFPE copy number
- Custom arrays

Microarray Technology

- Affymetrix
- Agilent
- Illumina

CENTRE SERVICES



SNP Genotpying and qPCR Services

The Ramaciotti Centre is equipped with a Fluidigm BioMark HD system for high-throughput real time PCR. The system utilises multiple chemistries and offers unparalleled throughput for real-time PCR and SNP genotyping.

Services

- Gene expression
- SNP genotyping
- Sample identity tracking (SNPTrace™)

Single Cell Services

Using the Fluidigm C1™ Single Cell Auto Prep System the Centre can provide a range of single cell services.

Services

- Gene expression profiling (qPCR)
- mRNA sequencing
- Whole genome sequencing
- Exonic sequencing
- Targeted sequencing

Sanger Sequencing

We provide Sanger sequencing and genotyping services using an Applied Biosystems 3730 DNA Analyzer.

Services

- DNA sequencing
- Genotyping

Quality Control Services

The Centre offers a nucleic quality control (QC) service using the Agilent 2100 Bioanalyzer and TapeStation and the LabChip GX.

Services

- RNA integrity analysis (RIN)
- DNA integrity analysis (DIN)

Bioinformatics

The Centre has continued its longstanding collaboration with the NSW Systems Biology Initiative (the SBI) for the analysis of data. The SBI has expertise in:

- genome assembly and annotation
- comparative genomics
- *de novo* transcriptomics and differential expression analysis by RNA-seq
- pathway, network and systems-level analysis of transcriptomic data
- data analysis from microarray platforms
- network visualization
- integrative analysis of transcriptomic and proteomic data.

The SBI works with users of the Ramaciotti Centre collaboratively and also welcomes researchers to work inside the SBI on a ‘research hotel’ basis.

The Centre has an excellent track record in service provision, routinely delivering high quality services in both genomics and transcriptomics.

Summary of services provided to the research community in 2016:

29,946
samples sequenced analysed by Sanger sequencing

16,644
samples sequenced by next generation sequencing

3,281
samples analysed on QC platforms

2,029
samples analysed by micorarray

1,824
samples analysed on Fludigm technology

OPERATIONAL REPORT

The Centre delivers high quality, state-of-the-art genomic and transcriptomic services to the research community. During 2016 the Centre:

- Analysed a total of 53,724 samples
- Increased the number of analyses performed by next-generation sequencing by 45% on the previous year
- Introduced a NanoString service

Illumina Next Generation Sequencing Service

The Illumina next generation sequencing service continues to grow and diversify. The number of samples analysed on Illumina sequencing platforms, and the number of sequencing runs performed have increased year on year since the service was introduced in 2009, refer to the graphs opposite. The number of samples submitted for the microbial diversity profiling/amplicon service continue to increase, as researchers investigate the influence of the microbiome in environmental and biomedical samples and in biotechnology production processes. Samples submitted for transcriptomic analysis also continue to increase as projects transition from microarray to RNA sequencing. The Centre also now offers low input RNA sequencing and ribosomal reduction services as part of its transcriptomic services.

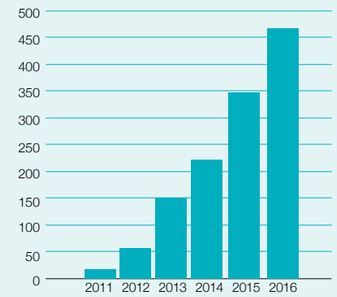
PacBio Sequencing Service

The PacBio RSII sequencing service has taken off and established the Centre as the leading provider of long read sequencing data in Australia. Sample numbers increased on the previous year and the number of SMRT cells run increased by 100%. Most of the samples sequenced were DNA samples from bacteria or fungi, facilitating easier genome assembles than with short read data. 2016 saw the introduction of two new services, long read amplicon, and iso-seq for RNA analysis.

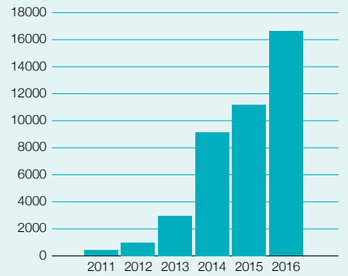
New Service: NanoString Panels

During the year, the Centre started to offer a Nanostring service using the nCounter Analysis System located at UNSW's School of Women's & Children's Health. The system can be used to analyse gene expression including miRNAs, perform SNV genotyping and analyse protein expression. NanoString technology has some advantages over qPCR, the assays work well on small sample amounts from a variety of sources including FFPE and lysates, and assays can be highly multiplexed -up to 800 genes in a single tube. Pre-designed gene expression panels are available for cancer, inflammation and immunology.

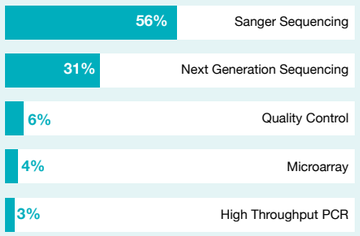
Number of Next Generation Sequencing Runs Performed by Year



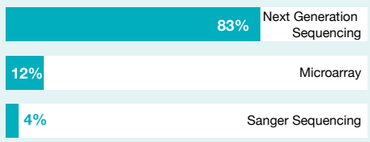
Number of Samples Analysed by Next Generation Sequencing by Year



Samples Analysed by Service



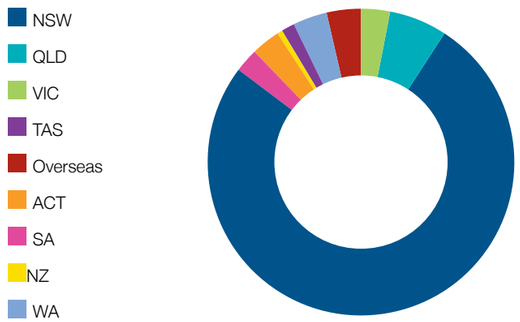
Revenue by Service



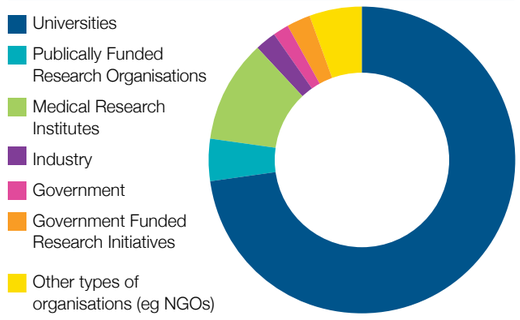
CUSTOMER PROFILE

The Centre has a customer base of over 500 researchers from academia and industry. We serve all the leading universities and research institutes in Australia and support a wide range of research covering many disciplines.

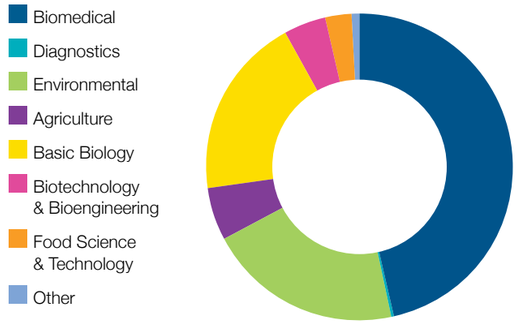
Customers by State or Country



Customers by Type



Customers by Discipline



A
Academia Sinica – Taiwan
Asbestos Disease Research Institute
Australian Antarctic Division
Australian Institute of Marine Sciences
Australian Museum
Australian National Herbarium
Australian National University
Australian Wine Research Institute
ANZAC Research Institute

B
Beijing Biomarker Technologies - China
Biosceptre Australia

C
Centenary Institute
Children's Cancer Institute
Children's Hospital at Westmead
CSIRO Agriculture
CSIRO Animal, Food and Health Sciences
CSIRO Black Mountain
CSIRO Food & Nutrition
CSIRO Land & Water
CSIRO Oceans & Atmosphere
Curtin University
Cytox – United Kingdom

D
Deakin University

E
Edith Cowan University
Elizabeth Macarthur Agricultural Institute
EnGeneIC limited

G
Garvan Institute of Medical Research
Genea

I
Institute of Dental Research

J
James Cook University

H
Harry Perkins Institute of Medical Research
Heart Research Institute

K
Kirby Institute
Kolling Research Institute

M
Macquarie University
Melanoma Institute Australia
Microbiogen
Monash University
Murdoch Children's Research Institute

N
National Centre for Genetic Engineering and Biotechnology – Thailand
National Measurement Institute
Neuroscience Research Australia

O
Olivia Newton John Cancer Centre

P
Peter MacCallum Cancer Centre
Plant and Food Research – New Zealand

Q
Queensland Berghofer Institute of Medical Research

R
Royal Botanic Gardens
Royal North Shore Hospital
Royal Prince Alfred Hospital

S
Stephen Sanig Research Institute
SpeeDx
Strain Biotech - Mexico
St Vincent's Centre for Applied Medical Research
St Vincent's Institute

T
Technical University of Denmark
Telethon Kids Institute

U
University of Adelaide
University of Canberra
University of Newcastle
University of New South Wales
University of Queensland
University of Melbourne
University of Padova – Italy
University of the Sunshine Coast
University of Sydney
University of Tasmania
University of Technology Sydney
University of Western Sydney
University of Western Australia

V
Victor Chang Cardiac Research Institute

W
Westmead Millennium Institute
Westmead Institute for Medical Research

HIGHLIGHTS FROM 2016

Genomics Infrastructure Grant- Advancing Australia's Genomics Capability

In 2016 Bioplatforms Australia, in association with the Ramaciotti Centre and the Australian Genome Research Facility, secured a $2 million grant from the National Collaborative Research Infrastructure Strategy (NCRIS) Agility Fund. This funding will provide a much needed boost to Australia's next generation sequencing capacity and support breakthrough research in the biomedical sciences, agriculture and the environment.

Visit by Australia's Chief Scientist

As part of an evaluation of selected NCRIS facilities, Australia's Chief Scientist, Dr Alan Finkel AO, and members of an Expert Working Group tasked with developing the 2016 National Research Infrastructure Roadmap visited the Ramaciotti Centre for Genomics in August 2016. This was a great acknowledgement of the high profile the Ramaciotti Centre has in the field of genomics. Members of the group included Prof Adrian Byrne, CEO of the ARC, Dr Andrew Cuthbertson, CSO of CSL, the DVC Research UNSW, Prof Nicholas Fisk and A/Prof Grainne Moran, PVC Research Infrastructure, UNSW.

Andrew Cuthbertson, Alan Finkel and Marc Wilkins

Successful Application to the NSW State Government RAAP

The Ramaciotti Centre successfully applied for funding from the NSW State Governments Research Attraction and Acceleration Program (RAAP) and received a $300,000 grant towards genomic infrastructure. This funding will be in conjunction with NCRIS Agility funding to purchase a high throughput sequencing platform.

Koala Genome

The Ramaciotti Centre completed the sequencing of the koala genome using PacBio long-read technology. The genome was then assembled by the Systems Biology Initiative and is the highest quality marsupial genome to date. The genome has already underpinned dozens of investigations on koala biology, including conservation, disease management and on the detoxification of terpenes in their eucalyptus-leaf diet. These studies have been led by Prof. Rebecca Johnson (Australian Museum) and the Koala Genome Consortium.

HIGHLIGHTS FROM 2016

Ongoing Industry Collaboration

The Ramaciotti Centre for Genomics has continued its collaborations with industry; in 2016, this included a collaboration with the biotechnology company Microbiogen. In this ARC linkage-funded project, yeast strains with a capacity to grow on xylose are being sequenced. Bioinformatic analyses, undertaken by Dr Richard Edwards team and staff in the Systems Biology Initiative, are then being used to understand the potential of these strains in the biofuel industry.

Acquisition of 10X Genomics Chromium System

In 2015 the Centre applied to the UNSW Major Research Equipment and Infrastructure Initiative Scheme for funding to expand its next generation sequencing capacity. This funding was used in 2016 to purchase a 10X Genomics Chromium system. The Chromium system enhances our *de novo* assembly capability by providing long-range information on a genome-wide scale and expands our single cell capabilities by facilitating deep profiling of complex cell populations.

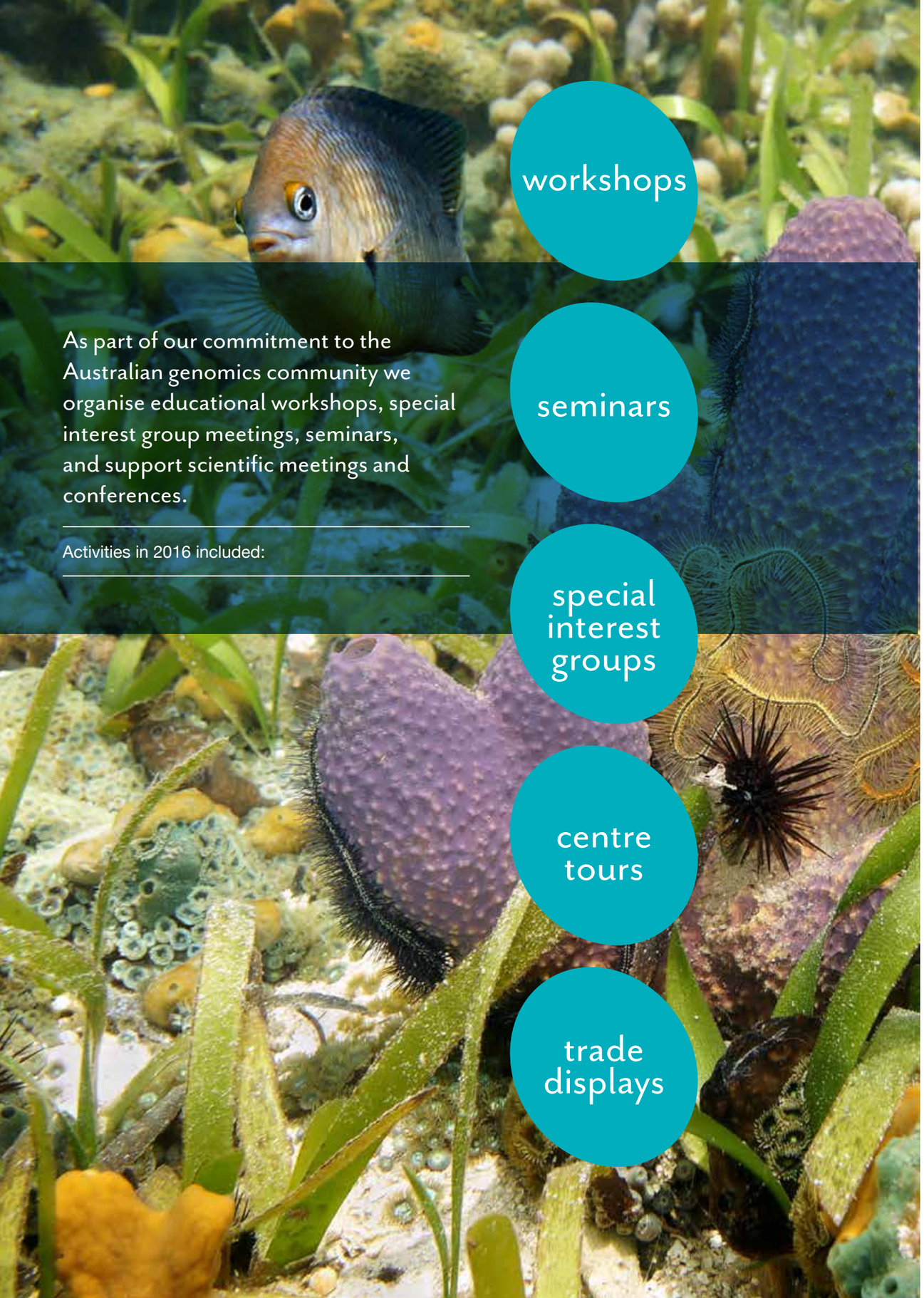
A Safe Workplace – SafeWork NSW Audit

The Ramaciotti Centre's laboratories and work health and safety procedures were reviewed during a SafeWork NSW audit of UNSW. The Centre's laboratories and the systems in place to maintain a safe working environment impressed the auditors. UNSW received a 91% pass mark, the highest that has been awarded to UNSW during such an audit.

National Framework Dataset Programs

The Centre continues to work on a number of Bioplatforms Australia funded framework dataset projects. These projects seek to build biomolecular datasets that have impact on problems of importance to Australia. Projects that we are currently involved in include:

- Marine Microbes – profiling of marine microbial communities in various locations and habitats
- Stem Cells – characterisation of stem cell populations using single cell sequencing
- Antibiotic Resistant Pathogens – sequencing pathogens to understand virulence and resistance to antibiotics
- Oz Mammals Genomics – genome sequencing of Australian mammals under threat or facing extinction



As part of our commitment to the Australian genomics community we organise educational workshops, special interest group meetings, seminars, and support scientific meetings and conferences.

Activities in 2016 included:

PROMOTIONAL ACTIVITIES

Workshops

Next Generation Sequencing Workshop – 8th July
The Ramaciotti Centre and Illumina organised a half day symposium to educate new users on the use of next generation sequencing technology to advance their research. The session included fundamentals of NGS, experimental planning and data analysis

Partek Data Analysis Workshop 8th July
The Centre hosted a one-day data analysis workshop delivered by Partek. This free workshop provided instruction on analysing transcriptome data from next generation sequencing. The Ramaciotti Centre has a Partek licence, allowing workshop attendees to subsequently analyse their experimental results independently.

PacBio Sequencing Workshop 27th October
Researchers interested in long read sequencing were invited to a one-day workshop designed to give an overview of how PacBio long read sequencing can be utilised in large genome research. The workshop covered both applications and bioinformatics tools available for long read data analysis.

Next-Generation Sequencing Special Interest Group Meetings

The Ramaciotti Centre, in association with the Australian Genome Research Facility, organises the 'NSW Next-Generation Sequencing Special Interest Group meeting'. This special interest group was established to encourage discussion and interactions around next generation sequencing. Seminars are held at different locations across Sydney.

7th April | UNSW
Speakers:
Prof Susan Ramus (UNSW)
"Large Scale Sequencing of Cases and Controls to Identify Rare Variants for Ovarian Cancer Susceptibility"

Dr Nadeem O Kaakoush (UNSW)
"Towards a role for the microbiota in the oesophageal adenocarcinoma cascade."

11th August | UNSW:
Speakers:
Dr Richard Bagnall (USyd)
"Genetic approaches to investigate heart failure and sudden cardiac death"

Paulette Barahona (Genea)
"The application of MPS for the determination of aneuploid in Non Invasive Prenatal Screening"

1st December | Kinghorn Centre for Clinical Genomics:
Speakers:
Dr David Gallego-Ortega
(Garvan Institute for Medical Research)
"Unravelling breast tumour cell diversity using highly parallel single-cell RNA-seq"

Dr John-Sebastian Eden (USyd)
"Using RNA-seq for pathogen discovery in Australian wildlife disease outbreaks."

Technology Seminars

The Ramaciotti Centre regularly hosts technology seminars by vendors that showcase the latest developments in the field of genomics:

16th June
"Understanding your Biology from Every Cell"
Dr Joy Kang (Field Application Specialist, Fluidigm)

29th June
"The 10X Genomics Platform"
Dr James Miller (Genomics Product Manager, Millennium Science)

14th September
"Nucleic Acid Archival, Amplification and Target Enrichment for Precision Medicine Programs: A Complication of Discovery and Diagnostic Applications"
A/Prof Andrew Brooks
(Chief Operating Officer, Rutgers University Cell and DNA Repository)

PROMOTIONAL ACTIVITIES

Education and Training

Microarray and sequencing data generated by the Centre features in the work of many Honours and PhD students. Students from UNSW and other educational organisations benefit from its resources. In a typical year over 100 PhD/Honours/Diploma/MPhil students will benefit from the Centre's resources and expertise.

The Ramaciotti Centre provides tours of the facility to groups of university and school students. This year we provided tours of the Centre to over 200 second and third year students studying cell biology, pathology, biotechnology and genomics, providing students with an overview of high throughput genomics and its application in their area of study.

As part of our commitment to educating the broader community on the applications of genomics we provided tours of the facility to 22 female, indigenous students from around Australia attending the UNSW Nura Gilli Winter school, 50 work experience students from high schools in the Sydney area, 15 L'Oreal Australian Girls in Science, and 15 students attending the UNSW Gifted Education Research and Resource Centre (GERRIC). Dr Helen Speirs also represented the Centre at the UNSW Science 50:50 International Women's Day career expo at the Australian Maritime Museum, a networking session providing high school girls the opportunity to find out more about the different roles for women in science.

Marketing

The Centre continues to promote its services in various ways. Helena Mangs presented at the Illumina Ignite Workshop (7th April) and Tonia Russell presented at the PacBio Asia Pacific User Group Meeting in Singapore (8-10th June). In addition to its website, the Centre keeps an online presence by using Twitter and Facebook.

Conferences

The Ramaciotti Centre exhibited at key conferences over the last 12 months:

- Lorne Genome, Lorne (14–16th February 2015)
- Joint Academic Microbiology Symposium (16th March 2016)
- ASMR – NSW meeting, Sydney (6th June 2016)
- Australian Genomics Technologies Association Auckland (9–12th October 2016)

Publications

The Ramaciotti Centre does not conduct its own research; nonetheless, in 2016 the Centre was acknowledged as the service provider in 112 peer reviewed publications and Centre staff were authors on paper featuring data generated by the microbial profiling service. Selected examples of publications acknowledging the Centre demonstrate the diversity of projects supported by the Ramaciotti Centre.

Publications by Staff

Introducing BASE: the Biomes of Australian Soil Environments soil microbial diversity database. Bissett, A et al. *GigaScience* (2016)

Selected Publications by Service

Next Generation Sequencing Service

Unravelling core microbial metabolisms in the hypersaline microbial mats of Shark Bay using high-throughput metagenomics. Ruvindy R et al. *The ISME Journal* (2016)

RNA-Seq analysis of Gtf2ird1 knockout epidermal tissue provides potential insights into molecular mechanisms underpinning Williams-Beuren syndrome. Corley S et al. *BMC Genomics* (2016)

Genome analysis and avirulence gene cloning using a high-density RADseq linkage map of the flax rust fungus, Melampsora lini. Anderson C et al. *BMC Genomics* (2016)

Consensus pan-genome assembly of the specialised wine bacterium Oenococcus oeni. Sternes P et al *BMC Genomics* (2016)

Effects of temperature stress and aquarium conditions on the red macroalga Delisea pulchra and its associated microbial community. Zozaya-Valdés E et al. *Frontiers in Microbiology* (2016)

Next Generation Sequencing & Microarray Services

Transcriptome analysis of human brain tissue identifies reduced expression of complement complex C1Q Genes in Rett syndrome. Lin P et al. *BMC Genomics* (2016)

Microarray Service

Directing an artificial zinc finger protein to new targets by fusion to a non-DNA-binding domain. Lim W.F, et al. *Nucleic Acids Research* (2016)

High content screening application for cell-type specific behaviour in heterogeneous primary breast epithelial subpopulations." Johnston RL, et al. *Breast Cancer Research* (2016)

Outside-in? Acute fetal systemic inflammation in very preterm chronically catheterized sheep fetuses is not driven by cells in the fetal blood. Kemp M, et al. *American Journal of Obstetrics and Gynecology* (2016)

Inhibition of miR-154 protects against cardiac dysfunction and fibrosis in a mouse model of pressure overload. Bernardo B.C, et al. *Scientific Reports* (2016)

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