

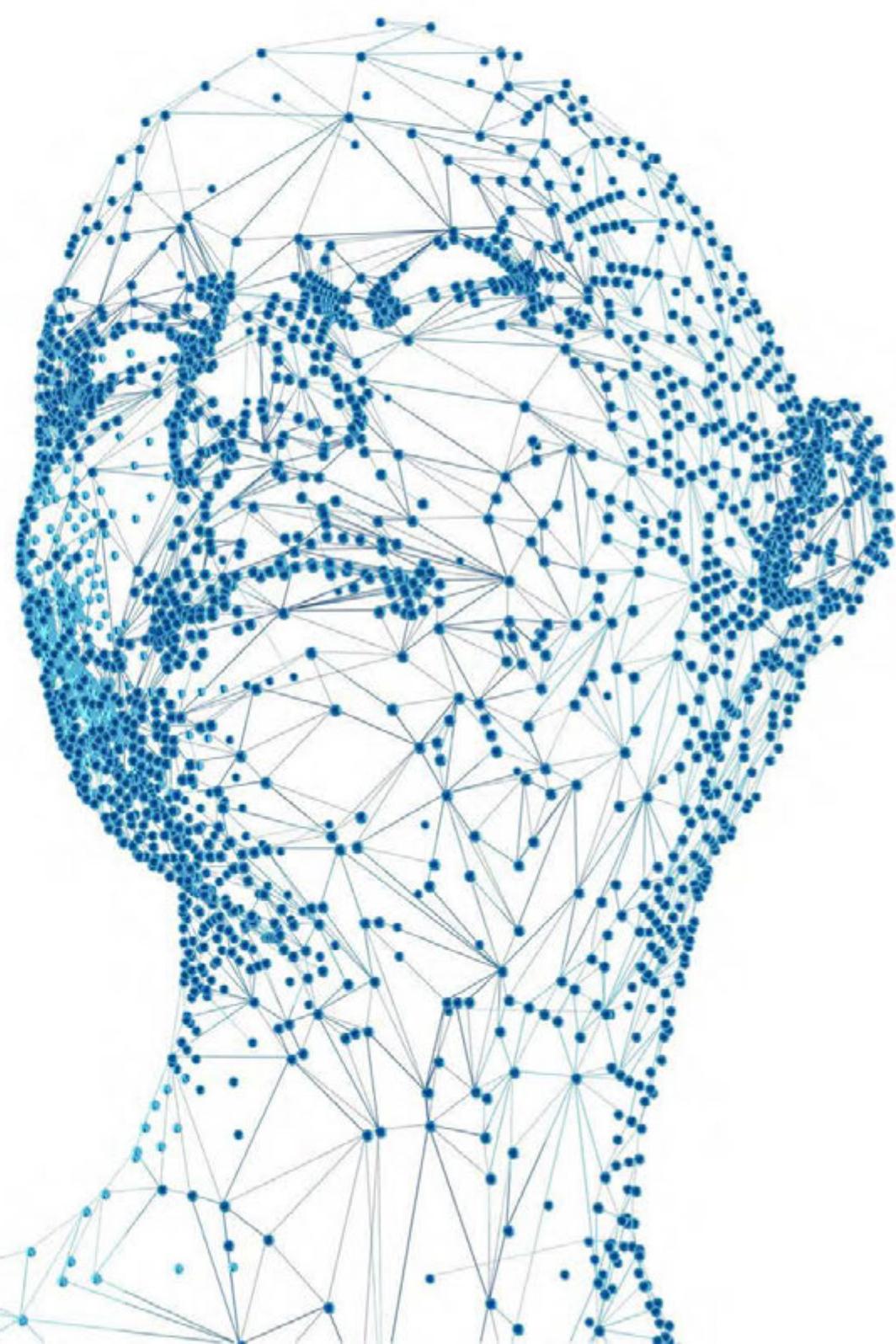


Melbourne Bioinformatics

BIOINFORMATICS + DATA SERVICES + INFRASTRUCTURE, FOR LIFE SCIENCES TODAY

ANNUAL REPORT 2017

*Providing bioinformatics support
for all researchers and students
in Melbourne's biomedical and
biosciences precinct.*





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BIOINFORMATICS + DATA SERVICES + INFRASTRUCTURE, FOR LIFE SCIENCES TODAY

It was a big year for Melbourne Bioinformatics in 2017. It's been 12 months already since we changed our name to better reflect where we sit in the research community, and we are firmly embedded in the Melbourne biomedical and biosciences precinct.

As part of the University of Melbourne community, our staff are heavily engaged in teaching and training, including designing and running hands-on and online workshops, the supervision of postgraduate research students with partners across the Parkville precinct, and making major contributions to lecturing and coordination of the MSc (Bioinformatics). During 2017, our bioinformaticians led and contributed to many publications in leading bioinformatics and scientific journals. Our experts have directly received significant grants from state, national and international funding bodies and



industry, including the likes of the Department of Health and Human Services (Victoria), NHMRC, the Wellcome Trust and Amazon. They have supported a multitude of projects to achieve successful grants and deliver on their milestones.

We have engaged with a diverse range of partners from the Precinct, as we hope many of you who have attended training sessions, sought expert advice or engaged in research projects with our staff will know. If you are yet to interact with Melbourne Bioinformatics, please let us know how we can support your research in the future.

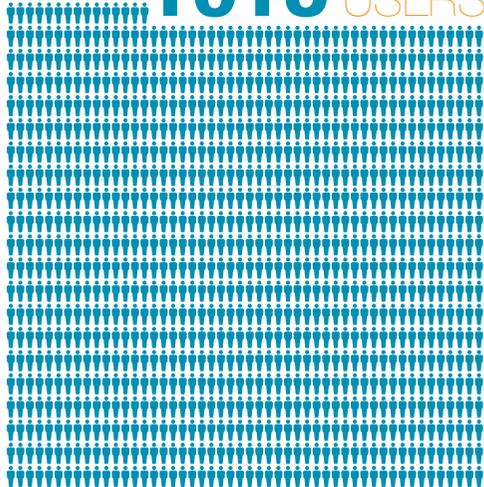
Andrew Lonie

Director

Melbourne Bioinformatics &
EMBL Australia Bioinformatics Resource (EMBL-ABR)

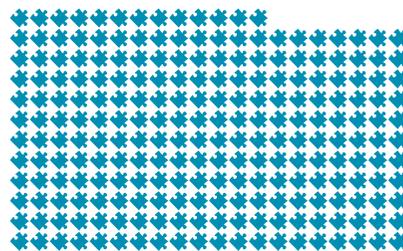
2017 SNAPSHOT

1015 USERS



Melbourne Bioinformatics provides high calibre life scientists with access to computational research resources.

233 PROJECTS



Melbourne Bioinformatics enabled over **\$35M worth of grants**, drawing international and local investment for the development of research infrastructure (industry grants) or for supporting our subscribers' laboratory research activities:



\$8.9M INDUSTRY GRANTS



\$26.1M RESEARCH GRANTS

This research project would not have been funded or able to begin without the staff expertise, support and infrastructure provided by Melbourne Bioinformatics.

Assoc Prof Daniel Buchanan,
Buchanan Laboratory: Oncogenomics,
Clinical Pathology, Melbourne
Medical School.



Melbourne Bioinformatics' computers and people enabled research that was credited in:



118
PUBLICATIONS



140
PRESENTATIONS

81% USERS

said that **access** to Melbourne Bioinformatics was important / very important for carrying out their project

80% USERS

had a good / very good experience with the Melbourne Bioinformatics' **e-mail help service.**

We have completed multiple analyses of large imaging datasets - 175 patients imaged 4 times over 3 years, plus started looking at new cohorts of patients. Our group published 6 papers in 2017 using results partly or wholly obtained with the use of this resource. The work is supported by a large NHMRC grant with 10 CIs from Australia, USA and Germany. We have always been impressed by the collaborative nature of Melbourne Bioinformatics and our access to high-performance computing. The appeal of a local resource is also great.

Assoc Prof Amy Brodtmann, Heart Foundation Fellow, Deputy Director of the Melbourne Dementia Research Centre, Co-Head Dementia Theme at The Florey Institute of Neuroscience and Mental Health, Director of Eastern Cognitive Disorders Clinic, Cognitive Neurology Clinical Lead at the Royal Melbourne Hospital.

TRAINING AND COMMUNITY

In 2017, Melbourne Bioinformatics focussed heavily on empowering life science researchers across the Precinct through training and developing their independence in applying new bioinformatics skills. In addition to the growing program of hands-on training workshops, new online training resources were made available to all. The training content is developed by leaders in the field and is complemented by the 'easy-on' analysis platforms that Melbourne Bioinformatics developed and supports. Led by Assoc Prof Daniel Park, the Melbourne Bioinformatics Platform has provided expert consultation to

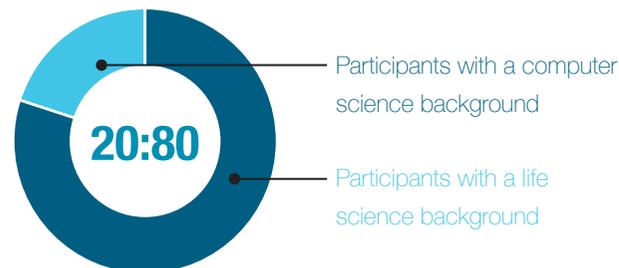
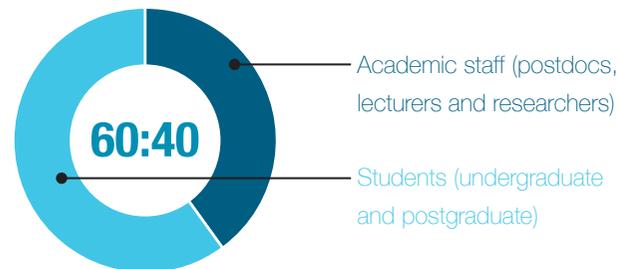
diverse groups around the University, guiding best-practice analytical approaches and covering all facets of biology. Our model of maintaining world-class expertise necessitates collaborative engagement on leading-edge research projects. Our bioinformaticians have been employing machine-learning approaches to optimise renal transplant systems, conducting Australian zoological population genetics analyses and visualising cell membrane structures in malaria-infected blood cells to name but a few projects.



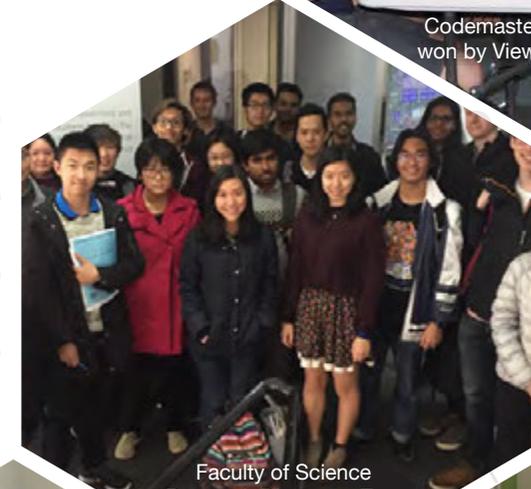
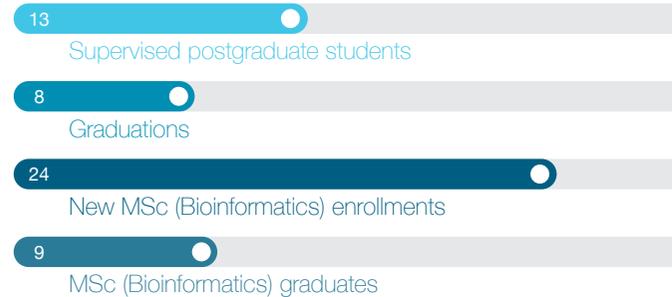
Codemasters 2017 was won by Viewbank College

WORKSHOPS

19 WORKSHOPS
320 PARTICIPANTS



POSTGRADS IN 2017



Faculty of Science Research Discovery Tour

SOCIAL MEDIA

760 eNewsletter subscribers
525 Twitter followers

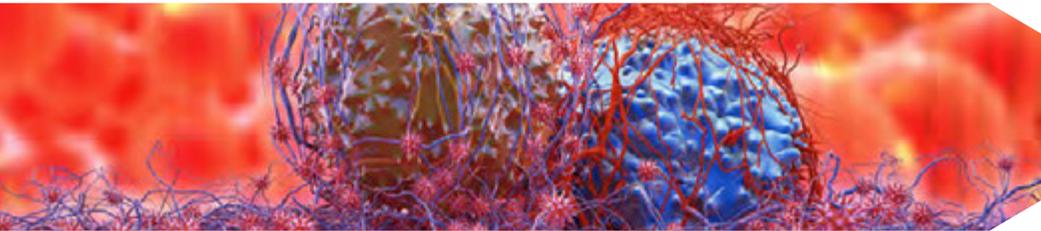


Unimelb postgrads learn about bioinformatics research projects



Year 7/8 students from Worawa Aboriginal College visit the machine room

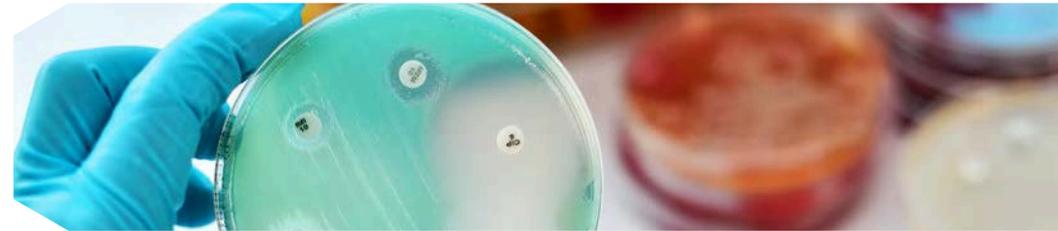
THEME ACTIVITIES



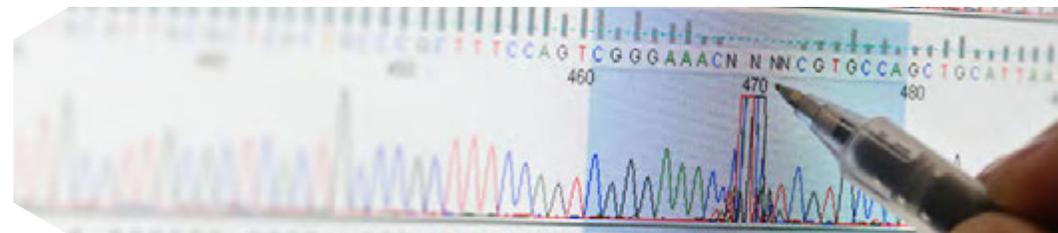
The **Cancer Genomics** theme contributed to and led major national and international research projects, particularly in breast, prostate and bowel cancer, providing advice, analytics and method development for a variety of techniques including DNA methylation, RNA sequencing, whole genome/exome/targetted DNA sequencing in both germline and tumour derived tissue types. In 2017 the team has presented at the International Society for Gastrointestinal Hereditary Tumours Conference (Florence, Italy), the Colon CFR Steering Committee Meeting (Hawaii, USA), Familial Aspects of Cancer: Research and Practice (Kingscliff, Australia), and other forums including on ABC's Radio National. They have contributed to and led several publications in leading bioinformatics and cancer journals and attracted prestigious grants, including the award of a Victorian Health and Medical Research Fellowship to Cancer Genomics Lead, Dr Bernard Pope.



Tools developed by the Cancer Genomics group such as Cpipe, Methpat and Hi-Plex continue to be improved and utilised by the research community. Tools developed by the Microbial Genomics team were recently applied to the analysis of national Listeria outbreaks in foods including lettuce and rockmelon by public health organisations. Lead, Assoc Prof Torsten Seemann, has updated his popular tools including Prokka, Snippy, ABRicate and MLST. Continued federal research infrastructure funding facilitates the ongoing maintenance and further development of the Genomics Virtual Laboratory.



The **Microbial Genomics** theme spans projects with a range of partners including the Doherty Institute, Microbiological Diagnostic Unit Public Health Laboratory, the Victorian Department of Health and Human Services and others. The group provides bioinformatics support via Melbourne Genomics Health Alliance (MGHA) funding to fight superbugs utilising antimicrobial resistance surveillance in four Melbourne hospitals. Another project advances understanding of the hospital Golden Staph, VRE, and *M. chimaera* and common food pathogens like Salmonella and Listeria. Our experts consistently contribute resources to international bioinformatics communities such as 'Homebrew Science', 'Bioconda' and 'Galaxy' and are regularly called on for their expertise internationally. In 2017, training workshops were delivered at Canada's McGill University, the Hong Kong Public Health Laboratory, the Doherty Institute and in WA, NSW and VIC.



The **Clinical Genomics** theme collaborates with the MGHA under the guidance of Software Engineer Anthony Marty, with the ambition of implementing a cloud based platform called GenoVic to support clinical genomics. The clinical bioinformatics analysis platform *DNAexus* has been procured and new germline and cancer clinical pipelines developed. The chosen variant curation tool, Agilent Alissa Interpret, was procured and configured for use while feature improvements specific to Alliance member needs are now being implemented. The team continues to developing a system to orchestrate the GenoVic clinical genomics platform and is ultimately working towards a repository that enables Alliance members to share genomic data to meet clinical needs.



Prof Lan Ma from Tsinghua University brings her talented students each year

The MSc(Bioinformatics) course continues to grow each year, with increasing numbers of biologists looking to further their bioinformatics skills. As well as learning from a variety of Melbourne Bioinformatics staff across their lectures and workshops, students undertake 18 month-long research placements in labs around the precinct. We're building bioinformatics capacity in the precinct while creating highly employable graduates equipped with real research experience.

Assoc Prof Andrew Lonie, Director, Melbourne Bioinformatics & EMBL-ABR

EXPERT ADVICE

- high end computing – in-house or in the Cloud
- experimental design
- grant writing
- data analysis, management and curation
- project management and collaboration
- open science – where and how to publish your data for maximum exposure
- all life sciences: agricultural, health, ecological

TRAINING

Hands-on workshops, interactive webinars, online tutorials including:

- Unix for beginners
- high performance computing for life scientists
- using the Genomics Virtual Laboratory
- variant calling
- RNA-Seq data analysis
- open source science with Git and GitHub
- bioinformatics best practices

COLLABORATIONS

- partner with our platform development and research infrastructure experts
- connect with the international partners of the EMBL Australia Bioinformatics Resource that we host
- access national and international bioinformatics resources via the EMBL-ABR: Melbourne Bioinformatics Node
- communicate with 700+ subscribers on our mailing list



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EMBL
Australia
Bioinformatics Resource



Melbourne Bioinformatics staff and compute resources are hosted by the University of Melbourne. The EMBL Australia Bioinformatics Resource is hosted at Melbourne Bioinformatics through a funding agreement between the University of Melbourne and Bioplatforms Australia.