



BIOPLATFOMS
AUSTRALIA



A S P I R A T I O N

2018

**ANNUAL
REPORT**



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CHAIRMAN'S REPORT



A time for ASPIRATION

The 2018 year saw Bioplatforms Australia further enable world-leading biomolecular science and research, establishing genomics, proteomics, metabolomics and bioinformatics as critical tools in modern life science.

Recognition of the national strategy

The Australian Government's commitment of an additional \$1.9 billion over the next decade reaffirmed the value of the National Collaborative Research Infrastructure Strategy (NCRIS) as a critical pillar of the Australian research sector. Bioplatforms is grateful for this contribution, and the opportunity it provides to collaborate with our NCRIS peers to strengthen Australia's research system and continue our work supporting a network of talented and committed scientists across Australia.

Our track record of access, engagement, quality and impact were recently recognised by the Australian Government providing Bioplatforms with extended financial backing totalling \$111 million over the next five years.

This funding will support the renewal and extension of our research infrastructure and ongoing operations. Importantly, it will also enable us to increase our efforts in creating greater life sciences outcomes, for example; through facilitating targeted collaborations,

focused initiatives and support for industry, including new products, services and applications.

Exciting prospects

The significant investment and support for quality science from the Australian Government, as well as the diverse portfolio of projects already underway, has positioned the next period as one of outstanding opportunity. The investment marks a key point in time where, with thoughtful consultation and planning, Bioplatforms can increase its focus on addressing key emerging challenges. We are exploring opportunities in data science with leading international organisations, partnering with critical Australian missions such as the preservation of our Great Barrier Reef, and the implementation of 'omics into the Australian healthcare system via the Genomics Health Futures Mission.

Key achievements

Over the past 12 months, our network has delivered some outstanding achievements, including:

- The world-first breakthrough of the Koala Genome, featured

on the cover of *nature genetics* journal.

- After broad consultation across Australia to define a national bioinformatics infrastructure investment, a community-driven biosciences framework is now underway and progressing with an Australian Bioscience Data Capability (ABDC).
- The public release of coral genomes, as part of the SeaSequence project. This information will assist the research community worldwide in exploring the adaptability and resilience of coral against environmental changes and pave the way for future coral reef restoration.

New initiatives – supporting unique value and collaboration

Under the leadership of Dr Anna Fitzgerald, we have continued to support and grow initiatives such as a systems biology analysis of antibiotic resistance, the systemic genomic characterisation of Australia's precious mammalian fauna and our involvement in the Australian Genome Health Alliance.



More recently, Bioplatforms has catalysed a series of new framework initiatives, working closely with communities of researchers to outline initiatives of unique value through widespread collaboration, including:

- **Australian Native Plants** – a partnership with Australia’s herbaria and botanic gardens, this initiative will provide genomic resources for the characterisation of Australia’s endemic flora.
- **Exceptional Responders** – hosted at the Garvan Institute of Medical Research, this program will recruit patients, their clinical teams and leading scientists to investigate why certain people respond exceptionally to trial therapies, while others do not.
- **Genotyping of the ASPirin in Reducing Events in the Elderly trial (ASPREE SNP)** – a low dose Aspirin clinical trial, permitting a new insight into healthy aging. Bioplatforms will provide a comprehensive single nucleotide polymorphisms (SNP) dataset to the 18,000 strong cohort involved.
- **Australian Microbiome** – a comprehensive mapping of Australian microbiota, and an extension of our successful ‘Biome of Australian Soil Environments and Marine Microbial Diversity’ projects. To support this work, Bioplatforms will partner closely with our NCRIS ‘cousin’, Integrated Marine Observing System (IMOS), together with the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the Director of National Parks (Commonwealth Department of Environment and Energy).

Partnering for success

Bioplatforms has been fortunate to partner with individuals and organisations sharing our core values and beliefs – resulting in impact, quality, collaboration and trust. Significant undertakings in the past year include:

The significant investment and support for quality science from the Australian Government, as well as the diverse portfolio of projects already underway, has positioned the next period as one of outstanding opportunity.

- Hosting Professor Niklas Blomberg, Executive Director of ELIXIR. ELIXIR unites Europe’s leading life science organisations in managing and safeguarding the increasing volume of data generated by publicly funded research. It coordinates, integrates and sustains bioinformatics resources across its member states and enables users in academia and industry to access services vital for their research. Niklas provided critical insight to global developments. He also advised Bioplatforms on our own planning for future enhanced investment in a national bioinformatics research infrastructure, including connecting to global resources such as those under Niklas’ stewardship.
- A technology transfer collaboration with the Therapeutic Goods Administration (TGA), aimed at assisting the TGA to develop and implement cutting-edge proteomic and glycomic methodologies for analysis of the safety and effectiveness of modern biological drugs and their generic replacements.

Planning for the future

Bioplatforms has been engaged by the Department of Education and Training as secretariat for a scoping study into Synthetic Biology national research infrastructure. This initiative has stemmed from contributions to the 2016 National Research Infrastructure Roadmap and a growing interest in this area by the Australian Government. The recent Australian Council of Learned Academies (ACOLA) report, ‘Synthetic Biology in Australia – An Outlook to 2030’, provides the context for a nationally collaborative research infrastructure response to the opportunity.

A highly effective team

The Australian Government investment secured this year marks a significant milestone for Bioplatforms. This was made possible only through the efforts and commitment of hundreds of people in our network. I would like to thank all involved, and particularly acknowledge the contributions of the platform Convenors, Professor Marc Wilkins, Professor Ian Smith, Professor Malcolm McConville and Associate Professor Andrew Lonie. Collectively, and individually, our Convenors have played a significant role in engaging broad research communities, providing advice to the Board, supporting our Executive and acting as the face of Bioplatforms.

I am also indebted to my fellow Directors, Dr Sue Meek, Dr Katherine Woodthorpe and Professor Peter Gray for their energy, insights and thoughtful guidance throughout such a critical time.

Finally, the contribution of the Company Executive, Andrew Gilbert and his small yet high-achieving team, has been central to our accomplishments, and to the aspirational plans that these efforts now permit.

Dr Les Trudzik
Chairman

2017/18 HIGHLIGHTS



CAPABILITY

-  **16** world-class nodes
-  **\$12 million** invested
-  **324** funded scientists



FRAMEWORK COLLABORATIONS

-  **12** active framework initiatives
-  **4** new initiatives approved
-  **213** science and industry collaborators
-  **130** new registered users to the data portal





ACCESS

-  **2,962** users
-  **13,317** job submissions
-  **1,300** jobs for industry and commercial organisations
-  **64%** of jobs were performed for the biomedical sector
-  Agriculture and environmental research accounts for **31%** of activity



SCIENTIFIC OUTCOMES OF TECHNOLOGY PLATFORM NODES

-  **353** research papers published in peer-reviewed journals
-  **54** papers published in leading journals including *Nature*, *Science* and *Proceedings of the National Academy of Sciences* (PNAS)
-  **50** successful grant applications

BIOPLATFORMS AUSTRALIA

Bioplatforms Australia supports bioscience innovation by connecting investment and resources with leading 'omics research capabilities.

Our mission is to enhance Australian genomics, proteomics, metabolomics and bioinformatics research capabilities, to support innovation and help transform scientific outcomes into tangible benefits for Australians. We do this by:

- supporting strategic investments in scientific research infrastructure and personnel
- connecting researchers with critical scientific infrastructure, and
- acting as a catalyst for research collaborations.

Aspiring towards a bright future

This year, following significant investment and funding from NCRIS, Bioplatforms is pleased to be planning our long term investment strategy. We will undertake thorough consultative engagement, capturing all potential opportunities and ensure our capability is fit for the exciting future ahead.

The Bioplatforms network is structured around four platform technologies:

- Genomics – DNA sequencing for gene discovery, genome mapping and analysis.
- Proteomics – Large scale analysis of protein structure and function.
- Metabolomics – Measurement and analysis of metabolites.
- Bioinformatics – Data science resources for largescale data curation, interpretation, analysis and integration.



Bioplatforms Australia meets Australia's research challenges and delivers beneficial outcomes for all Australians, by connecting national funding and co-investment with scientific expertise and capability.

Simon Easteal at the John Curtin School of Medical Science nitrogen freezer tanks, inspecting the National Centre for Indigenous Studies samples.



BIOPLATFORMS AUSTRALIA INFRASTRUCTURE PLATFORMS AND NODES



FEATURE STORIES

In 2017/18 Bioplatforms supported thousands of transformative research projects. Our infrastructure nodes were utilised and acknowledged in more than 350 research papers, 54 in leading journals such as *nature genetics*, and received grants for over 50 different projects. Here are two of our outstanding success stories.

Cracking the genetic code of koalas

The koala is an iconic Australian species that attracts visitors from around the world. However, wild populations are showing dramatic decline in numbers mainly due to diseases and loss of habitat. Koalas now need significant conservation intervention measures, strategies such as the NSW Koala Strategy and systematic analyses of genetic diversity and genetic monitoring, to ensure long-term survival.

The Koala Genome Consortium, led by Professor Rebecca Johnson, Director of the Australian Museum Research Institute, is a national collaborative initiative helping to conserve koala populations through better understanding of their genome. The team has delivered a world-first breakthrough in successfully sequencing the complete koala genome. This momentous step forward gives scientists unprecedented insight into the unique biology of the koala.

The initiative has provided insight into the diet and lifestyle choices of koalas, developmental stages, immune systems and the koala's response to widespread chlamydia and koala retrovirus (KoRV) infections, which are decimating populations in NSW and Queensland.

Considered to be the most complete marsupial genome sequenced to date, the quality of the genome is on par with that of humans. The highly accurate genomic data will provide scientists with new information that will inform conservation efforts, aid in the treatment of diseases, and help to

ensure the koala's long-term survival.

The completion of the marsupial genome sequencing undertaken to date was brought about through the meticulous efforts not only of Professor Johnson but Professor Kathy Belov and many other scientists from around the nation. The team now comprises a collaborative group of 54 scientists from 29 research organisations across seven countries. Together, they have ushered in a new era in our understanding and conservation of the iconic koala.

The Koala Genome story has now reached a global audience estimated to be greater than 250 million people, indicative of the interest in conserving one of Australia's iconic ambassadors.



The Koala Genome Consortium has afforded great insight into the koala's genetic building blocks, with the genome providing a springboard for the conservation of this biologically unique species.



The Indigenous reference genome

Next-generation sequencing capabilities will be applied to an exceptional collection of biological samples from around 7,000 Indigenous Australians as part of a new genomic data project run by The National Centre for Indigenous Genomics (NCIG). The project will run in collaboration with Indigenous communities and with support from Bioplatforms and the National Health and Medical Research Council (NHMRC).

The most valuable use of the collections will be to provide reference data about genome variation in Indigenous populations, enabling variation associated with health and disease to be appropriately interpreted. The role of genome function and variation in health and disease in Indigenous Australians cannot be understood solely from studies of European populations. The new datasets will be used to improve Aboriginal health and support a broad range of anthropology, historical and genealogy studies.

Using genome sequences from panels of Indigenous and non-Indigenous participants, the team will quantify the level and consequences of reference bias for genomic research and clinical genomics, and establish best-practice guidelines for implementing genomic tools for research and clinical practice in Aboriginal and Torres Strait Islander communities.

The high-quality of this dataset has allowed the project to characterise and make clinical predictions about sequence and structural genomic variation, and estimate the extent of differences between these populations compared to global populations. Data from samples in the collection may also provide information about genetic conditions of immediate clinical relevance to the living descendants of sample donors.



The Indigenous reference genome initiative will assemble high-quality genome reference sequences from Indigenous participants across Australia, to help improve the health and wellbeing of Indigenous Australians.



NETWORK ACCESS

The Australian life sciences sector requires a critical mass of intellectual expertise and leading-edge infrastructure for broad access across the nation. Bioplatforms ensures world-class technology platforms in Genomics, Proteomics and Metabolomics are supported through dedicated investment in these platforms with integrated Bioinformatics capabilities.

With the growing importance of complex biology in the life sciences sector, the research community continues to access various 'omics nodes with more than 13,300 submissions combined across the capabilities. To ensure an ongoing state-of-the-art capability, we are consolidating our diverse platforms into 'critical mass' centres, each with specialised functions.

Client access

In the past year a total of 2,962 discrete clients accessed the platforms capabilities nationally, with some international clients (Fig. 1). The highest number of clients came from New South Wales and Victoria.

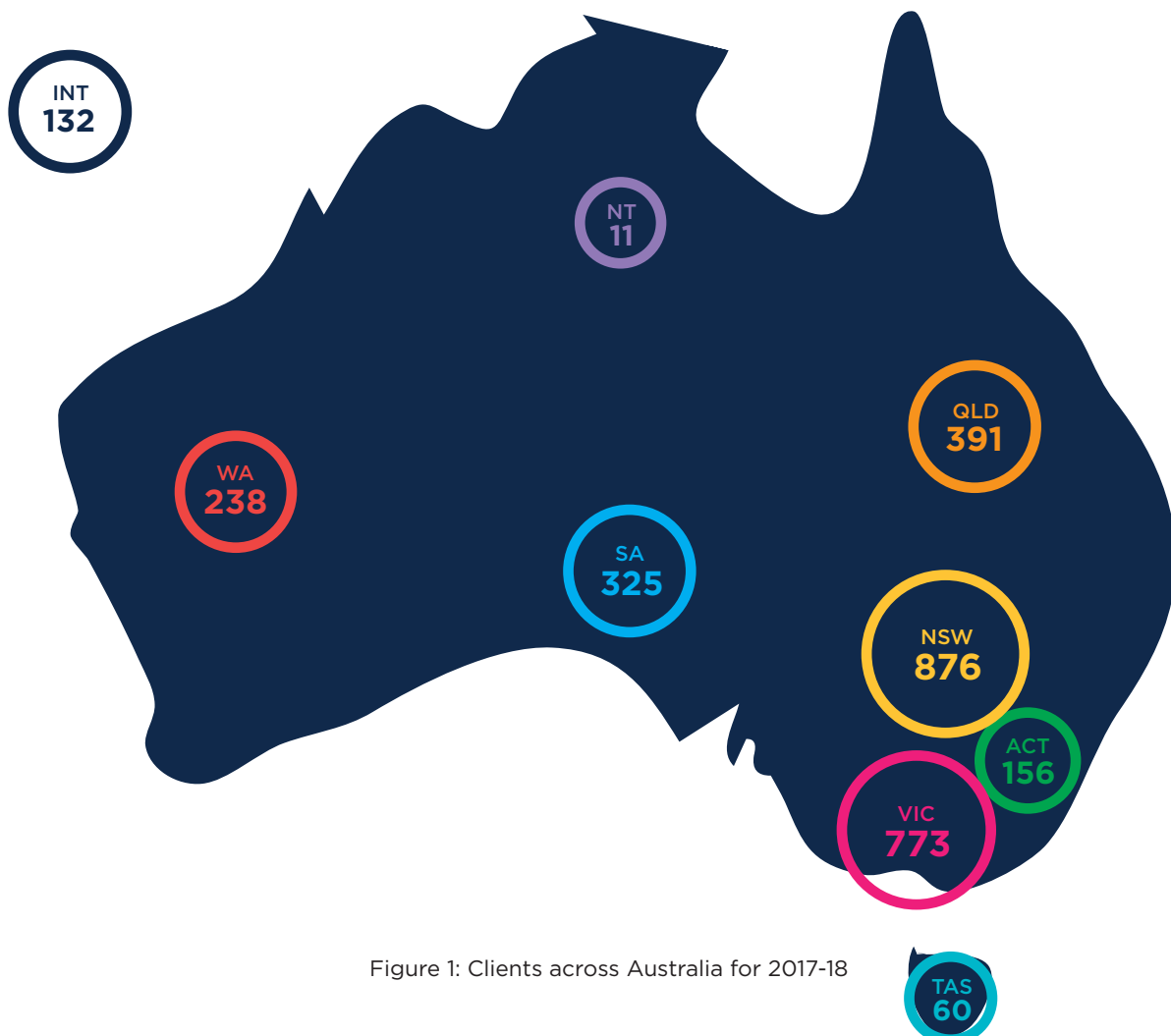


Figure 1: Clients across Australia for 2017-18



Figure 2: Our research partnerships in 2017/18

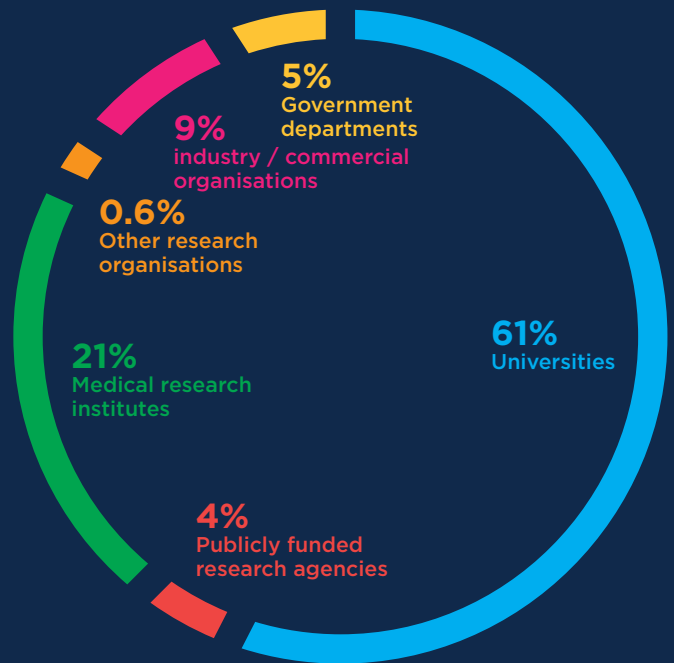


Figure 3: Client access by sector

Contributions to Australian research system

Bioplatforms both strategically partners with, and provides broad based access to, the breadth of the Australian research system (Fig. 2). We actively aim to engage peak programs such as Australian Research Council (ARC) Centres of Excellence (CoEs) and Cooperative Research Centres (CRCs), thereby both meeting the needs of our very best researchers and ensuring our network is engaged in significant collaborative research.

User profile and broad access

This year the majority of our clients are from Universities, at over 60 per cent. We saw an increase in clients from research organisations to 25.2 per cent and a smaller proportion of commercial and governmental clients (Fig. 3).

Submissions totalled 13,317, with a proportional distribution across clients and sectors, and an average of four to five submissions per client.

In 2017/18, our national infrastructure network was made available to 1,961 external clients and 1,001 internal, from within the Bioplatforms network. As always, we are proud to make our national infrastructure network available to clients outside of our network, to all researchers wishing to access 'omics capabilities.

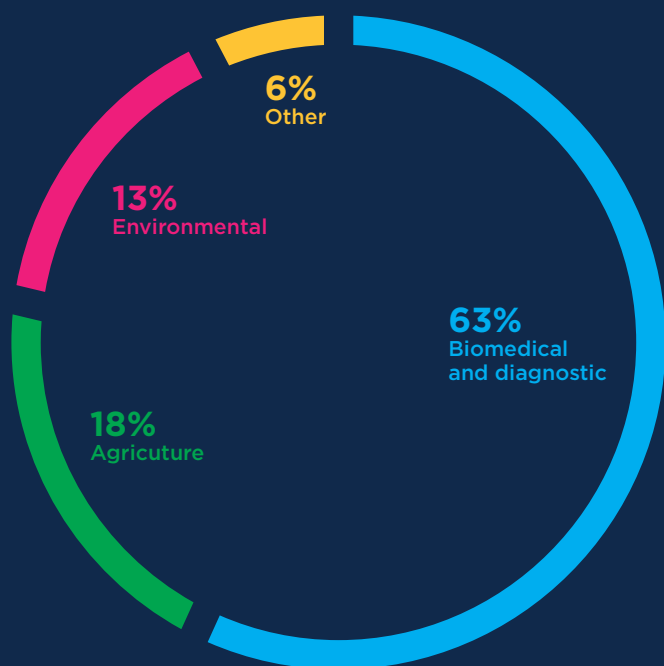


Figure 4: Client numbers by discipline

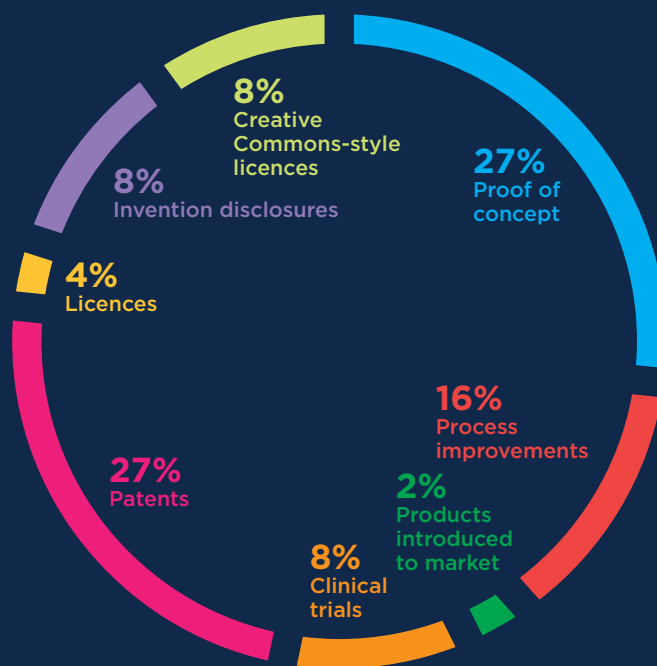


Figure 5: A snapshot of Intellectual Property (IP) and commercialisation activities

Research focus

Client disciplines this year continued to focus heavily on biomedical research and diagnostics, with an increase in concentration on the environment (Fig. 4).

Bioinformatics training

Access to bioinformatics capabilities continues to be an important mission for Bioplatforms. In collaboration with the CSIRO, the EMBL Australia Bioinformatics Resource (EMBL-ABR) and others, we again ran workshops to help life science researchers analyse genomics data (using publically accessible tools and resources) and build bioinformatics skills.

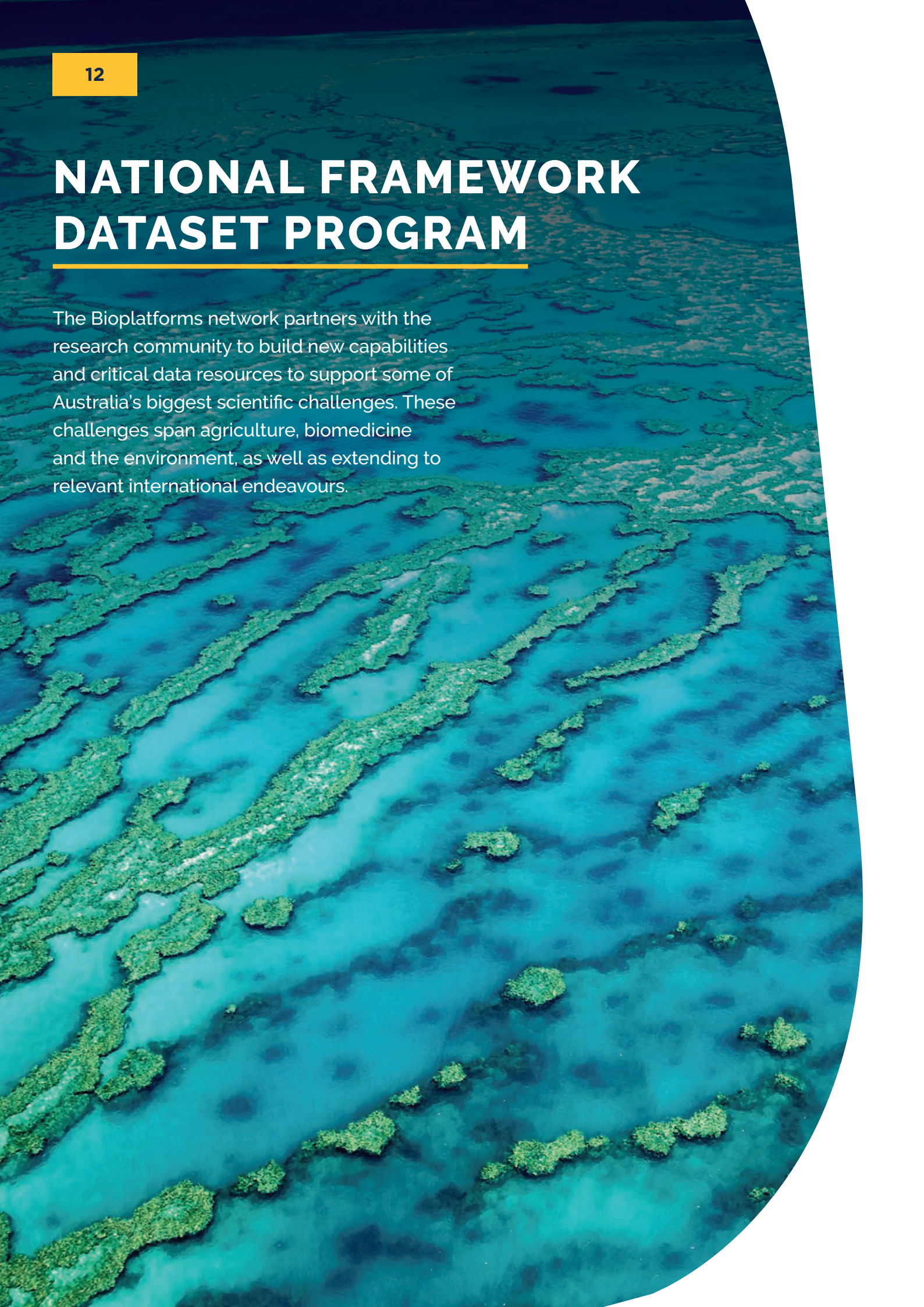
Some of the key workshops run in 2017/18 included an Introduction to Metagenomics workshop, in conjunction with the CSIRO, A Cancer Genomics workshop, in conjunction with the NSW Office of Health and Medical Research (OHMR) and an RNA-Seq Data Analysis workshop, in conjunction with the Queensland Facility for Advanced Bioinformatics (QFAB). Since our training program began in 2012, we have advanced to 25 trainers, delivered 50 workshops and trained 1,343 researchers.

Commercial focus

Within our network, from work cited as 'commercialisation' in a recent access survey, 75% of key IP and commercialisation activities occurred through proteomics facilities. This year saw a high focus on proof-of-concept and patents, as well as process improvements (Fig. 5).

NATIONAL FRAMEWORK DATASET PROGRAM

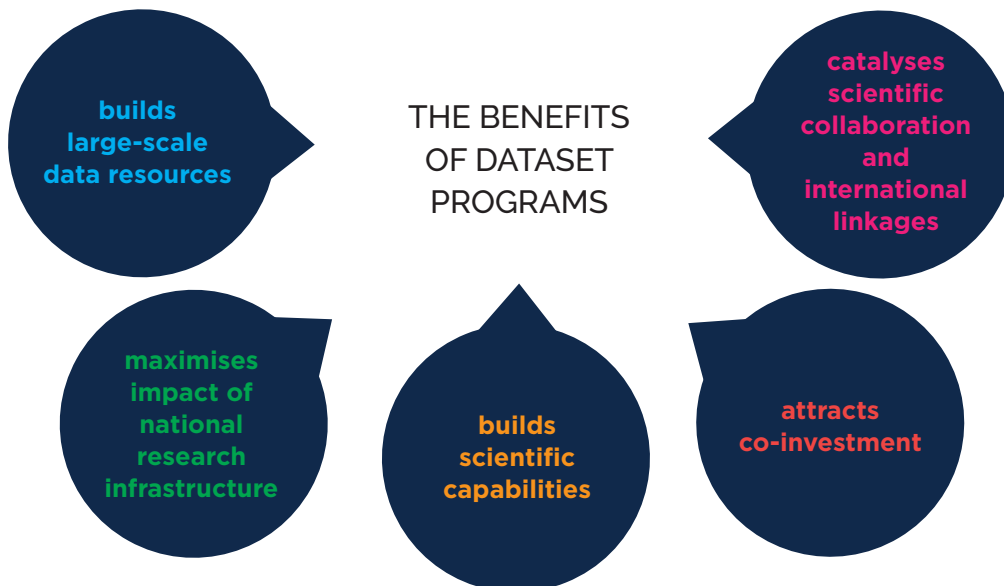
The Bioplatforms network partners with the research community to build new capabilities and critical data resources to support some of Australia's biggest scientific challenges. These challenges span agriculture, biomedicine and the environment, as well as extending to relevant international endeavours.



Framework initiatives use integrated 'omics infrastructure to support research themes of national significance. Over the lifespan of the Bioplatforms National framework dataset program, 18 initiatives received investment for research integrating genomics proteomics and metabolomics. The interdisciplinary and multi-institutional nature of these projects ensures the datasets are relevant to current scientific questions and immediately employed for high impact research.

The data collection goals have been completed for six of our dataset projects. The wheat, melanoma, koala, Great Barrier Reef SeaQuence and environmental barcoding datasets are publicly accessible and now serving diverse research objectives. The value of the dataset will be augmented by ongoing mining of the resource and extension of the data by researchers.

Sample and data collections are ongoing for the remaining eight dataset collaborations. The two new projects initiated during 2016-17, Oz Mammal and Environomics, have made significant progress already and provided vital information, such as sharing the genetic background data of endangered mammals populations, to inform conservation. We have four initiated projects progressing in their establishment phase and over the next year we will review opportunities for new projects and collaborations sourcing in-demand data resources.





COMPLETED

- Samples sequenced
- Genome and metadata publicly available
- New research published or underway



ACTIVE

- DNA sequencing in progress
- Genome assembly underway
- Data mining and analysis
- Data repository in development



NEW

- Sample collection/prioritisation commenced
- DNA extraction and sequencing protocols in development
- Bioinformatics pipelines in development



INITIATED

- Due diligence completed
- Initial collaborators confirmed
- Budget approved and work program in development

NATIONAL FRAMEWORK DATASET PROGRAM INITIATIVES

Bioplatforms has continued to support and grow initiatives such as a systems biology analysis of antibiotic resistance, the systemic genomic characterisation of Australia's precious mammalian fauna and our involvement in the Australian Genome Health Alliance.

New initiatives - supporting unique value and inclusivity

During 2017-18, Bioplatforms has catalysed a series of new framework initiatives, working closely with communities of researchers to outline initiatives of unique value and inclusivity, including:

ASPREE SNP

Aspirin in Reducing Events in the Elderly (ASPREE) is a low dose Aspirin clinical trial, permitting a new insight into healthy aging. Initiated in 2012, the clinical trial involves 16,703 Australians aged over 70 years and 2,411 Americans aged over 65. ASPREE has completed whole genome sequencing of 2,000 of the oldest and healthiest Australian participants in partnership with the Kinghorn Centre for Clinical Genomics at the Garvan Institute.

This project will provide a comprehensive single nucleotide polymorphisms (SNP) dataset to the 18,000 strong cohort involved, assisting with the identification of rare coding variants in clinically significant genes. A biobank of biological samples from each participant, used for genetic and biomarker studies, enables ASPREE to conduct molecular epidemiology and healthy ageing research. This is of significant interest to the clinical community for monogenic disease research. Bioplatforms supports the ASPREE genotyping project, led by the Monash University, along with multiple national and international partners.

Australian Microbiome

The Australian Microbiome framework initiative will establish a comprehensive mapping of Australian microbiota, in an extension of our successful 'Biome of Australian Soil Environments and Marine Microbial Diversity' project. This framework initiative will use genomic technologies to obtain a blueprint of the potential of microbial communities across the Australian continent. Everything from soil to oceanic regions will be used to advance the understanding of the function of microbes in the environment and how to utilise this data to inform practical applications. To support this work, Bioplatforms will partner closely with IMOS, together with the CSIRO, National Parks and researchers from over 40 partner organisations.

Genomics for Australian Plants

Australian native plants support many important sectors of the Australian economy, including agriculture, forestry, fisheries, aquaculture and tourism. This initiative will create a collaborative network, with Australian Botanic Gardens and Herbaria working together in the collection, management, dissemination and application of genomic data for Australian plants. Unlocking the enormous information in nuclear genomes of plants could significantly improve conservation management decisions. There are currently 225 plant genomes, which represents 0.06% of an estimated 403,000 genomes available that had been

assembled across the plant tree of life. Novel traits and biochemical pathways identified through genomic analysis may also be harnessed for applications such as biofuel, drug and crop breeding developments. The genomic characterisation of Australia's flora will assist in the management and conservation of native flora, which has suffered from various degrees of disturbances since European settlement, as well as advancing the utilisation and understanding of Australia's unique plant diversity.

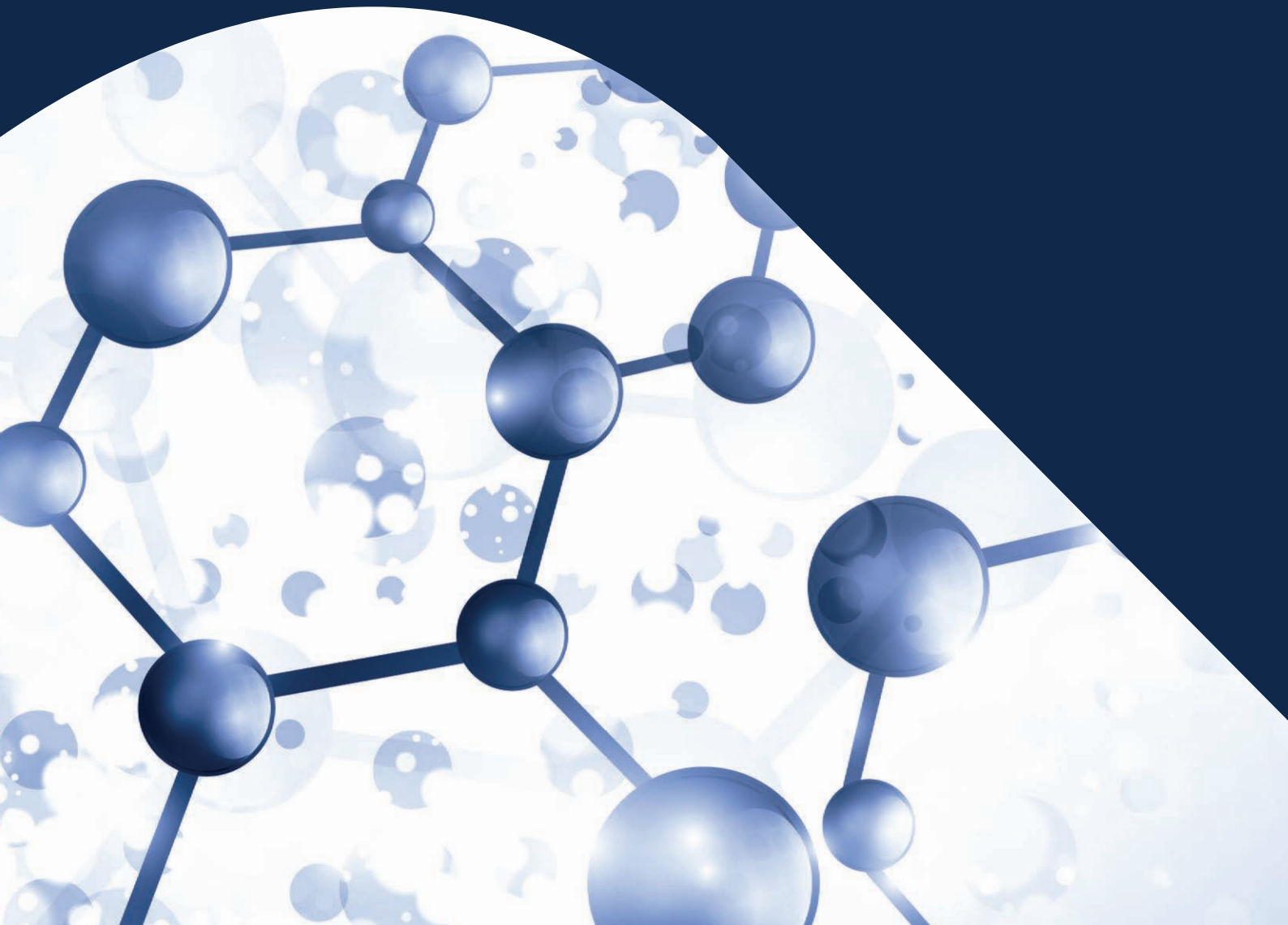
The Exceptional Responders

The Exceptional Responders project recruits patients, their clinical teams and leading scientists to investigate why some individuals have unusual and unexpected responses to therapies, or environmental factors, while others don't, based on natural genetic differences. Hosted at the Garvan Institute of Medical Research, this program analyses the genomes of these rare responders in the hope of identifying the genetic and molecular changes that underpin their responses to treatment. Insights will be used to better design future trials and understand mechanistic response to new drugs. Such studies could also reveal biomarkers to help predict responses to the same or similar treatments in other patients.

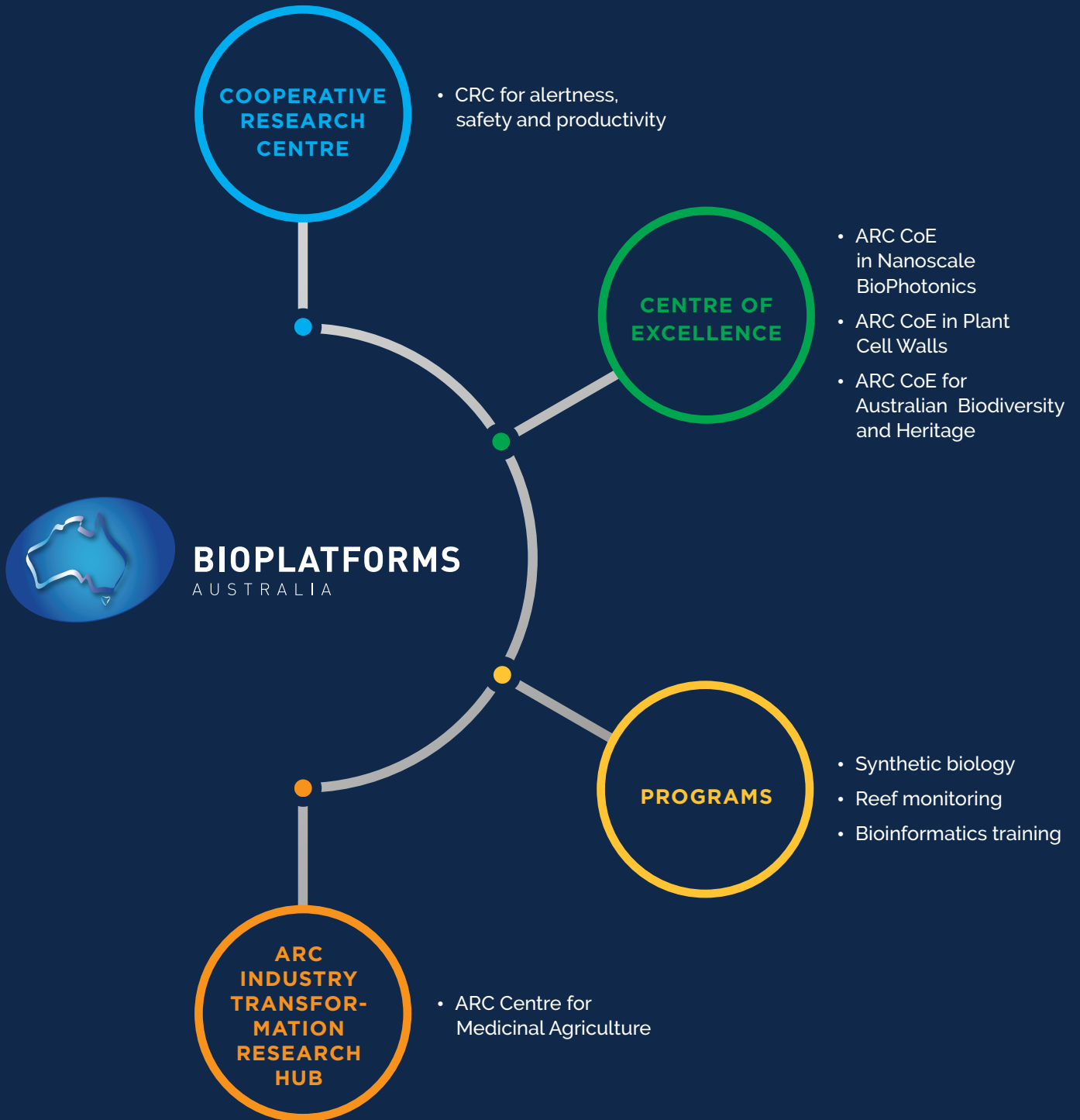
COLLABORATIONS AND PARTNERSHIPS

Bioplatforms has been fortunate to partner with individuals and organisations sharing our core values and beliefs – building impact, quality, collaboration and trust.

Bioplatforms has an ongoing partnership with Cooperative Research Centres (CRC), Australian Research Council (ARC) Centres of Excellence (CoE), and ARC Industry Transformation Research Hubs. We also collaborate closely on national programs.



COLLABORATING FOR SUCCESS



Our collaborations and partnerships for 2017/18

INDUSTRY ENGAGEMENT

Engagement is a significant factor in translating science into economic and social benefit. Our National Framework Dataset collaborations have proven to be highly effective in engaging end-users in high priority research endeavours. To boost innovation partnerships with a strong commercial focus, we encourage industry engagement and funding, by supporting node involvement in industry related work, or partnering in funding requests and submissions.



Department of Defence Science and Technology (DST)

The hazards posed by the use of chemicals, toxins and microorganisms as weapons are of concern to Defence and National Security agencies globally. DST Group has engaged the Australian Genome Research Facility (AGRF) in a pilot study to determine gene expression profiles of physiologically relevant samples exposed to toxic agents. The work aims to identify novel biomarkers/ pharmacological targets at critical time points of toxic agent exposure that may have implications for medical countermeasure selection and administration regimes.

Therapeutic Goods Administration

Bioplatforms developed a key relationship with the Therapeutic Goods Administration (TGA) to transfer knowledge in biological analysis to ensure safe, effective and cheaper medicines are available to the Australian public. We now have four distinct collaborations underway. The collaborations now comprise of a number of activities including:

- Development of analytical methods to understand the structure and function of monoclonal antibodies at our Australian Proteome Analysis Facility (APAF).
- Development of methodologies to analyse the sugars on monoclonal antibodies – a discipline called glycomics – that provide stability and function to these important drugs.
- Training of TGA staff in readiness for transfer of these methods into TGA hands.
- Investigation into the qualities of vaccines and critical preventative health medicines for Australian society.
- Training in cutting-edge, real-time polymerase chain reaction (PCR) methods at the Australian National University (ANU) genomics facility.

Advancing our understanding of Giardia

Giardia is one of the most common parasitic human diseases globally. Around 10% of those infected have no symptoms. In 2013, there were about 280 million people worldwide with symptomatic giardiasis. The risk for human health is that some Giardia strains that affect pets can cross into humans (zoonotic), whilst others do not (host specific). Current tests can't easily differentiate these host specific and zoonotic strains.

Proteomics International has an ongoing collaboration with Murdoch University Veterinary School and a leading US veterinary company to create an improved diagnostic test for the parasite Giardia. The test under development is strain specific and could be used to test if pets infected with Giardia present a risk to their owners. A proof of concept study is currently underway for this project.

The experimental approach to achieve this uses proteo-genomics – the combination of proteomic information taken from pet infections with specific genome information of the Giardia pathogen strain. This challenging Giardia genome sequencing work and customised bioinformatic approaches were undertaken by Australian Genome Research Facility. The genome in itself has provided unique research data that will be prepared for publication and ongoing study with academic partners. Continuing work aims to identify peptide targets specific to the pathogen pet-host infection.

Helping the Mala move house

Researchers from the Oz Mammals Genomics (OMG) initiative are using DNA analysis to understand the genetic makeup of the breeding populations of endangered Australian mammals.



The Oz Mammals Genomics initiative will allow for new studies informing mammal evolution and guide conservation of the Australian mammal fauna, including the Mala.

The Mala is a small Australian marsupial inhabiting semi-arid regions of Australia. Cats and foxes are driving this once populous species towards extinction. The Australian Wildlife Conservancy (AWC) protects an important population of Mala at Scotia Wildlife Sanctuary in NSW. The Mala at this sanctuary were saved through initial captive breeding programs. The AWC plans to reintroduce the Mala to the Newhaven Wildlife Sanctuary in the Northern Territory where a purpose-built fence and predator-free area has been established.

As a result of the genetic analysis conducted by researchers from the Department of Biodiversity, Conservation and Attractions Western Australia, and the University of Sydney, the team were able to provide AWC with recommendations on the number of specific Mala to translocate from two different populations, in order to maximise genetic diversity and provide the best founding population for the Newhaven site in the Northern Territory. The insights will support and inform ongoing recommendations to conservation managers in handling the movement of animals between sanctuaries.

TECHNOLOGY PLATFORMS CAPABILITIES

Bioplatforms enables innovation by investing in scientific infrastructure and building biomolecular research capabilities. The capabilities network is organised into four technology platforms - genomics, proteomics, metabolomics and bioinformatics, through 16 leading universities and research facilities located around Australia.

Since our foundation, Bioplatforms and partners have invested approximately \$87 million in high-end instrumentation. Some 324 staff are employed per annum across all four platforms.



GENOMICS

High-throughput genomic technologies continue to impact every field of life science research. Our four genomics nodes offer a comprehensive suite of sequencing technologies and bioinformatics capabilities that are heavily utilised by the Australian research community. New instrumentation purchased with support of the NCRIS Agility Fund and commissioned during the year, has expanded the capacity to produce high-quality, large-scale genomic data.

Australian Genome Research Facility

The Australian Genome Research Facility (AGRF) offers a broad portfolio of genomics services and delivers national coverage with facilities in most capital cities. The AGRF node is accredited by the National Association of Testing Authorities (NATA) to ISO 15189 quality standard. New capabilities include long read sequencing (PacBio and Oxford nanopore tech), comprehensive genomics and high-throughput single cell transcriptomics, supported by a 10X Genomics Chromium system (single cell and linked reads).

Ramaciotti Centre for Genomics

The Ramaciotti Centre for Genomics at the University of New South Wales provides services across research fields of biomedicine, agriculture, the environment, food and biotechnology. New capabilities include long read sequencing (PacBio), comprehensive genomics and high-throughput single cell transcriptomics supported by a 10X Genomics Chromium system (single cell), and human exome and whole genome sequencing (Illumina NovaSeq6000). The centre offers new sample preparation services for short and long read sequencing for high throughput analysis, such as genome-wide methylation profiles on a single nucleotide level or multiplexing of bacterial genomes.

Biomolecular Resource Facility

The Biomolecular Resource Facility (BRF) at the Australian National

University (ANU) provides next generation genome sequencing and bioinformatics capability. New capabilities include a comprehensive genomics and high-throughput single cell transcriptomics, supported by a complete 10X Genomics Chromium system and increased informatics capabilities. The facility is currently obtaining NATA accreditation for clinical exome sequencing service, and trialling high-throughput mouse genotyping. The BRF is continuing its ongoing work with the National Centre for Indigenous Genomics, National Computational Infrastructure (NCI) and Mediaflux (a commercial storage provider) to prototype access to long-term persistent, secure storage of genomic data.

The Kinghorn Centre for Clinical Genomics

The Kinghorn Centre for Clinical Genomics (KCCG) at the Garvan Institute of Medical Research, is a purpose-built facility specialising in clinical genomics, enabling the advancement of the translation of genomic information to improve health. The centre focuses on large scale human genomics and bioinformatics for personal health genomics, disease diagnostics, discovery genomics and precision health applications with accreditation to the standards required for medical testing in Australia.

PROTEOMICS

Proteomic applications are diverse, growing and provide insight into all manner of complex biological processes. Bioplatfroms currently supports four proteomics facilities, each with their own distinctive capabilities and focus.

Australian Proteome Analysis Facility

The Australian Proteome Analysis Facility (APAF) at Macquarie University provides access to a broad array of proteomics services and cancer specialities, including significant capacity in high-throughput mass spectrometry, amino acid analysis, N-terminal sequencing and multiplexed enzyme-linked immunosorbent assay (ELISA). This year APAF increased diagnostic

analysis services such as A1/A2 beta-casein analysis.

Monash University Biomedical Proteomics Facility and Monash Antibody Technology Facility

Our two Monash University nodes provide access to advanced mass spectrometry systems that allow accurate identification, characterisation and quantification of proteins isolated from diverse sources. The Monash Antibody Technology Facility also offers specialist capabilities in producing custom-made monoclonal antibodies using high-speed robotic platforms, together with services for antibody purification and ELISA development. The facilities are establishing a collaborative integration with metabolomics and lipidomics services.

The University of South Australia

The University of South Australia (UNISA) node is a proteomics research infrastructure accessible via collaborative model. UNISA offers mass spectrometry imaging specialties and this year it developed small molecule analysis and imaging and lipid analysis services. UNISA also collaborated with the research community in publishing an article on 'Balancing sufficiency and impact in reporting standards for mass spectrometry imaging experiments' in GigaScience.

Proteomics International

Proteomics International (PI) at the Harry Perkins Institute of Medical Research in Western Australia, provides sophisticated proteomics services and expertise in developing protein biomarkers. New Capabilities include expanded pharmacokinetic analysis, in particular molecule quantitation in plasma for clinical trials. They strive to improve research practices in proteomics and undertake in-house projects such as investigating the reproducibility of proteome coverage and quantitation using Isobaric mass tags (iTRAQ and TMT), the results of which were published in the *Journal of Proteome Research*.

METABOLOMICS

Metabolomics involves the large-scale characterisation and analysis of cell metabolites in order to understand the biology of an organism and its response to environmental stimuli. Metabolomics is integral to the suite of 'omics technologies needed for systems analysis and has been referred to as the 'glue' that brings multiple 'omics efforts together.

Our five metabolomics nodes possess synergistic technologies and expertise, and continue to expand their detection, quantification and informatics capabilities.

The University of Melbourne

The University of Melbourne's School of BioSciences and Bio21 Institute offer broad metabolomics capabilities with particular expertise in biomedical and imaging specialities, plant and environmental research. New capabilities include the development of automation for analyses of defined target, free fatty acids and plant lipids.

Australian Wine Research Institute

The Australian Wine Research Institute (AWRI) focuses on the

metabolomics of agricultural products, food and beverages, and micro-organisms, with a commercial lens. The node has specialist expertise in identifying and profiling secondary metabolites and volatile compounds. This year AWRI delivered research collaborations across the wine industry, from building and measuring the quality of fine Australian sparkling wines to understanding the drives of terroir in the Barossa Valley.

Murdoch University

Murdoch University's Separation Science and Metabolomics Laboratory offers ultra-high resolution analysis relevant to food safety and quality, plant and environmental metabolomics, as well as clinical and biomedical research. Murdoch University furthered its agriculture speciality with new capabilities in conducting phytohormone testing, and metabolic phenotyping. Building on the laboratory focus on the nexus between exposure and health, Murdoch is involved in the Restoration Of gut microflora in CrITical Illness (ROCIT) trial, led by Fiona Stanley Hospital and supported by the Department of Health WA. The trial is a multi-centre, randomised, placebo-controlled clinical trial of probiotics in critically ill adults.

University of Western Australia

The Centre of Metabolomics at the University of Western Australia is a multi-focus group providing comprehensive analytical and data interpretation services for all areas of life sciences. The Centre's focus is on biomedical and environmental specialities.

University of Queensland

The Australian Institute of Bioengineering and Nanotechnology (AIBN) at the University of Queensland provides metabolomics services including metabolic engineering. The institute is particularly focused on fluxomics modelling, which can be used to analyse and engineer mammalian, plant or microbial fermentation systems and optimise product development. The AIBN facility is collocated with Bioplatforms supported proteomics capabilities, to provide systems biology capability as well as a strong bioinformatics support. The facility is accessible to all collaborators but specialises in cell characterisation for industrial biotechnology.





Our investment strategy embeds bioinformatics skills directly into research teams through training services and expertise.

BIOINFORMATICS

Bioinformatics is an enabling capability and an essential component of Australia's 'omics research infrastructure. In order to cater to the distinct differences between bioinformatics research and those who apply bioinformatics in research, our investment strategy embeds bioinformatics skills directly into research teams through training services and expertise. We also support bioinformatics centres to develop new bioinformatics methods, software tools, super-computing capabilities and e-infrastructure solutions to enhance workflows, analytical capacity and data management and storage.

Centre for Comparative Genomics

The Centre for Comparative Genomics (CCG) at Murdoch University has specialised laboratories and expertise for bioinformatics, software development and high-performance computing. It provides

strategic support to our large-scale projects through the development of internet-based software applications, informatics workflows, Laboratory Information Management Systems (LIMS) and cloud storage solutions.

Systems Biology Initiative

The Systems Biology Initiative (SBI) at the University of New South Wales provides bioinformatics expertise in genomics and molecular systems biology, in particular regarding data annotation, analysis, integration and visualisation. The institute collaborates widely with our 'omics partners as well as external research and industry bodies. Over the last financial year, the Institute collaborated with the University of Melbourne metabolomics node and co-authored a publication in Briefings in Bioinformatics on 'Establishing a distributed national research infrastructure providing bioinformatics support to life science researchers in Australia.'

EMBL Australian Bioinformatics Resource

EMBL Australia Bioinformatics Resource (EMBL-ABR), hosted at The University of Melbourne, provides national research infrastructure to support Australian bioinformatics capabilities. EMBL-ABR focus on data management, annotation, analysis and development of virtual laboratories and engagement with research communities through training and outreach. EMBL-ABR brings together existing bioinformatics expertise within local groups and institutions across Australia, and provides coordination at a national level.

LEADERSHIP

Bioplatforms is committed to maintaining a high standard of governance and leadership. Strategic direction and operational oversight is provided by an independent Board of Directors and supported by an Executive Management Committee who advise on platform technologies and organisational initiatives.

BOARD MEMBERS AND RESPONSIBILITIES

Bioplatforms' Directors offer a wealth of experience across scientific, business and government domains. Each Director has responsibility for particular aspects of organisational strategy in addition to their fiduciary duties.

Dr Leslie Trudzik – Chairman

Les is a founding Board Member of Bioplatforms and became Chairman in 2013. He is responsible for developing the organisation's performance and impact framework.

Dr Sue Meek – Director

Sue joined the Board in 2012 and is responsible for organisational communications and liaison with the Commonwealth government.

Dr Katherine Woodthorpe – Director

Katherine joined the Board in 2014 and is responsible for industry engagement, advising on the innovation pipeline, and providing experience to support challenging decision making processes.

Professor Peter Gray - Director

Peter was appointed to the Board to provide scientific insight and expertise to all platforms. He supports academic and industry engagement, and integration with aligned NCRIS capabilities.

EXECUTIVE MANAGEMENT COMMITTEE

The Executive Management Committee manages and advises on platform issues and operations. It is also responsible for implementing strategic initiatives, including Commonwealth funding agreements established with network partners.

During the year, Associate Professor Andrew Lonie took up the position of Bioinformatics Convenor (acting). Andrew is the Director of Melbourne Bioinformatics and EMBL-ABR, and a renowned molecular biologist. Melbourne Bioinformatics evolved from the Victorian Life Sciences Computation Initiative for which Andrew was Director from 2015 to 2017.

Committee members are:

Chair

Andrew Gilbert, General Manager, Bioplatforms Australia

Genomics Convenor

Professor Marc Wilkins

Proteomics Convenor (acting)

Professor Ian Smith

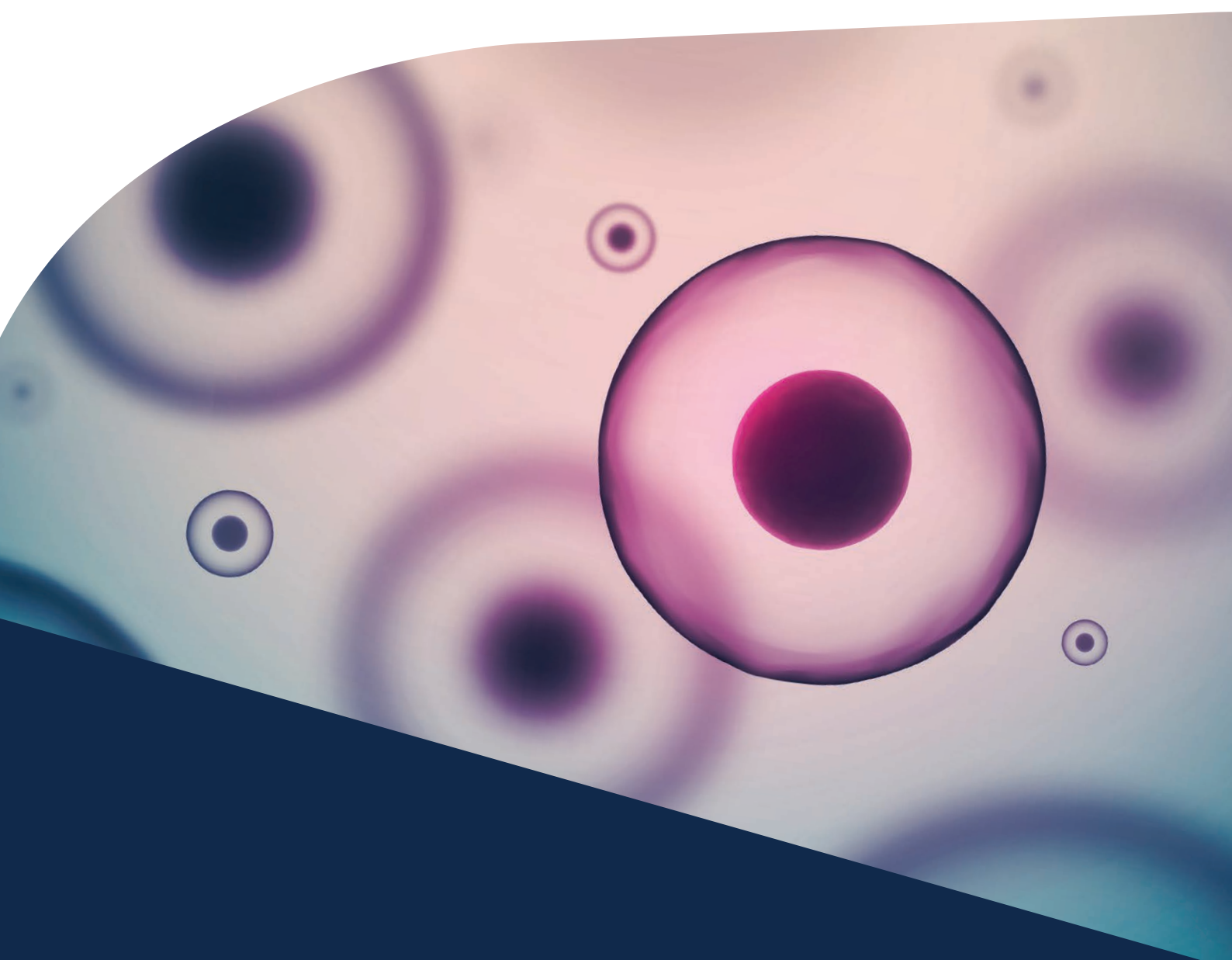
Metabolomics Convenor

Professor Malcolm McConville

Bioinformatics Convenor (acting)

Associate Professor Andrew Lonie





BIOPLATFORMS
AUSTRALIA

NCRIS 
National Research
Infrastructure for Australia
An Australian Government Initiative

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Bioplatforms Australia is a non-profit organisation that supports Australian life science research by investing in state-of-the-art infrastructure and expertise in genomics, proteomics, metabolomics and bioinformatics.

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