Melbourne Genomics Health Alliance
&
Australian Genomics Health Alliance

Professor Andrew Sinclair

Deputy Director: Murdoch Children's Research Institute
Executive Director: Victorian Clinical Genetics Service
University of Melbourne, Department of Paediatrics
Australian Genomics Health Alliance

Assoc. Professor Clara Gaff

Executive Director: Melbourne Genomics Health Alliance

Melbourne Genomics Health Alliance

Exec. Director: Assoc. Prof. Clara Gaff

Founding members

The Royal Melbourne Hospital

The Royal Children's Hospital Melbourne

THE UNIVERSITY OF MELBOURNE

FIAT LUX Walter+Eliza Hall Institute of Medical Research

Murdoch Childrens Research Institute
Healthier Kids. Healthier Future.

CSIRO

agrf Australian Genome Research Facility Ltd

New members

Peter Mac

Austin Health

MonashHealth

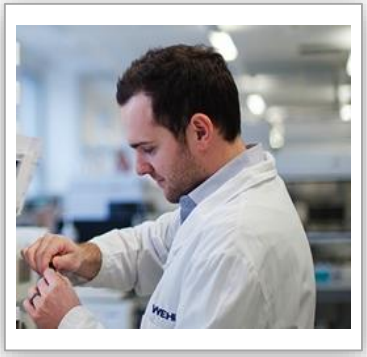
FUNDING: Members **$3.4 million 2014-15**, State Govt & Members **$35 million 2016-19**

Collaboration focused on health care is needed

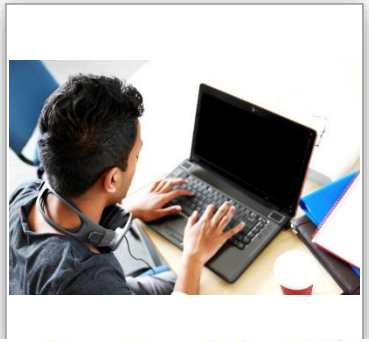
Patients

Clinicians

Diagnostic lab



Researchers



2014 -2015 Demonstration Phase

Build a 'prototype'

Testing policies

Counselling & consent

Single bioinformatics platform

Shared variant curation db

Variants linked to clinical data

Patient data entry

Researcher access to data

Multiple organisations

Different conditions

Evaluate *compared to standard care*

Process

- what worked
- what didn't
- potential solutions

Impact

- detection rate
- change in management
- Cost effectiveness

Clinicians

Patients

Diagnostic scientists

Data scientists

Demonstration Project

Prospective: Singleton Whole Exome Sequencing with targeted analysis prospective *i.e.* in parallel with usual investigations

Five flagship diseases:

- Hereditary peripheral neuropathies (CMT)
- Childhood syndromes (CS)
- Focal epilepsy (Epil)
- Hereditary colorectal cancer syndromes (hCRC) - germline
- Acute myeloid leukaemia (AML) - somatic

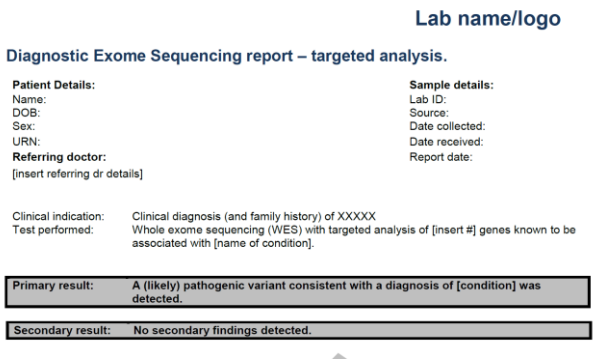
n= 305 patients

Shared approaches

Common clinical consent form (germline)

Data standards

Curation guidelines



Lab name/logo

Diagnostic Exome Sequencing report – targeted analysis.

Patient Details:	Sample details:
Name:	Lab ID:
DOB:	Source:
Sex:	Date collected:
URN:	Date received:
Referring doctor:	Report date:
[insert referring dr details]	

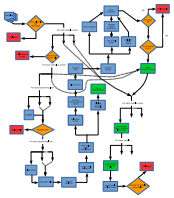
Clinical indication:	Clinical diagnosis (and family history) of XXXXX
Test performed:	Whole exome sequencing (WES) with targeted analysis of [insert #] genes known to be associated with [name of condition].

Primary result:	**A (likely) pathogenic variant consistent with a diagnosis of [condition] was detected.**
Secondary result:	**No secondary findings detected.**

Common report format

Multidisciplinary review meetings

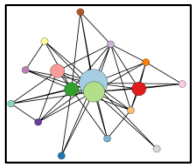
Proof of concept for State-wide approach



Analysis: Common Bioinformatics Pipeline (Cpipe) *VLSCI*

Interpretation & Reporting Variant Curation Database (MG-LOVD) *NeCTAR*

Storage & compute *VLSCI*



Access to clinical data: Data linkage *BioGrid*

Access for researchers: Research Data Storage *RDSI*

Patient data entry *BioGrid*

Patients: pathogenic variants – interim results

Participants	**Total**	AML	CRC	CS	CMT	EPIL
Analysed	**171**	24	25	80	35	41
Pathogenic variant detected	**31%**	38%	20%	57%	29%	10%
Not detected by Std care	TBD	TBD	none	45%	29%	10%

Melbourne Genomics – cost analysis

40 children with suspected syndromes

Standard investigations

A total of
$190,007
was spent on diagnostic investigations, an average of
$4,750 per patient.

7 diagnoses were made

Cost per diagnosis of

$27,143

Singleton exome

A total of
$80,000
was spent on singleton exomes at
$2,000 per patient.

25 diagnoses were made

Cost per diagnosis of

$3,200

Clinicians have a better understanding

- Designed to promote change in clinician behaviour
- Capability Opportunity Motivation Behaviour (COM-B) Model (Michey *et al*. 2011)
- All clinicians interviewed as part of the process evaluation (n=28)

"**So it's given us hands-on experience with the data and being able to understand how the test works and how the curation process works. I definitely have a much better understanding about the limitations of the test and also how it's supposed to look."**

And they report they want…

Decision support: algorithm with capacity to indicate whether exome is appropriate based on phenotype data (or recommend a different test)

Knowledge resource encompassing evidence and clinical actions

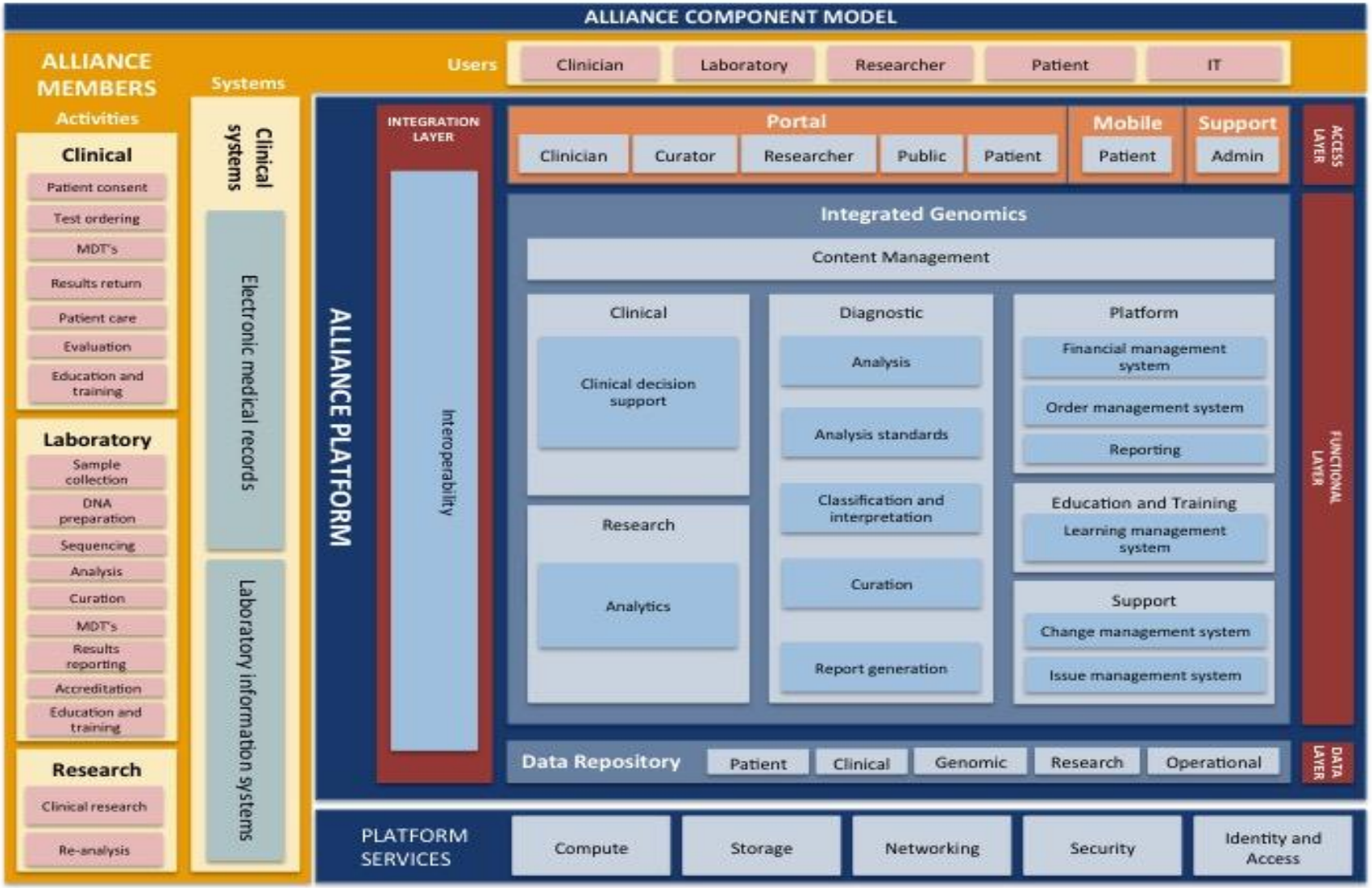
Reports integrated into hospital systems and electronic patient records that **link genotype and phenotype data**

Systems that **prompt for review** when gene lists are significantly updated

Professional **upskilling**, particularly opportunities for experiential learning ("learning by doing")

Support and reallocation of resources within the **workforce**

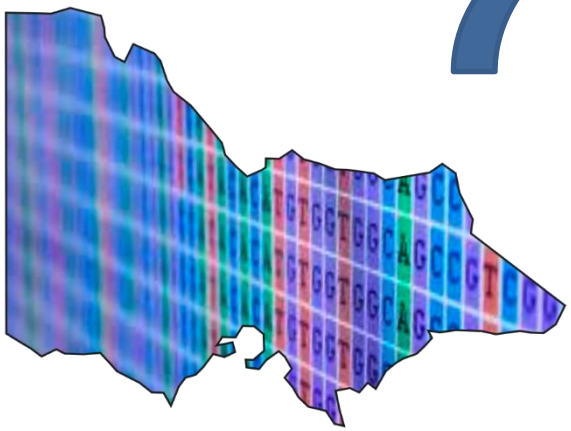
Single shared Statewide platform



Benefits of a single platform

- ✓ Economies of scale
- ✓ Scalable according to need
- ✓ Rapid adoption of new knowledge and discoveries
- ✓ Meets the needs of and provides consistency for all users
- ✓ Facilitates sharing and use of data internally and externally
- ✓ Adaptable for other –omics
- ✓ Collaborative approach optimises funding opportunities

Others are adopting our model



Melbourne Genomics Health Alliance

Australian Genomics Health Alliance

Queensland genomics alliance

Australian Genomics Health Alliance

Vision: to provide evidence based genomic medicine that will improve healthcare outcomes in the most cost-effective way

Partners

Harry Perkins Institute of Medical Research
Path West
Genetic Services of Western Australia
Telethon Kids Institute
University of Western Australia

South Australian Health & Medical Research Institute
SA Pathology / Centre for Cancer Biology
University of Adelaide

Melbourne Genomics
Monash University
Victorian Comprehensive Cancer Centre

The University of Queensland
Institute for Molecular Bioscience
QIMR Berghofer Medical Research Institute
Genetic Health Queensland
Diamantina Institute
Pathology Queensland

Sydney Children's Hospitals Network
Garvan Institute of Medical Research
NSW Health Pathology
Children's Cancer Institute Australia
The University of Sydney
Children's Medical Research Institute
University of New South Wales
Centre for Genetics Education

Australian National University

Murdoch Childrens Research Institute
Victorian Clinical Genetics Services
Melbourne Health
The University of Melbourne
Walter and Eliza Hall Institute
Peter MacCallum Cancer Centre
Royal Children's Hospital
Victorian Life Sciences Computation Initiative

Peak Professional Bodies

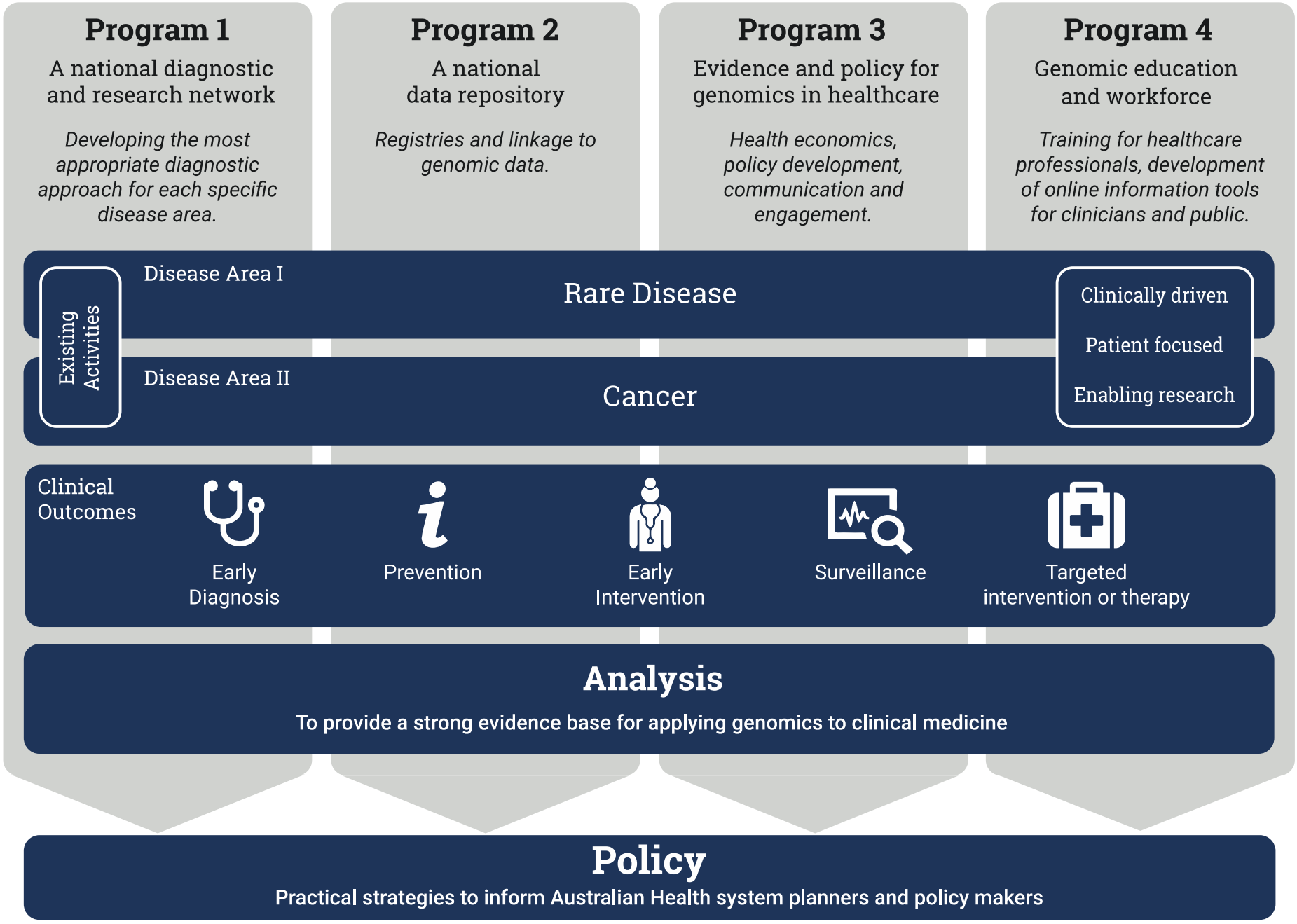
Royal College of Pathologists of Australasia
Human Genetics Society of Australasia

National Partners

Bioplatforms Australia
Australian Genome Research Facility
BioGrid Australia
National Computational Infrastructure
Commonwealth Science and Industrial Research Organisation
Rare Voices Australia

International Partners

Broad Institute of MIT and Harvard
Baylor College of Medicine
Institute of Child Health, UCL
Global Alliance for Genomics and Health
Global Genomic Medicine Collaborative


Program 1
A national diagnostic and research network
Developing the most appropriate diagnostic approach for each specific disease area.
Program 2
A national data repository
Registries and linkage to genomic data.
Program 3
Evidence and policy for genomics in healthcare
Health economics, policy development, communication and engagement.
Program 4
Genomic education and workforce
Training for healthcare professionals, development of online information tools for clinicians and public.
Existing Activities
Disease Area I
Rare Disease
Disease Area II
Cancer
Clinically driven
Patient focused
Enabling research
Clinical Outcomes
Early Diagnosis
Prevention
Early Intervention
Surveillance
Targeted intervention or therapy
Analysis
To provide a strong evidence base for applying genomics to clinical medicine
Policy
Practical strategies to inform Australian Health system planners and policy makers

Melbourne Genomics Acknowledgements

CEOs/Leadership

Gareth Goodier (RMH)
Christine Kilpatrick (RCH)
Stephen Smith (University of Melbourne)
Doug Hilton (WEHI)
Kathryn North (MCRI)
Lynne Cobiac (CSIRO)
Sue Forrest (AGRF)

Steering Group

James Angus (Chair)
Julian Clark
Sue Forrest
Clara Gaff (Exec Director)
Trevor Lockett / David Hansen
Andrew Sinclair
Mike South
Paul Waring / Jon Emery
Ingrid Winship

Community Advisory Group

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Heather Renton
Margaret Sahhar
Janney Wale
Christine Walker
Liat Watson

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Brenda Greyling (Clinical)
Natalie Thorne (Bioinf)
Tim Bakker (Info Mgmt)
Karen Meehan (Comms)
Michele Cook (Admin)

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Bill Wilson
Emily Forbes
Nessie Mupfeki

Genetic Counsellors
Gemma Brett
Emma Creed
Ella Wilkins

Advisory Groups

Genomics and Bioinformatics
Chair: Graham Taylor / Alicia Oshlack

Clinical Interpretation and Reporting
Chair: Paul James

Information Management
Chair: David Hansen

Flagships

AML
Andrew Roberts
Ian Majewski
Seong Lin Khaw
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Eddie Chew

CMT
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Lynette Kiers
Adrienne Sexton

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Laboratories

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Melanie Smith
Clare Love
Chris Guest

AGRF
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Melanie O'Keefe
Matthew Tining
Lavinia Gordon
Rust Turakulov

Working Groups

Pipeline platform
Computing
Variant database
Database users
Clinical bioinformatic workforce
Sequencing
Patient survey
Cost-effectiveness
Research access
Patient-entered data tool

Workshop Groups

Information requirements
Lifestyle data
Business case
Education symposium
Evaluation
Reporting

Information Systems

DIAGNOSTIC SYSTEMS
Cpipe / MG-LOVD
Simon Sadedin
John-Paul Plazzer
Anthony Marty
Guido Grazioli
Richard Sinnott
Glenn Tesla
Advanced Users Group
VLSCI
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Melissa Southey