National Imaging Facility

NCRIS
National Research Infrastructure for Australia
An Australian Government Initiative

BECAUSE SEEING CHANGES EVERYTHING.

National Imaging Facility

STRATEGY, IMPACT AND FUTURE

Our vision:

Enable Australian imaging science to unlock solutions to major challenges.

Our mission:

Make cutting-edge imaging capabilities accessible to Australian medical researchers, materials and agriculture scientists, enabling them to solve challenges across research and industry

This document outlines the way National Imaging Facility contributes to Australian wellbeing and outlines our future priorities.

Throughout we illustrate the way NIF addresses the challenges identified in the National Research Infrastructure Roadmap 2021. NIF focuses on Medical Products, but makes valuable contributions in Food and Beverage, Frontier Technologies and Modern Manufacturing and Resource Technology and Critical Minerals.

National Imaging Facility

AUSTRALIA'S ADVANCED IMAGING NETWORK

We provide open access to flagship imaging equipment, expertise, tools, data and analysis. We address Australia's strategic science and research priorities, and this benefits Australian industry and helps keep Australians healthy.

What we do

NIF provides a full suite of advanced imaging capability including preclinical and clinical, human and animal imaging, radiochemistry, and imaging data analysis.

We focus on health and medical innovation, and also provide highly specialised capabilities for agriculture, materials science, museums and cultural applications.

We are the experts in developing new imaging technologies, processing and interpreting imaging data, and applying imaging to solve complex problems.

Our expertise, equipment and services are critical to Australia's ability to translate health discoveries, undertake clinical trials and commercialise medical products.

How we work

NIF partners with state-of-the-art imaging projects led by teams with world-class capabilities. We operate efficiently at a national level, share innovative ideas and deep expertise, and work collaboratively across the research, health, innovation and industry sectors.

We partner with people who can translate their discoveries into real-world applications.

Our impact

NIF is unlocking solutions to the world's biggest imaging challenges across commercial, clinical and research fields. We have helped Australians innovate in fields such as bioengineering, clinical science, biology, medical technology, pharmaceutical and non-pharmaceutical therapies, agriculture, materials, museums and cultural collections.

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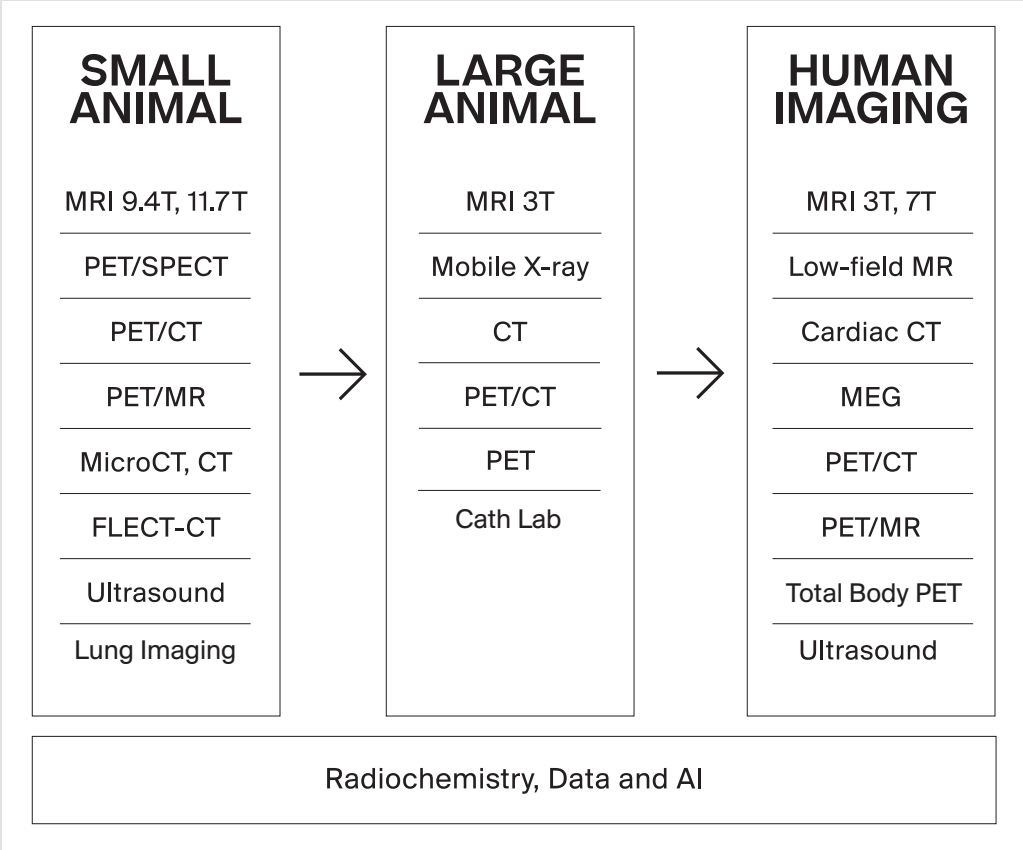
HELPING TRANSLATE DISCOVERIES TO MEDICAL BENEFITS AND PRODUCTS

Thousands of scientists, doctors, and professionals across hundreds of Australian institutions, companies and research organisations use our work to help answer their medical research questions. We also work with engaged volunteers and patients who make a valuable contribution to health and discovery by being part of research.

Our capabilities span the continuum of small and large animal imaging, to human imaging—allowing researchers to translate fundamental research to improvements in human health.

Within our themes, we offer many types of biomedical imaging, including magnetic resonance imaging (MRI), positron emission tomography (PET), X-ray computed tomography (CT), ultrasound and more.

Our work forms the basis for preclinical trials for in vivo models and large-scale, multi-site clinical human trials. Importantly, NIF is at the leading edge of developing Australia's capability, both experimentally and theoretically, to address any new challenges and applications that use biomedical imaging for medical research.



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NIF BY THE NUMBERS in 2020

2,558 researchers from **1,100** facilitated projects across **105** organisations

1,691 new users trained

146 clinical trials supported

30,060 hours of instrument time used

34 fellows providing world-class expertise across imaging, data science and radiochemistry

55 open access instruments across **13** different sites

3/3 Number of funded Medical Research Future Fund Frontiers 2020 projects that are associated with NIF facilities

NIF consists of expertise, technology, national-reach, and interdisciplinary Practices

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THE NATIONAL IMAGING FACILITY STRATEGY

Drivers: World-leading imaging technology magnifies the productivity and impact of outstanding researchers, but it is sophisticated and difficult to use, requiring human operators with deep imaging expertise.

Expertise goal: Expand Australia's world-leading community of imaging experts and users

Action E1 Coordinate expertise and infrastructure to support leading national researchers and clinicians.

Action E2 Develop expertise to make imaging applicable across disciplines, institutions and communities.

Action E3 Nurture Australia's next generation of world leaders in imaging research.

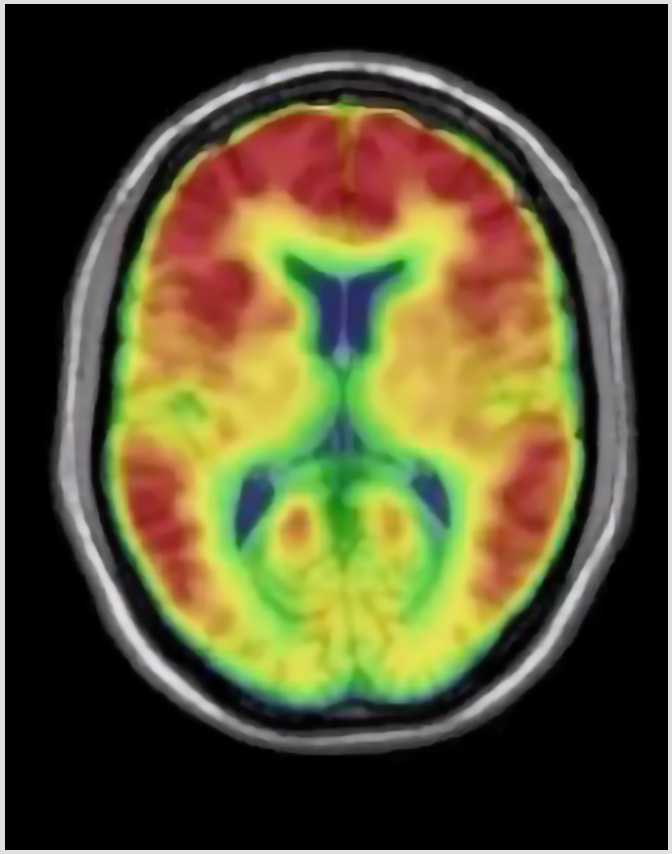
Drivers: Breakthrough hardware and advances in machine learning are transforming imaging technology globally. This is accelerating scientific discovery and its translation to impact.

Technology Goal: Keep Australia at the forefront of imaging technology and imaging data analytics

Action T1 Scope, map and develop transformative imaging technologies.

Action T2 Ensure Australia is at the cutting edge in applying data science to imaging.

Action T3 Prioritise investments for innovation and international comparative advantage.



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Drivers: Imaging has become a core technology for research translation at a time when Australian and state governments have developed a strong policy focus on impact.

Impact Goal: Deploy imaging capabilities to support translation, clinical trials and commercialisation

Action I1 Empower impact-focused teams in imaging science, health, agriculture, and materials science.

Action I2 Increase integration between basic science, applied science and clinical research by applying imaging.

Action I3 Foster partnerships with industry and end users.

Drivers: As imaging technologies increase in scale and complexity, national coordination and distributed tools are critical for making cutting-edge capabilities affordable and accessible across the country.

Coordination Goal: Maximise NIF's impact by operating as an integrated, national-scale platform

Action C1 Increase accessibility for all Australian researchers and clinicians.

Action C2 Create single 'front door' for users and standardise practices across NIF.

Action C3 Share knowledge, expertise, data and sustainable business models among NIF's nodes.

Drivers: The power of modern imaging is precipitating rising demand for imaging capabilities across science, medicine and industry, but effectively implementing imaging technologies requires strong partnerships.

Partnership Goal: Ensure that NIF has the partnerships to deliver on its vision

Action P1 Nurture relationships with government and contribute constructively to policy.

Action P2 Build bridges to diverse communities and develop non-government funding streams.

Action P3 Enhance other parts of the Australian research ecosystem.

IMAGING FOR IMPACT

THE NATIONAL IMAGING FACILITY UNDERPINS FOUR OF AUSTRALIA'S RESEARCH INFRASTRUCTURE ROADMAP THEMES: MEDICAL PRODUCTS, FRONTIER TECHNOLOGIES AND MODERN MANUFACTURING, FOOD AND BEVERAGE AND RESOURCE TECHNOLOGY AND CRITICAL MINERALS

		Medical Products	Frontier Technologies and Modern Manufacturing	Food and Beverage	Resources Technology and Critical Minerals Processing
Better evidence for decision-making in health	Advanced imaging methods and analysis provide critical evidence for decision-making—for example, imaging facial nerves affected by melanomas—across all aspects of health and clinical science to keep Australia healthy.	●	●		
New diagnostics and therapies combined	New-generation nuclear therapies where imaging-based diagnosis and treatment is combined and delivered together (called 'theranostics') are revolutionising cancer therapy, such as high-grade brain cancer treatments.	●	●		
Better health for the young and older Australians	Imaging studies that look at conditions in younger and older Australians—such as detecting dementias or drug effects during pregnancy—are essential for understanding and promoting healthy development and ageing.	●			
Equitable regional and rural health	Crucial to societal equity and research quality, delivering a geographically distributed network of advanced imaging to support research and personalised medicine, and taking part in medical trials, is a major national challenge.	●			
Growing use of imaging in agriculture and ecology	Imaging is accelerating as an important capability for agricultural and ecological sciences; for example, imaging how roots use phosphorus in nutrient-poor soils without destroying them.		●	●	
Critical contributions to materials, engineering and culture	Many varied industrial and research problems—such as chemical processes, materials science, environmental and ecosystems research, security, palaeontology and cultural preservation—are increasingly opening up to the benefits of advanced imaging technologies.		●		●

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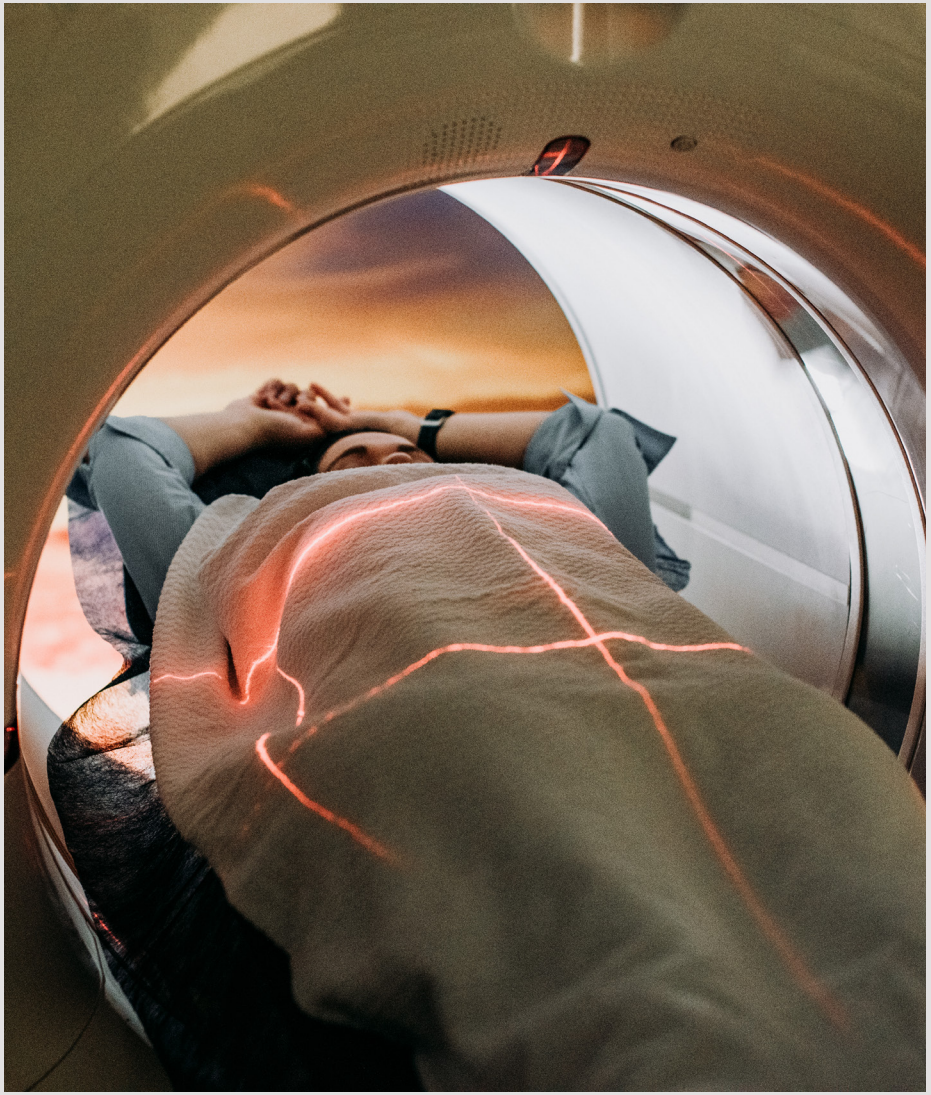
NATIONAL-SCALE COORDINATION

NIF WILL IMPLEMENT THREE NATIONAL-SCALE COORDINATION NETWORKS.



These networks will make it easier, cheaper and simpler for researchers to access key imaging technology in Australia. We will simplify processes, harmonise instruments for multi-site studies (calibrate instruments to appropriate standards and with each other), standardise practices, share innovations and continue to increase the quality of the data we produce. Researchers will be able to use a single 'front door' to access any part of the NIF network. Standardisation will reduce the costs of using imaging for research, for researchers and for NIF.

Our three networks:

Applying machine learning to revolutionise imaging

Machine-learning techniques can transform how images are made and interpreted. Our plans will accelerate adoption, promote best practice, and increase research reproducibility (to ensure that research studies can be easily proven or disproven).

Harmonising a national Magnetic Resonance Imaging network

A new generation of preclinical and clinical trials conducted at multiple centres will require the underpinning support of our nationally coordinated MRI network.

Coordinating a radiochemistry and molecular imaging network

National-scale coordination of radioisotope and radiochemistry for imaging will strongly support the clinical translation of new radiotracers, and support Australian clinical trials in dementia, cancer, and cardiac and metabolic diseases.

FUTURE CAPABILITIES

TO ENSURE A WORLD-CLASS RESEARCH IMAGING CAPABILITY NIF PRODUCES, AND DELIVERS TO, A NATIONAL ROADMAP FOR IMAGING RESEARCH INFRASTRUCTURE.

The NIF Imaging Roadmap shows how we will deliver on the priorities outlined in the 2021 National Research Infrastructure Roadmap for imaging.

We will support innovation and ensure Australia's international comparative advantage by prioritising these capabilities over the coming five years.

		Medical Products	Frontier Technologies and Modern Manufacturing	Food and Beverage	Resources Technology and Critical Minerals Processing
Accelerating next-generation imaging technologies	Australia is a pioneer in developing new imaging technologies and translating them to real-world applications.	●	●	●	●
Furthering critical magnetic resonance technology	Australia is a world-leader in applying and translating MRI technology—it will continue to be an important part of our imaging research infrastructure.	●	●	●	
Translating portable biomagnetic imaging	A new generation of ultra-sensitive room-temperature magnetometers promises to bring advanced, portable diagnostic biomagnetic imaging to clinics for neurological, cardiovascular and neonatal health.	●	●		
Pioneering full-colour X-ray scanners	Recent breakthrough technology promises to revolutionise the entire field of computed tomographic (CT) imaging, called photon-counting CT imaging.	●	●		●
Applying new-generation ultrasound for treatments and diagnostic techniques	Ultrasound technology is quickly evolving to provide higher quality images and innovative treatments for new therapeutic approaches—such as for diseases like Alzheimer's disease.	●	●		
Advancing molecular imaging to visualise whole-body processes	Next-generation molecular imaging and radiopharmaceuticals are revolutionising how we see biological processes at the molecular level. We can use hybrid and total-body imaging technologies to more effectively diagnose and treat people.	●	●		

National Imaging Facility

OUR GOVERNANCE STRUCTURE AND MANAGEMENT TEAM

NIF operates as an Unincorporated Joint Venture of 14 partners and is administered by The University of Queensland.

Board

The Board is our key governing body. The Board provides NIF with oversight and strategic direction, and monitors its performance. The Board is accountable to The University of Queensland as the administering organisation.

Chair:
Emeritus Professor Margaret Harding
Members:
Dr Erol Harvey
Professor Carolyn Mountford,
Dr Thomas Barlow
Ms Sue Renkin
Professor Stephen Rose
Professor Joe Shapter

Management

Chief Executive Officer:
Professor Wojtek James Goscinski
Chief Operating Officer
Ms Saba Salehi

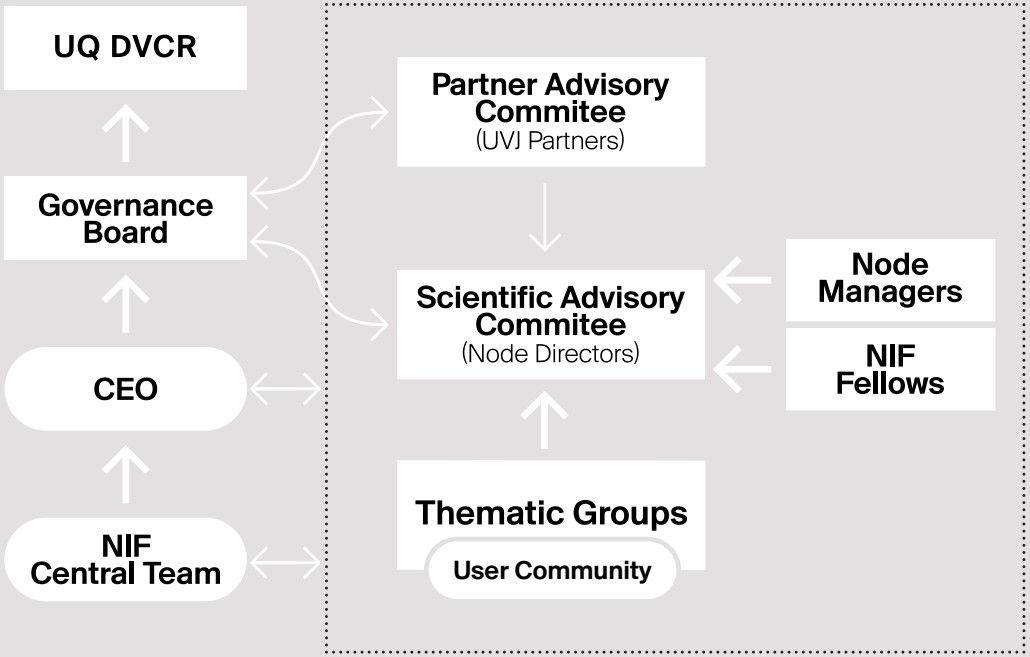
Partner Advisory Committee

The Partner Advisory Committee provides the Board with strategic advice about institutional, state and national issues that affect how we deliver national imaging capabilities that support the leading edge of international science. It comprises senior executive representatives of our partners.

Scientific Advisory Committee

The Scientific Advisory Committee is the primary scientific and technical committee for NIF, and comprises of Node Directors or co-Directors.

Governance Structure



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OUR FACILITIES

Brisbane:

- Centre for Advanced Imaging, University of Queensland
- Herston Imaging Research Facility (HIRF) and radiochemistry capability at Q-Trace

Sydney:

- Radiochemistry capability at ANSTO, Lucas Heights
- Preclinical and clinical imaging capability at Sydney Imaging, The University of Sydney
- Biological Resource Imaging Laboratory at University of New South Wales
- The 3T MRI capabilities at Neuroscience Research Australia (NeuRA) and Research Imaging NSW (RINSW)
- Biomedical Magnetic Resonance Facility at the Western Sydney University, Sydney
- Macquarie University **(new in 2021)**

Newcastle:

- University of Newcastle **(new in 2021)**

Melbourne:

- Melbourne Brain Centre Imaging Unit, University of Melbourne, Parkville
- Radiochemistry capability at Austin Health and Peter MacCallum Cancer Centre
- Monash Biomedical Imaging, Monash University, Clayton
- Preclinical Imaging Facility at Alfred Research Alliance-Monash Biomedical Imaging, Monash University, Prahran
- Swinburne Neuroimaging, Swinburne University of Technology, Hawthorn
- The Florey Institute of Neuroscience and Mental Health, Heidelberg
- Olivia Newton John Cancer Research Institute **(new in 2021)**

Adelaide:

- Small Animal Imaging Facility and Clinical Research and Imaging Centre at SAHMRI, North Terrace
- Large Animal Research Imaging Facility (LARIF), Gilles Plains

Perth:

- Centre for Microscopy, Characterisation, and Analysis, Harry Perkins Building, The University of Western Australia

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OUR FUNDERS, PARTNERS AND MAJOR STAKEHOLDERS

National Imaging Facility is a $300m portfolio of imaging capabilities which have received investment from the Australian government, under National Collaborative Research Infrastructure Strategy (NCRIS), state governments, and its network of 14 university, medical research institute and government science agency partners.

NIF is administered by The University of Queensland and is independently governed. Our partners are essential to delivering our mission. We work together to address Australia's hardest imaging challenges.

NIF acknowledges and thanks our nodes and users who contributed images and stories for this document.

NIF Nodes

ANSTO

Olivia Newton-John Cancer Research Institute | La Trobe University

Macquarie University Sydney · Australia

Monash University

SAHMRI South Australian Health & Medical Research Institute | Large Animal Research Imaging Facility

Swinburne University of Technology

The Florey Institute of Neuroscience & Mental Health

The University of Melbourne

UNSW The University of New South Wales

The University of Newcastle Australia | HMRI

The University Of Queensland Australia | HIRF Herston Imaging Research Facility

The University of Sydney

The University of Western Australia

Western Sydney University

Government funding partners

NCRIS National Research Infrastructure for Australia — An Australian Government Initiative

NSW Government

Queensland Government

Government of South Australia

Victoria State Government

Government of Western Australia

NCRIS Project Partners

Research Infrastructure Health Forum

Bioplatforms Australia

PHRN Population Health Research Network

Therapeutic Innovation Australia

Phenomics Australia — Enabling genomic medicine

Informatics Project Partners

ARDC Australian Research Data Commons

MASSIVE

Microscopy Australia

International Partners

EuroBioImaging

Global BioImaging — growing collaboration

National Imaging Facility

CONTACT US

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