



THE UNIVERSITY OF
MELBOURNE

A better world

BEGIN >

Research that enriches lives

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A better world



Research that enriches lives

Foreword

“The research systems that are most effective at producing knowledge for the public good are characterised by freedom of action and movement. There needs to be permeability and fluidity, allowing the ready transfer of ideas, skills and people in all directions between the different sectors, research disciplines and various parts of the research endeavour.”

Paul Nurse FRS, FMedSci, Nobel Laureate
at THE World Academic Summit, September 2017, London

At the University of Melbourne the fusion of ideas and approaches underpins a story of growth and innovation. Our researchers work across disciplines, and in partnerships with our wider communities, to build potential solutions to some of the world’s most pressing questions.

Interdisciplinary research collaboration is integral to the University of Melbourne’s overarching research strategy. This is exemplified in the University’s three Grand Challenges – Understanding our Place and Purpose, Fostering Health and Wellbeing, and Supporting Sustainability and Resilience. The University is committed to bringing researchers together from across disciplines to tackle some of society’s most complex problems in innovative ways; whilst continuing to also nurture deep discipline depth.

The Melbourne Interdisciplinary Research Institutes and Hallmark Research Initiatives catalyse new interdisciplinary collaborations to foster research of quality and impact. Sharing our vision for a strong, more resilient and inclusive

society, the support of the University’s enthusiastic partners is essential – hospitals, research institutes and centres, advocacy groups, people with lived experience, not-for-profits, industry and government.

The research stories we have profiled are drawn from across the broad scope of interdisciplinary research that takes place at the University of Melbourne. They provide a snapshot of the challenges and opportunities society faces, and illustrate the ways our research activities are tackling them. In particular these stories also describe ways our researchers are collaborating closely with communities beyond the University.

It is through this collision of creative enquiring minds and growing ideas that solutions to complex challenges can be achieved.

Professor Mark Hargreaves
Pro Vice-Chancellor
(Research Collaboration and Partnerships)

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'3am' by Kelly, as part of the ASPIRE Photovoice project.

Protecting migrant women from family violence

On the hard concrete of the streets around Collingwood, a child is lit against the dark night by fluorescent light.

If a picture says a thousand words, '3am' by Kelly tells a heartbreaking story: that for her and her son this cold, uninviting place is safer than home.

Worldwide, almost a third of women who have been in a relationship have experienced physical or sexual violence at the hands of an intimate partner. Domestic and family violence is a significant public health issue in Australia, influencing the wellbeing of many women and children.

A research collaboration between the University of Melbourne, the Multicultural Centre for Women's Health and the University of Tasmania has found that migrant and refugee women in Australia experience the same types of violence non-migrant women experience—sexual violence, physical violence, financial abuse, and emotional abuse. But, should they leave their partner, they also face language barriers, extreme social isolation, the fear of being separated from their children, and losing rights or access to services.

"We were very concerned about how the system might make women vulnerable to violence," says Cathy Vaughan, researcher at the Melbourne School of Population and Global Health, who led the Analysing Safety and Place in Immigrant and Refugee Experience (ASPIRE) project.

ASPIRE sought to understand women's experiences of family violence and how they vary for women who have resettled in different places, and have different cultural backgrounds and visa statuses.

By training a group of bicultural workers as co-researchers, and involving them in the design and implementation of the research program, the ASPIRE project helped migrant and refugee women tell their personal and often painful stories, providing evidence of these poorly understood problems.

A Photovoice project, allowing a means of self-expression through photography, provided vivid accounts of migrant women's experiences.

The project also drew on 46 in-depth interviews with migrant women who had experienced family violence, 57 interviews with informants from service organisations, and 26 focus groups conducted with 233 women and men from different cultural communities.

“We were able to document the range and types of violence these women experience. We found they experience additional forms of violence that are partly related to their visa status, such as partners withholding documentation, taking away their passports, giving them false information about their rights, or saying they or their children will be deported.”

The ASPIRE project drew on the practical experience of the Australian Red Cross and Migrant Resource Centres, and was funded by Australia’s National Research Organisation for Women’s Safety.

“You need to bring that theoretical background into contact with people who are dealing with this issue in the real world, together with what community members are telling us,” Dr Vaughan says.

The ultimate aim was to provide evidence and guidance for improving response to family violence for women.

“We knew from our conversations with service providers that the types of visas women hold makes a huge difference to what services they can access,” says Dr Vaughan.

“For example, if a woman came here on a spousal visa as a partner of an Australian citizen, she could still proceed with an application for permanent residency even if she left the relationship because of violence. She would also be fully entitled to family violence support services.”

In contrast, a woman with a prospective marriage visa, engaged but not yet married to a citizen, would not be entitled to any of those services, or have access to things like Medicare and Centrelink. Similarly, partners of international students have restrictions on the services they can access because of their visa status.

“This evidence flags ways that responses to family violence need to change when assessing risk. For example, it doesn’t currently take into account visa status.”

‘Inescapable loneliness’ by Ruby, as part of the ASPIRE Photovoice project.

“Worldwide, almost a third of women who have been in a relationship have experienced physical or sexual violence at the hands of an intimate partner.”

ASIPRE is bringing about social change. The project was heavily cited in the Royal Commission into Family Violence Report, and is being used to inform the response to the Commission’s recommendations.

The collection of photographs taken by ASPIRE participants has been exhibited at libraries and other public spaces and continues to move viewers, shining a light on the challenges facing migrant women.



Beyond bushfires

The Black Saturday bushfires of 2009 were devastating for school principal Janette Cook and her Kinglake community.

One thing that struck Kinglake school principal Janette Cook was how deeply – and for how long – her students’ mental health was affected.

“The triggers were the same for the adults as it was for the children,” Ms Cook says. “Like if there was smoke, if it was a windy day, if the power went off.”

“Such things triggered anxiety and nervousness for an extended period – it’s still going on.”

The fires, which struck regional Victoria, claimed 173 lives and burnt down Middle Kinglake Primary School.

As Ms Cook oversaw the school’s rebuilding, and teachers worked to help students recover, researchers embarked on an ambitious project to survey bushfire survivors over a six-year period. A team of researchers from six institutions, including the University of Melbourne, surveyed over 1000 survivors to learn about their mental health and wellbeing.

The findings of the Beyond Bushfires study were clear – the mental health and social impacts of the bushfires

were larger and went for longer than previously thought. That meant mental health support services were required for longer. Also, stronger social ties to others, including membership of community groups, helped people recover – to an extent that surprised the research team.

“The research confirmed many of the things we were noticing in children,” Ms Cook says. “Things like anger.”

“Meanwhile, connections to community groups, like sports clubs, was very important and provided great support. There were many times when the kids just rallied around each other.”

With little other research to draw on, Kinglake teachers welcomed the Beyond Bushfires study. Ms Cook said she hoped it would lead to more support, such as additional psycho-social personnel being made available to schools after major disasters. She also hoped that it would lead to a greater recognition that people needed longer to recover after a disaster, and that such disasters caused gaps in students’ learning.

The study's lead researcher, Lisa Gibbs from the Centre for Health Equity at the University of Melbourne, said four years after the bushfires, the rate of mental health problems was approximately double that of the general population.

This is based on a survey of over 1000 bushfire-affected people by phone or online in 2011–13. The researchers then repeated the survey in 2014, conducting in-depth interviews with a smaller number of people and inviting them to walk around their homes, gardens and communities and share their stories.

“It really got them thinking about what was important to them, and what they wanted to show us,” Associate Professor Gibbs says.

“People showed us a lot of trees and landscapes, and it made us realise just how important that connection to the natural environment was.”

Involved in the study's design, the Australian Red Cross has used the findings to upgrade its services to reunite people after disasters. Emergency Management Victoria used the report in a recent discussion paper, presenting a new approach to recovery that recognises the many different community factors that support resilience. The state Department of Education and Training used the report to plan school support programs and further study into the impact of disasters on schools.

The study has been relevant to how communities recover after other disasters like floods and accidents, Associate Professor Gibbs says, with findings being shared with other academics and experts.

“At a recent presentation we gave, people who were attending from Christchurch who were very involved in the recovery following the Christchurch earthquakes, commented on how many parallels there are,” Associate Professor Gibbs says. “These are conversations we have all the time.”


The Beyond Bushfires project partnered with community, emergency and government organisations. Subject to funding, researchers hope to repeat their surveys and track mental health and wellbeing results over a longer period.

School principal Janette Cook, who attended community meetings to discuss the report and its findings, said it was important that people felt included by the research. “People felt they were being listened to,” she says. “Having the results fed back to them, they felt like, ‘it wasn't just me – this is genuine and it's OK’.”

“The findings of the Beyond Bushfires study were clear. The mental health and social impacts of the bushfires were larger and went for longer than previously thought.”

*Middle Kinglake primary students
with former principal Janette Cook.
Picture: David Geraghty*





*Dr Samantha Loi
interacting with 'Betty'
the support robots.*

How robots can reach out

**Younger people with dementia can struggle to feel independent and engaged.
Could robots help build connections with the wider world?**

That's the question Dr Samantha Loi has put to the test, with the help of Betty and Lucy. Betty and Lucy may be under 40cm tall but they can chat about the news, play music, and call out bingo numbers. In future these robots may be able to read a person's emotions, make phone calls for them, and remind them to take medication or eat lunch.

Samantha Loi, from the University of Melbourne's Academic Unit for Psychiatry of Old Age, wanted to find out how people with younger-onset dementia responded to robots. It's a significant issue – there are 24,500 Australians under the age of 65 who have been diagnosed with dementia.

During the pilot Dr Loi used the robots in two different settings – at the Royal Melbourne Hospital and at Cyril Jewell House, a residential care facility. In small groups, participants got to know the robots and provided feedback to researchers.

"They liked having Betty there, they weren't scared of her," Dr Loi says.

Participants particularly enjoyed Betty playing Elvis songs, which prompted a discussion about their favourite music genres. Some participants got up to dance. Betty's 'mindfulness' session was also popular.

"We all sat there and Betty told us to close our eyes, we listened to her and tried to relax," Dr Loi says. "The nurses were like, 'what's going on? Everything's very quiet.'"

Dr Loi reports a degree of apprehension among both nursing staff and participants about using a robot, but found that this dissipated as the trial progressed, with some participants saying that they felt more confident trying new technology in general.

**“There are 24,500
Australians under the
age of 65 who have been
diagnosed with dementia.”**

Some teething troubles were encountered during the trial, largely when wifi was unavailable and due to the fact that the robots needed to work well at all times and boot up quickly. Research partners from La Trobe University performed troubleshooting as the trial progressed as nursing staff were usually too busy to fix any problems. Once Betty was up and running (literally – she can move around!), the La Trobe team trialled a smaller, second robot which doesn't move, to see how participants responded.

Alice Bennett, manager at Cyril Jewell House, said the residents took a shine to the robots.

“It was about something or someone actually being there with them,” she says. “The robot was dancing and moving, the residents were clapping along – they were engaged. When you put on the radio, they're not engaged.”

“Artificial intelligence can be terrifying, we thought there might be a bit of negativity, but there was none – absolutely none.”

The youngest resident involved was aged 32, and participants had either younger-onset dementia or Multiple Sclerosis.

Mrs Bennett said the trial was early-stage and the robots needed refinement over time, but the nursing team thought they had “huge potential” to help younger people engage and communicate.

Some health professionals have voiced concerns about robots replacing human contact for people in need of care. Dr Loi said it was important to be mindful of this.

“It's not at all to replace people – I really don't think robots could,” she says. “It would be as a supplement.”




Dr Samantha Loi and Professor Rajiv Khosla who helped conduct and design the robot pilot trial respectively.

For example, the robots could be used to facilitate leisure activities in residential care facilities, allowing staff to focus on residents with more complex needs, and free up carers for people with dementia who live at home. In future, carers could go out shopping knowing the robot would interact with the person being cared for – and call the carer if a problem emerged. Meanwhile, patients would be able to use the robots to connect to the internet, make phone calls, or play a favourite album.

Dr Loi said caring was challenging and, given they never tired of repetitive tasks, the robots could provide respite. “The robot has the patience of forever,” she says.

Dr Loi is planning to write a report on the trial, which was funded by the Royal Melbourne Hospital's Home Lottery scheme. They're also giving presentations to mental health clinicians and robotics experts.



India at night satellite image,
showing electrification
(Source: NASA)

Energy transition transforming women's lives

If you use the term 'energy transition' in Australia, people are likely to think about electric cars or replacing coal generation with renewable energy.

In rural Asia – where women can spend hours every day collecting firewood or cow dung for fuel, manually hauling water or grinding grain – energy transition can transform women's lives.

Reihana Mohideen has seen this transition first hand. Following a degree in electrical engineering, Dr Mohideen worked in developing countries for Oxfam Australia and the Asian Development Bank, and then embarked on a research career exploring the social and gender implications of energy innovation in South Asia.

Access to clean, modern, sustainable energy is integral to the sustainable development goals of the United Nations and is vital for improving the lives of billions of people around the world. Dr Mohideen has worked on improving energy access and social inclusion in India, Bangladesh, Bhutan, Maldives, Nepal and Sri Lanka. She explains that women in these countries traditionally manage the household chores of food processing and collecting fuel and water, which is back-breaking and time-consuming work. Access to modern energy can dramatically cut this workload.

“The typical rural scene is women walking down the road with massive loads of firewood on their heads. Similarly, with water, some women spend four hours a day walking back and forth carrying large pots filled with water on their heads.”

In some villages in Nepal, women spend several hours a day pounding and grinding grain. This can be significantly cut with powered food processing equipment.

Dr Mohideen, a senior research fellow at the Melbourne Energy Institute, is developing frameworks and decision making tools to ensure the energy systems implemented benefit and empower women and by extension, their communities. For some communities, transformation comes with expansion of a country's existing electricity grid.

For more isolated or less populated communities, options may be limited to stand-alone solar, wind and micro-hydro systems, sometimes backed with diesel generators.

“When you provide a modern energy system you're locking a community into that system for up to 20 to 25 years,” says Dr Mohideen.

"I have seen so many lovely little solar PV systems that only power two light bulbs and a phone charger, but that can't expand or evolve to use later innovations."

"These small systems don't necessarily enable women to have pumped water, to have food processing machines or mechanical equipment to contribute to the local economy."

In addition to flexible long-term planning, Dr Mohideen says communities need to consider their specific energy needs and priorities, and be provided the information necessary to make informed choices.

"We have to make sure that the gender implications are understood," says Dr Mohideen.

"If not, what we invariably find is that women's tasks are not prioritised, and the tasks men do get prioritised in technology choices."

"We want to solve the access problem by giving the community the most advanced and innovative technology choices and make sure the community has enough energy to be productive."

In developing countries, just 365 kilowatt hours a year per household, enterprise or community institution – the Tier 3 minimum energy of the World Bank's multi-tier approach to providing sustainable energy access – is enough to power lighting and televisions, charge mobile phones and computers, pump water, provide mechanised food processing, basic refrigeration, washing machines and rice cookers.

"That's less than the amount of electricity used by the typical old 'beer' fridge in an Australian garage."

This level of access to modern energy reduces the amount of back-breaking manual labour women do and creates opportunities for economic empowerment. The less time women spend on household chores, the more time they can spend on income-raising activities. And with modern energy, these enterprises become more productive.

"In some villages in Nepal, women spend several hours a day pounding and grinding grain."

Local clinics in electrified communities can also stay open for longer hours, get modern equipment, and provide better diagnostics and services. Indeed, international data shows a clear decline in maternal mortality rates when energy consumption increases from very low to moderate levels. Cooking with electricity instead of firewood or cow dung also makes the air in homes healthier. The World Health Organization estimates that over 4 million people die prematurely every year due to indoor air pollution related to cooking with solid fuels such as these.

Dr Mohideen has partnered with government agencies and utilities in various Asian countries. She has designed templates, specifications, and a reference energy system to help them consider the implications of energy technology and system innovations for women.

"The standard teams that I would lead or work with would typically include mechanical and electrical engineers, economists to do the cost estimates, environmental specialists to do the environmental impact assessment, social specialists to do social due diligence, and so on," says Dr Mohideen.

"You can't work on a power system in the real world without a cross-disciplinary team."

The next stage of the research is to pilot the reference energy system in a rural community, either in India or Bangladesh.

"The technology exists, the knowhow exists, and there is a good business case."

The Barefoot College is an example of a scheme with a gender equity focus which connects rural communities to solar, water, education, professions and advocacy to help communities and individuals take control of their lives and the wellbeing of their communities.



A photograph of Dr Andrew Martel, a man with glasses and a dark sweater, sitting at a wooden table. He is smiling and has his hands clasped. On the table are several architectural models made of light-colored wood. One model is a tall, multi-story house with a gabled roof. Another is a smaller, more complex structure with multiple levels and openings. A third is a long, low structure with a flat roof. The background shows a modern building interior with large windows and a wooden wall.

Dr Andrew Martel and some examples of Architecture student designs.

Meeting housing needs – for all

Imagine living in a home where you can't turn on the tap easily, can't get into the shower without help, and can't gauge if you're about to hit your head on a shelf.

This is a prospect that faces some people with a disability. Jennifer Morgan, Director of Health and Wellbeing at disability service provider Yooralla, says a lack of suitable housing is segregating some Australians from mainstream housing.

Some people with a disability end up paying high rents, moving from their preferred suburb or living in aged care homes.

“This leads to uncertainty and anxiety for the person with a disability, and can often leave people isolated and feeling disconnected from their community,” Ms Morgan says.

“We all want to be equal citizens in the world, not defined by how our environment may limit us.”

Enter a team of Architecture students from the University of Melbourne. The students took on the challenge of

designing a townhouse for people with disabilities. And it wasn't an abstract task – the designs were tested out on two informed audiences. People with a disability pored over the plans and gave their feedback at a workshop, as did residential developers.

Andrew Martel, Lecturer in Construction and Architecture at the University of Melbourne, hopes the designs will be picked up and put into practice by developers. “But even if that doesn't happen,” says Dr Martel, “there's still a research goal: to ask why not, and study what stifles innovation in housing.”

As part of the course, workshop participants, who have a mobility, vision or hearing impairment were shown 12 student designs for townhouses on paper. The students modified the plans to make them clearer and larger, using figures with, for example, seeing eye dogs or in wheelchairs.

Dr Martel said workshop participants particularly liked the placement of a seat near the front door to help people juggle keys and shopping, as well as the way students focused on accessible kitchens and bathrooms – challenging rooms for people with a disability. Participants liked the use of timber strips along walls to help people with vision impairments gauge how far away the wall was.

“And participants had no hesitation telling us where they thought there would be problems,” Dr Martel adds.

“They had strong concerns about staircases with a gap beneath them, because people could hit their heads. They wanted more power points to manage lamps, heaters and fans without having cords everywhere. And they were concerned about security and how to see who was at the front door.

“Knowing who’s at the door came up as really important. People were hesitant to just open the door to anybody,” Dr Martel says.

“A lack of suitable housing is segregating some Australians from mainstream housing.”

“There’s a whole suite of straightforward things that you can do, that we think will make a material benefit for people with a disability. It’s not an unsolvable problem.”

Staff from property development company Frasers Property Australia attended the workshops, which were supported by the University’s Melbourne Sustainable Society Institute and the Hallmark Disability Research Initiative, and gave their own feedback on the designs. The company now has the completed designs and is considering putting specific elements into practice.

Dr Martel believes that, with no regulatory requirement for private housing to be suitable for people with a disability, and with issues of intellectual property and planning laws sometimes proving a complication, studying the innovation pathway to better housing is central to the University course.



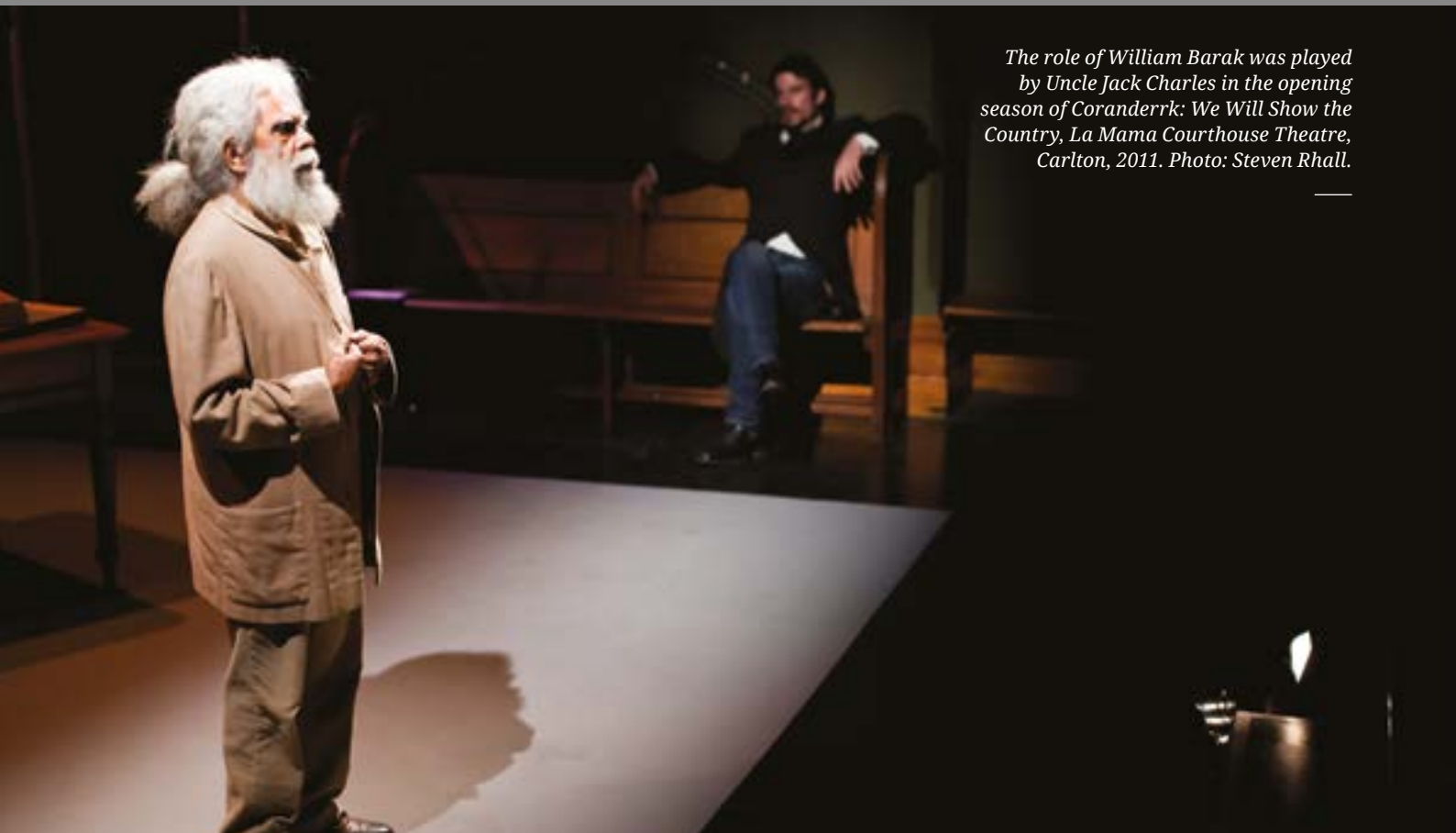
Birds eye view of one of the accessible designs.

The new National Disability Insurance Scheme aims to provide more accessible housing, and with 4.3 million Australians living with a disability, the market potential is now considerable. Dr Martel’s research with the students, and with colleague Dr Georgia Warren-Myers, aims to provide the NDIS with options for building new accessible housing – rather than relying on expensive retrofitting of properties down the track.

“Great discussions were had and lots of practical ideas generated that may seem like common sense or intuition, but are absent in a lot of stock housing,” says Ms Morgan, a participant in one of the project’s workshops.

“As people with disabilities shared their lived experience with us, we gained some expertise too.”

Ms Morgan says it makes sense to build homes that could flex to meet the needs of people as they age or acquire a disability – not least because it would help people to feel empowered.



The role of William Barak was played by Uncle Jack Charles in the opening season of Coranderrk: We Will Show the Country, La Mama Courthouse Theatre, Carlton, 2011. Photo: Steven Rhall.

Minutes of evidence

Reading out the minutes from a long-past parliamentary enquiry may sound a little dry – but there’s one case where it regularly brings the audience to tears.

In the play ‘Coranderrk: We Will Show The Country’, actors recreate hearings from an 1881 enquiry into the future of an Aboriginal reserve in Victoria. At the enquiry, residents of the reserve spoke passionately about their desire to stay, to maintain land rights, and to exercise sovereignty.

Actor Greg Fryer says it was rare to hear Aboriginal people formally articulating their views in that period.

“I’d have non-Indigenous audiences some nights crying after the show, saying ‘I didn’t know this – what can I do?’ I’d say, ‘just share the story. Now you’ve got the knowledge,’” says Fryer, who plays the role of Wurundjeri man Robert Wandon.

“Our oral history has been dismissed because it’s not recorded, so it’s never given validity. This actually gives the oral history validation. That’s a big thing – affirmation.”

The play is part of a research project that brings the 1881 enquiry to life. Researchers at the University of Melbourne studied the minutes, then collaborated widely to build a play, website and school curriculum from the research. The play has been seen by more than 8000 people, including at the Sydney Opera House and on-country at Coranderrk.

Julie Evans, Chief Investigator of the project, explains that more than 150 people lived at Coranderrk in the nineteenth century. The reserve, located 60 kilometres from Melbourne, was a successful farm. But with authorities seeking to break it up, Coranderrk residents – led by William Barak, clan head of the Wurundjeri people – ran a strong campaign to stay and for self-determination. This led to the 1881 parliamentary enquiry into the reserve’s future.

Associate Professor Evans, from the University's School of Social and Political Sciences, says that the outcome was initially positive – Coranderrk was gazetted as a permanent reserve – but a few years later a new government changed the law to force residents out and distribute the land to white settlers.

Aboriginal witnesses at the enquiry drew attention to structural, or in-built, injustice, Associate Professor Evans says. That's one of the reasons the Minutes of Evidence project remains so relevant.

"The same thing can happen in 1881 that happens in the 21st century – denying land," she says.

"You need to know your past in order to understand how to move forward in the future, in a more just way."

Associate Professor Evans says the project involved Indigenous and non-Indigenous people working collaboratively via 'meeting places' – on stage, at schools, through research – to bring the parliamentary enquiry to life. It was funded by an Australian Research Council grant and by nine other partners. The Victorian Aboriginal Education Association and the Department of Education produced a curriculum about Coranderrk for Victoria's year 9 and 10 students.

Greg Fryer says high school students responded strongly to the play, developed by Ilbijerri Theatre Company and La Mama Theatre. "We had 200 kids once, they stuck from the beginning to the end and there wasn't much fidgeting or texting. And they asked questions which indicated they were actually listening to it. That blew us away, that these young people are saying 'we want to know more'."

"Our oral history has been dismissed because it's not recorded, so it's never given validity. This actually gives the oral history validation. That's a big thing – affirmation."



Robert Wandon played by Greg Fryer in the opening season of Coranderrk: We Will Show the Country, La Mama Courthouse Theatre, Carlton, 2011. Photo: Steven Rhall.

Fryer says that he found the play affirming and also learnt a lot from it. The enquiry heard from 22 Aboriginal people which, for him, contains an important message – Indigenous communities are traditionally consultative and do not always leave it to one person to speak up.

Learning that some white settlers fought hard to help Coranderrk residents was a 'huge eye-opener' for Fryer, who was particularly struck by the role of one of the commissioners, wealthy landowner Anne Bon. He also thinks that hearing the Coranderrk story helped non-Indigenous people understand that they may have been beneficiaries of an unjust system.

And hearing from modern-day descendants of Coranderrk residents, who often attended the play and told their stories in the Q and A afterwards, helped actors and researchers alike piece together more information.

"For the actor, if there's education and enlightenment through art, we have done our job," Fryer says.

"A lot of times our stories are horrendous, massacres and these sort of things," he says. "This is a story that's got beauty to it, and joy. It's been a godsend to hear a story of beauty from back in this dark period. You'll cry but they're tears of happiness."

"It's got to have healing elements to it, not only for the immediate family but other people beyond, black and white."



*Virtual Reality is
transforming group
singing therapy.*

Singing in a virtual reality world

You're sitting around a crackling campfire as night falls. Someone picks up a guitar and a few friends start to sing along. An owl hoots from a nearby tree as you chuckle about your singing prowess.

But you won't need any mosquito repellent. This is a virtual world – the people around the campfire are actually sitting in wheelchairs in their homes around Melbourne. And the online get-together is about more than camaraderie – there's a medical purpose too.

Jeanette Tamplin is a music therapist who knows the value of singing for people with quadriplegia. As well as reduced function in their limbs and trunk, they can have respiratory dysfunction, which can cause serious illness.

Researchers know that group singing therapy helps people with quadriplegia breathe better and make social connections. But Dr Tamplin, Research Fellow in Music Therapy at The University of Melbourne, faced a challenge – it's not always easy to bring together participants in the same room. So she set about researching how virtual reality (VR) could make group singing more accessible.

The first step in the project, funded by the Melbourne Networked Society Institute, was to trial existing UK-based VR programs with Victorian spinal cord patients. Mostly aged in their 20s to their 40s, the patients don a smartphone-enabled VR headset and sing together. Dr Tamplin plays her guitar and facilitates, as her avatar bobs along.

"They all thought it was great, they loved it," Dr Tamplin says.

"One of the guys said, 'this is the first time I've been camping since I had my accident', which was four years ago."

"People talked about forgetting their current physical situation. One person described having a lot of back pain, and then while they were in the VR experience, they hadn't thought about it."

Dr Tamplin's team was relieved to find that participants felt physically comfortable and didn't feel nauseous using the headset – which can be a problem with VR. Some said they felt less inhibited singing in front of others via an avatar.

But there was a technical problem, called 'latency'. The audio delay between people singing in different locations was too long for participants to sing in time together. So experts at the Melbourne Networked Society Institute and the University's Learning Environments team set about developing a solution – a separate, open-source audio system which can be integrated into their own VR campfire setting.

There have been other modifications too. The program works without hand controls – instead, participants focus on a spot, and that functions like a mouse click. And because participants can't look at a songbook while wearing the headset, the lyrics flash up above the campfire.

“This is a virtual world – the people around the campfire are actually sitting in wheelchairs in their homes around Melbourne.”

After some more refinement of the application, the research team hopes to secure funding for a larger clinical trial with spinal cord patients in 2018, collaborating with research partner Austin Health.

And Dr Tamplin will be rolling out some of the songs which have proved popular with her group singing participants – Knockin' on Heaven's Door is a fan favourite, as is Better Be Home Soon and Let it Be.

“The primary aim is that it's a way of accessing a peer support group with a therapy focus,” she says of the telehealth trial.

“They enjoy the feeling of being transported somewhere else, actually having felt like they'd left the space where they were. They have this sense, when they take their headset off, of ‘oh, I'm here again!’”

Steven Ribarich, who has received musical therapy from Dr Tamplin, says he'd always enjoyed singing – but never contemplated doing so in a group. After sustaining spinal injuries in an accident, he says he'd been able to forget his inhibitions through VR singing.

“To use virtual reality to get people together in the same spot sounds fantastic and is something you look forward to,” Mr Ribarich says.

Learning to breathe well again had proved a challenge.

“The exercises are very boring and laborious, so using music and singing is a lot more enjoyable.

“It's a no brainer.” he says.



A participant using a virtual reality headset to participate in group singing therapy.



Bringing healthy smiles to new Australians

Your tooth aches so much it keeps you awake at night. It hurts to chew. Hot soup or cold ice-cream can give you a lightning stab of pain. But it's so much worse for small children.

Early childhood tooth decay is a major public health issue. Tooth decay is five times more prevalent than asthma, and it's one of the most common and preventable reasons for childhood hospitalisations – 7103 admissions of children under the age of four in the year 2013–14 alone.

Community health worker Sarwat Nauman is helping migrant families learn to look after their children's teeth in the Australian context.

A migrant from Pakistan herself, Ms Nauman was an ideal peer educator to bridge Melbourne's Pakistani community and researchers for 'Teeth Tales', a community-based study addressing the oral health needs of migrant communities with diverse cultural, religious and language backgrounds.

"Not all toothpastes are halal," explained Ms Nauman, who works with predominantly Muslim Pakistani families for Merri Community Health Services (Merri Health). "People feel hesitant about talking about these issues. It's much

more convenient to work with us because we're part of their community, and we're aware of the cultural and religious issues involved."

Teeth Tales was an eight-year study led by the Jack Brockhoff Child Health and Wellbeing Program at the University of Melbourne and community health service, Merri Health, with support from the local Moreland City Council and Dental Health Services Victoria. Dentists in the area had noted that children with migrant backgrounds often presented with very high treatment needs.

"It was clear that there were sociocultural differences in child oral health, and that it needed action," said the project's lead researcher Lisa Gibbs.

The Teeth Tales study started with an exploratory phase, talking with migrant families to explore how they look after their teeth, their oral health challenges, and their knowledge and use of local services.

Brighter smiles for all. Picture: Lisa Gibbs



“We knew that would include people who had come on humanitarian, family and skilled visas, and that there would likely be different issues arising from those different migration experiences.”

For example, migrants from countries without safe drinking water might give their children soft drinks, not realising that Melbourne’s tap water is safe to drink and fluoridated to help prevent cavities. Or those who fled persecution might feel hesitant about using government services.

Drawing on this new understanding, the team conducted a pilot program with North Richmond Community Health, testing different ways to conduct oral health education and dental screenings with newly arrived cultural groups.

For example, they brought oral health into a family’s comfort zone, conducting ‘lap-to-lap’ examinations, where the child has the checkup sitting on his or her mother’s lap, rather than an intimidating dentist’s chair.

“This approach was really successful in connecting with parents and talking to them about their child’s oral health needs. Merri Health’s ‘Little Smiles’ program still uses this approach, where they go to children’s play groups and talk to the parents,” says Associate Professor Gibbs.

Oral health workshops for parents were presented by a peer educator with the same language and cultural background.

The third phase of the study involved a larger trial in the Moreland area. Close partnerships with Arabic Welfare, Victorian Arabic Social Services and the Pakistan Australia Association Melbourne helped the team reach and recruit families.

The program resulted in improved children’s oral health, better awareness of good oral health habits and local public dental services among their parents, changes to the practices of community health organisations and Dental Health Services Victoria, and published papers contributing to our body of knowledge.

“Tooth decay is five times more prevalent than asthma, and it’s one of the most common and preventable reasons for childhood hospitalisations”

Beyond brighter smiles, the study’s insights have also informed cultural competency guidelines for other organisations, made available through the Centre for Culture, Ethnicity and Health.

Associate Professor Gibbs would like to see all Australians take to heart the ‘prevention is better than cure’ oral health message.


“Some people think it’s inevitable that you get decay in your teeth, particularly for children. They think that it’s not that big a deal because they fall out anyway.

“But it is a big deal – children shouldn’t experience this level of pain and suffering and it’s easily prevented.”

Ms Nauman is delighted to hear participants telling her they’re continuing with regular dental checks for their children.

“It’s a chain reaction that’s continued, despite the project finishing up a couple of years ago.

“We’d love to have programs of this type in the future for adult oral health, as well as children.”



*Jody Barney, Deaf
Indigenous Community
Consultant standing
outside the County Court in
Melbourne.*

Just justice through supporting fitness to plead

Accessing justice on an equal basis is a major issue for many people with disabilities.

Indigenous man Marlon Noble was only four months old when he had meningitis, a serious infection of the membranes that protect the brain and spinal cord. It left him with learning difficulties.

Years later, in early adulthood, charges were brought against him for allegedly sexually assaulting two minors. He was found ‘unfit to plead’ because it was thought he couldn’t understand the charges and trial processes.

Mr Noble was held in jail for ten years without conviction, despite witnesses later claiming he never committed the offences and the charges being withdrawn.

A new collaborative project led by University of Melbourne researchers aims to prevent this kind of injustice by developing practical and legal solutions to the problem of people with disabilities being found ‘unfit to plead’ and being held in indefinite detention.

Unfitness to plead laws are intended to protect the rights of people with the kinds of disabilities that affect their understanding of what is happening in a trial. These disabilities include acquired brain injuries, mental health issues, intellectual disability, Alzheimer’s disease, or even hearing impairments that make communication difficult.

But once a court finds an accused person unfit to plead, the court’s options range from releasing the accused into the community – usually under supervision – to incarceration, often with no end in sight.

“Marlon Noble’s case is not unique,” says Piers Gooding, researcher at the Melbourne Social Equity Institute. “There are other people who have been held in long-term indefinite detention for periods that far outstrip the prison sentences they might have received in a typical trial.”

Dr Gooding is part of the Unfitness to Plead Project funded under the National Disability Research and Development Agenda. He and his colleagues are working to understand how these laws can create grossly unequal outcomes, to make recommendations for policy changes and law reform, and to develop ways to ensure fairer participation in the justice system for people with cognitive disabilities.

The project shifts the focus from assessing a person's fitness to plead to providing the supports the person needs to understand the trial process.

"The basic idea is that people like Marlon Noble could be supported to participate in proceedings, so long as the right support was available to them," says Dr Gooding.

The project's team included legal, social equity, Indigenous health, and disability researchers partnering in a six-month trial with three Aboriginal-controlled and disability-specific community legal services. The project trained support workers to provide help to accused people with cognitive disabilities.

"The availability, the access, and the right to have information told to you is a human right."

The support they provided included things as simple as using plain language with clients, helping them attend meetings and court hearings, or helping defence lawyers de-jargon their communication. In some cases, their assistance ensured that the client and the courts were aware of available disability services as part of a support package presented to court as an alternative to detention.

"The availability, the access, and the right to have information told to you is a human right," said Jody Barney, a Deaf Indigenous Community Consultant involved with the project. "These opportunities aren't given to Aboriginal people with cognitive impairments in the justice systems until it's too late."

Ms Barney, a Murri woman originally from Urangan, was employed to help train support workers and teach them what it might be like to work with Indigenous people with disabilities, drawing on her 30 years working in the field, and her own experiences of living with hearing loss.



People with mental illness and/or cognitive disabilities are over-represented in the prison population. Picture: Tom Thorpe.

Ms Barney says this very specialised communication support is urgently needed for helping accused people understand their rights, inform their counsel, and ensure they're supported during their case.

"The work is often overwhelming due to the complexities – not only of the legal system – but those of culture, community and the disability itself. Effective communication skills are very different with Aboriginal people. There are various subtleties that will be often miscommunicated," she says.


The trial program ended in late 2016 and was widely endorsed by lawyers, support workers and clients alike, and has had strong awareness-raising support from Indigenous media. The full project evaluation was launched in September 2017, and is already making a difference.

Several of the lawyers involved have reported changing the way they work with clients. In addition, half of the support workers trained for the program were retained by their legal centres at the end of the trial.

At a national level, the project informed the senate enquiry report 'Indefinite detention of people with cognitive and psychiatric impairment in Australia'.

"This was community-engaged, rights-based participatory research," explained Dr Gooding.

"We want the findings of our research to be retained within the organisations we worked with, and their networks and communities. All have full access to the findings of our project and we hope this will help them to pursue further action and funding to address these issues."



*A stormy day in
Melbourne.*

Thunderstorm asthma

Until recently, many of us were unaware of the danger presented by thunderstorm asthma. While a relatively rare phenomenon, this dangerous intersection of weather and medical predisposition affects asthma sufferers and non-asthma sufferers alike. And the consequences can be deadly.

On Friday 21 November 2016, thunderstorm asthma led to an unexpected, rapid-onset emergency across Melbourne, putting unprecedented pressure on hospitals, emergency services. It caused a nine-fold increase in asthma-related hospital admissions and led to some pharmacies running dangerously low of the asthma relief drug Salbutamol.

It wasn't until the days following Victoria's most severe thunderstorm asthma event that the general public became aware of the extent and severity of the incident and struggled to come to terms with the aftermath.

The storm that struck Melbourne around 5.30pm on 21 November 2016 showed no signs of being different from many others but, after triggering over 2000 calls to ambulances and sending nearly 10,000 people to emergency departments across the state, has raised significant interest and concern.

The question as to why this seemingly ordinary spring storm caused such a severe outbreak of asthma is one that a team of researchers from the University of Melbourne is determined to answer. In collaboration with the Bureau of Meteorology, the Victorian Department of Health and Human Services and other Australian universities, hospitals and physicians across the state are considering what triggered airway distress in many people who had never experienced asthma before, and which contributed to the tragic deaths of nine people.

As Ed Newbigin, Coordinator of the Melbourne Pollen Count Team notes, “grass pollen counts on 21st of November were extreme with a large proportion of the grass pollen blown in from the extensive grazing lands to the west and north-west of Melbourne”.

Jeremy Silver, from the University’s School of Earth Science describes the situation as the perfect storm for a mass asthma event. The storm, Dr Silver says, was preceded by a ‘gust-front’ of turbulent air which caused strong, unpredictable winds and drew cold air down from above, dropping the temperature by around ten degrees and raising humidity levels drastically. This sudden increase in humidity is thought to have helped fragment the grass pollen into particles small enough to enter the airways, creating a ‘mist of allergens’ to which many commuters were exposed as they travelled home from work.

Victoria’s Inspector General for Emergency Management conducted a review of the response to the 2016 thunderstorm asthma event. This review notes the importance of improving public health information and warnings but mentions that “developing timely and tailored community warnings will be dependent on an improved understanding of applicable triggers.”

Jo Douglass from the Department of Clinical Immunology and Allergy at the Royal Melbourne Hospital is working alongside the Melbourne Pollen Count Team and others to shed light on the mystery of thunderstorm asthma. As

Professor Douglass explains, initial work in the area has found a link between rye grass allergy and susceptibility to thunderstorm asthma. She also explains that people who have suffered asthma in the past are more likely to be affected, even if they haven’t had an asthmatic episode for many years.

What becomes clear when talking to the researchers involved in this project is the desire to prevent an emergency at the scale and severity of the 2016 event. Given that we need a way of forecasting to enable improved response and better preparation heading into the spring storm season, this project could not have come at a better time.

“Essentially” says Associate Professor Newbigin “we just want to better prepare Melbournians for future thunderstorm asthma events”.

“Thunderstorm asthma affects asthma sufferers and non-asthma sufferers alike and the consequences can be deadly.”

Even rain from thunderstorms can worsen some people’s asthma symptoms.



In brief

Moving with the power of thought

Smaller than a paperclip, the Stentrode™ device is implanted into a blood vessel next to the region of the cerebral cortex, that part of the brain involved in the planning, control, and execution of voluntary movements.

Once implanted, the device picks up signals that would normally be sent to a person's limbs to create movement. The signal will be sent to a computer, and transmitted to a robotic 'exoskeleton', an external skeleton that supports and protects a person's body and, finally, attached to the person's limbs.

This notion of wirelessly thought-controlled limbs is possible thanks to a collaboration of 39 brilliant minds from 16 departments across the University of Melbourne's medicine, science and engineering faculties and colleagues at the Royal Melbourne Hospital and Florey Institute of Neuroscience and Mental Health.

The initial idea, conceived by Dr Tom Oxley – a neurology trainee at the time – led to conversations with leading neurologist, Professor Terry O'Brien, and further discussions with colleagues in the Melbourne School of



An exoskeleton, similar to this one, will be used by patients implanted with a stentrode. Picture: Rex Bionics

“A device the size of a matchstick, implanted next to the brain’s motor cortex, could one day help paralysed people move their limbs.”

Engineering including Professor David Grayden and Nick Opie, a senior research fellow and co-head of the Vascular Bionics laboratory at the Royal Melbourne Hospital.

The life-changing research that ensued has been made possible by University of Melbourne funding supported by US Defense Advanced Research Projects Agency (DARPA), Australia's National Health and Medical Research Council (NHMRC), US Department of Defense, US Office of Naval Research Global, the Australian Defence Health Foundation, and the Brain Foundation.

“The Stentrode™ can record brain signals from within a blood vessel next to the brain,” says Dr Opie. “All the patient will have to do is think about it.”

“I’ve always been fascinated by the integration of man and machine and the ways that people and machines could function together. Fortunately, I was born in the time to do this,” Dr Opie says.

“The first patients will most likely be young people who’ve suffered a traumatic spinal cord injury and are suitable for exoskeleton legs. They’ll be chosen for their level of determination, their resolve and their physiology.”

The researchers are currently working towards securing ethical approvals for the first human trial, which, if all goes well, will be expanded to a global trial. Dr Opie anticipates that the technology could become commercially available in as little as six years.

What happens next, one way or another, will make history.

New hub for biomedical engineering research named after inventor of cochlear implant

A new institute that brings together biomedical engineers, clinical researchers and industry partners to develop real-world solutions for public health has been launched. Located in the Melbourne Biomedical Precinct, the Graeme Clark Institute for Biomedical Engineering (GCI) is a hub for University of Melbourne researchers and industry partners to collaborate on developing new bionic devices, implants, drug treatments and assistive technologies such as prosthetics, and diagnostics.

The Institute is named after Professor Graeme Clark AC who invented the Bionic Ear along with his University of Melbourne colleagues, the first prototype multiple electrode implant device that successfully improved the ability of deaf people to understand speech.

The inaugural Director of the Graeme Clark Institute, Professor Mark Cook, says the Institute will link clinical and engineering fields in the pursuit of new solutions to public health.



Inventor of the Bionic Ear, Professor Graeme Clark.

19 Stories of Social Inclusion

A lot of people talk about 'social inclusion'. But it's not always clear what they mean. Graeme Innes, the former Australian Disability Discrimination Commissioner, once said of people with disabilities: 'We do inclusion by just doing it.' If this is true, then this project goes to the source. It invites 19 Australians to share their narratives of connection, belonging and contribution.

19 Stories of Social Inclusion tells the story of 19 individual Australians living full lives in their communities. The project explores what it means for people with disabilities to be 'socially included', and what it means to exercise the right to live independently and be included in the community, fulfilling government obligations under Article 19 of the United Nations Convention on the Rights of Persons with Disabilities.

19 Stories emerged from a unique collaboration between the Hallmark Disability Research Initiative at the University of Melbourne, and Belonging Matters, a community based advisory and capacity building resource.



Meg Pargeter is a Trainee Administration Assistant at the Hume Bank in Albury Victoria. Meg's story is featured in '19 Stories'. Picture: VERTO

In brief

Melbourne School of Government

The Melbourne School of Government (MSoG) works to inspire and equip governments, businesses, social partners and individuals to meet the challenges of contemporary governance. Through globally aware, interdisciplinary, dynamic, and innovative research and teaching, the Melbourne School of Government seeks shared and sustainable solutions to these challenges. The School is a platform for exploration, debate and innovation nationally and in our region, facilitating research that meets the needs of governments, industry and social partners.

MSoG focuses on supporting interdisciplinary research by bringing together expertise from across the University of Melbourne including, but not limited to economics, political science, international relations, engineering, health, sociology, development studies, philosophy and law. Through these activities the School unites policy

makers, industry leaders and citizens through ideas that are actionable and provide lasting solutions. In October 2017, Melbourne Law School Associate Dean Professor John Howe was appointed the Director of the Melbourne School of Government.

Public Policy Lecture Series

The new MSoG Public Policy Lecture Series demonstrates the relevance of research generated across the University to the major policy challenges facing Australia and the world. Speakers in the Series come from across the University to reflect on how their research relates to these policy challenges. Topics to be addressed include the public policy dimensions of climate change, the threat of pandemics, statelessness, terminal life issues, big data and genomics.

government.unimelb.edu.au



“Paul Keating: The Big Picture Leader In Conversation” held in November 2016.

Melbourne Interdisciplinary Research Institutes

Melbourne Interdisciplinary Research Institutes bring researchers together from across the University of Melbourne to tackle society's complex problems in innovative ways.

The University of Melbourne's cross-disciplinary research is focused on three Grand Challenges: Understanding our Place and Purpose, Fostering Health and Wellbeing, and Supporting Sustainability and Resilience. The Melbourne Interdisciplinary Research Institutes work with industry, government and not-for profit organisations in Australia and overseas to challenge current thinking and offer new solutions that change our world.

Melbourne Energy Institute

The Melbourne Energy Institute's research portfolio engages over 300 researchers from disciplines including architecture, arts, economics, engineering, finance, health, law and planning. The unifying theme of their research programs is building capacity to meet the challenges of transitioning towards a low-carbon energy system.

Melbourne Networked Society Institute

The Melbourne Networked Society Institute catalyses interdisciplinary research to understand and create a connected future. The Institute provides a focal point enabling the University of Melbourne to address the impact of connectivity on society.

– *Data, Systems and Society Research Network (hosted by MNSI)*

DSSRN is building a community of research scholars and data infrastructure to support collaborations and partnerships, as well as sharing knowledge, tools and resources in the broad area of data, systems, and society.

Melbourne Neuroscience Institute

The Melbourne Neuroscience Institute draws on the impressive breadth of Neuroscience research activity at the University of Melbourne. The Institute supports ground-breaking research through interdisciplinary partnerships, collaborations and new strategic programs and the translation of these initiatives to improved clinical, health and teaching outcomes.

Melbourne Sustainable Society Institute

The Melbourne Sustainable Society Institute facilitates and enables research linkages, projects and conversations leading to increased understanding of sustainability and resilience trends, challenges and solutions.

Melbourne Social Equity Institute

The Melbourne Social Equity Institute acknowledges an imperfect world. Chances of birth such as class, race, ability or gender can lead to marginalisation and societies are often divided. MSEI supports collaborative research between academics, members of community organisations, policy makers and people with lived experiences to build fairer societies.

– *Melbourne alliance to end violence against women and their children (hosted by MSEI)*

MAEVe strives to make a difference to the lives of women, families and communities by addressing and preventing, through interdisciplinary and intra-institutional collaboration, the problem of violence against women.

Learn more about the Melbourne Interdisciplinary Research Institutes by visiting:
research.unimelb.edu.au/melbourne-research-institutes

Hallmark Research Initiatives

Hallmark Research Initiatives are broader in scale than existing research groups and have a distinctive interdisciplinary emphasis.

Intended to enable the maturing of focused research communities that build on existing strengths across the University of Melbourne, the Hallmark Research Initiatives are designed to harness cross-University capabilities to increase the impact of the University's high quality research and opening up new funding opportunities. The Hallmark Research Initiatives are part of the strategic embedding of a Grand Challenges perspective in the University's research profile.

Ageing Research Initiative

The Hallmark Ageing Research Initiative unites researchers in ageing to facilitate interdisciplinary research. To assist them to pursue funding opportunities in collaborative frameworks and support connection between researchers, industry partners and stakeholders.

Computational Biology Research Initiative

The Hallmark Computational Biology Research Initiative promotes and facilitates computational biology research and researchers across the University of Melbourne.

Disability Research Initiative

The Hallmark Disability Research Initiative fosters instigation and development of interdisciplinary disability research across the University of Melbourne. It has a focus on participatory methodologies and high-impact research and teaching that engages with the disability community.

Statelessness Research Initiative

The Statelessness Research Initiative will be embedded in the new Peter McMullin Centre on Statelessness and will draw on expertise and networks across the University of Melbourne to undertake research, training and engagement activities aimed at reducing statelessness and protecting the rights of stateless people.

Indigenous Research Initiative

The Hallmark Indigenous Research Initiative facilitates collaborative and interdisciplinary research focused on Indigenous issues across the University of Melbourne.

Materials Research Initiative

The Materials Research Initiative focuses on fostering interdisciplinary materials research across the University of Melbourne community, external collaborators and potential industry partners.

Therapeutic Technologies Research Initiative

The Therapeutic Technologies Research Initiative is focused on new applications of mechanopharmacology and organ-on-a-chip technology to transform drug-screening processes.

Children's Lives Research Initiative

The Children's Lives Research Initiative aims to be a world-class interdisciplinary, cross-sectoral program that understands the challenges experienced by children and young people growing up in the 21st century, and identifies potential solutions and appropriate responses to these challenges.

Economic and Social Participation Research Initiative

The Economic and Social Participation Research Initiative will develop our understanding of how participation in and engagement with social, economic and political institutions can be enabled across the life course irrespective of gender, socioeconomic status, ethnic or racial background, as well as other key characteristics.

Learn more about the Hallmark Research Initiatives by visiting:
research.unimelb.edu.au/hallmark-initiatives



For further information visit:
www.research.unimelb.edu.au