



THEO
MURPHY
HIGH FLYERS
THINK TANK 2012

AUSTRALIA'S POPULATION: SHAPING A VISION FOR OUR FUTURE

PROGRAM
INTERCONTINENTAL
HOTEL, ADELAIDE
26-27 JULY 2012



FOREWORD

This year, the Academy is holding its tenth High Flyers Think Tank on a topic of national relevance. Sixty outstanding early career scientists from around Australia and neighbouring countries will engage in fresh thinking about novel applications of science and gaps in knowledge that need to be addressed to meet one of tomorrow's biggest challenges.

Population is a central issue of our time. Without recent population growth, issues such as water security and climate change would not have the social importance they have today. Population is by definition crucial to our future, in South Australia as elsewhere. It is also a particularly relevant issue for a nation composed mainly of recent immigrants and with immigration providing two-thirds of our current growth. The 2012 Think Tank *Australia's population: shaping a vision for our future* will examine questions whose answers will inform how we and our descendants live in the future.

The Think Tank is a unique opportunity for leading early to mid-career researchers from a broad range of disciplines to build upon a foundation of existing science and consider future science and technology advances. Using such science, policy responses can be developed to achieve national goals related to current and predicted population changes.

The 2012 Think Tank is generously supported by the Theo Murphy (Australia) Fund courtesy of the UK Royal Society. The Academy is delighted to have this funding available to enable some of Australia's brightest young scientists to engage in fresh thinking about a fundamental issue for our nation's future and to develop networks that will enrich their careers.

Professor Suzanne Cory AC PresAA FRS
President, Australian Academy of Science



DAY 1

THURSDAY 26 JULY 2012

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DAY 1

8.15 am Registration

SESSION 1 INTRODUCTORY SESSION

Chairs: Dr Oliver Mayo DSc FAA FTSE,
Dr Kristin Alford 2012 Theo Murphy High Flyers
Think Tank Steering Committee Co-Chairs
Venue: Banksia

- 9.00 am Welcome**
Professor Suzanne Cory AC
PresAA FRS
President, Australian Academy
of Science
- 9.05 am Opening address**
The Hon Tom Kenyon MP
South Australian Minister for Science
and Information Economy
- 9.20 am 'Population is a central issue of our
time' — What can we do about it?**
Dr Oliver Mayo DSc FAA FTSE
Honorary Research Fellow, CSIRO
Livestock Industries | Adjunct
Professor of Biometry, Faculty of
Sciences, University of Adelaide
- 9.40 am Methodology and
conceptual framework**
Dr Kristin Alford
Founder and Managing Director of
Bridge8 | Lecturer in Foresight and
Social Change, University of Adelaide
- 10.30 am MORNING TEA**

SESSION 2 BREAKOUT GROUPS

- 11.00 am Group A — Who will we be?**
Chair: Professor Nick Martin
Venue: Acacia
- Group B — How will we share
activities and resources?**
Chair: Professor Graeme Hugo
Venue: Grevillea 1
- Group C — What will we do?**
Co-Chairs: Dr Cathy Foley and
Dr Kristin Alford
Venue: Grevillea 2
- Group D — How shall we live
in our habitat?**
Co-Chairs: Dr Nicky Grigg and
Dr Steve Cork
Venue: Banksia
- 1.00 pm LUNCH**
- 2.00 pm Return to breakout groups**
- 3.30 pm AFTERNOON TEA**
- 4.00 pm Return to breakout groups**
- 5.30 pm Close Session 2**
- 6.30 pm Coaches depart Intercontinental
Hotel for dinner venue**
- 7.00 pm Pre-dinner drinks**
- 7.30 pm Dinner at The Sanctuary,
Adelaide Zoo**
Speaker: Dr Paul Willis
Director, RiAus



DAY 2

FRIDAY 27 JULY 2012

8.00 am Return to breakout groups to finalise rapporteurs' presentations

SESSION 3 RAPPORTEURS' PRESENTATIONS

9:30 am **Chair: Professor Bob Williamson**
FAA FRS

Reports from each group —
rapporteurs to be given 15 minutes
plus 10 minutes discussion

9.40 am **Group A — Who will we be?**
Dr Edith Gray
Professor Greg Murray

10.05 am **Group B — How will we share
activities and resources?**
Dr Heinz Schandl
Dr Jackie Street

10.30 am **MORNING TEA**

11.00 am **Group C — What will we do?**
Dr Katerina Teaiwa
Dr Liam Wagner

11.25 am **Group D — How shall we live
in our habitat?**
Dr Kristin den Exter
Professor David Watson

11.50 am **Open discussion**
Chair: Dr Kristin Alford

12.40 pm **Summary**
Dr Oliver Mayo

1.00 pm **LUNCH**

2.00 pm – **Closed session: outcomes
and recommendations**
Steering Committee, speakers,
rapporteurs and Academy secretariat
Venue: Acacia

2.30 pm **Coaches depart for airport**



2012 THINK TANK — AUSTRALIA'S POPULATION: SHAPING A VISION FOR OUR FUTURE

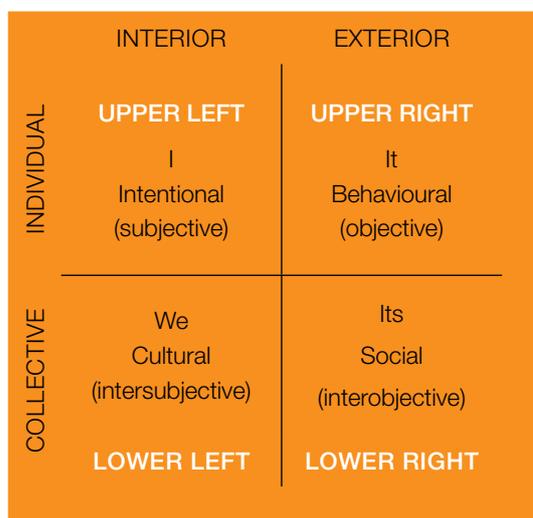
SCOPE

We propose a structured framework for bringing the perspectives of diverse scientific disciplines to issues arising from population scenarios for Australia's future.

BACKGROUND

The proposed framework is based on an existing body of academic futures work, primarily related to the four-quadrant model emerging out of integral futures theory. Integral theory suggests that four perspectives should be included when thinking through any topic. These can be represented in a four-quadrant model where the axes are *individual versus collective* and *interior versus exterior* to give subjective (I), intersubjective (we), objective (it), and interobjective (its) views (as shown in the figure below).

FIGURE 1
WILBER'S FOUR QUADRANT MODEL



From Collins, T & Hines, A 2010 'The evolution of integral futures: a status update', *World Future Review*, June – July, pp. 5–16. Accessible at www.wfs.org/Upload/PDFWFR/WFR_JunJul2010_Collins.pdf

APPLICATION

If the scientific disciplines applicable to population scenarios are viewed from these four perspectives, we can identify key research questions that need to be considered. There is surprising uncertainty in projected population futures, so questions that allow exploration of the consequences of different trajectories (and identifying outcomes that are robust to that uncertainty) are particularly relevant.

The Think Tank will focus on four key questions:

- A.** Who will we be? (not just genetics but values, identity...)
- B.** How will we share activities and resources? (culture, demographics, families, equity...)
- C.** What will we do? (employment, leisure, education, innovation...)
- D.** How shall we live in our habitat? (climate, natural and built ecosystems, sociopolitical environment...)

Established senior workers in relevant disciplines will participate, but the focus is on the early career researchers who have been chosen for their potential to contribute constructively to the debate and to develop an understanding of the major issues and gaps in knowledge in the topic areas. The Think Tank will provide a foundation of existing and new science upon which policy responses can be based to achieve national goals for population as broadly conceived above. The time frame requires rapid analysis and decision making, hence should be a valuable learning experience for all.

For the participants, the Think Tank is an outstanding opportunity to use and develop expertise in working in multidisciplinary and crossdisciplinary teams. Further, it is a unique networking opportunity amongst the nation's next generation of science leaders and hence will strongly support career development for the selected early career researchers.



THE PROCESS

DAY 1

Session 1: Introductory Session: keynote address and brief presentations

These presentations are aimed at stimulating lateral thought in the discussions that form the remainder of the Think Tank, rather than providing comprehensive coverage of the theme or any of the four specialist topics.

Session 2: Breakout Groups

Each participant has been assigned to one of four breakout groups and each group will be chaired by the relevant topic speaker(s). Each group is made up of approximately 15 researchers from across Australia with a mix of skills and experience in order to stimulate lateral thinking and to challenge the participants to extend themselves and think dynamically. Each Chair has pre-selected two participants to act as the group's rapporteurs. The role of the rapporteurs is to collate the group's discussions and distil the discourse into a 15 minute presentation. The breakout groups are asked to examine and address their group's discussion questions but are also encouraged to move beyond these questions to other topics identified during the discourse.

DAY 2

Session 3: Rapporteurs' presentations

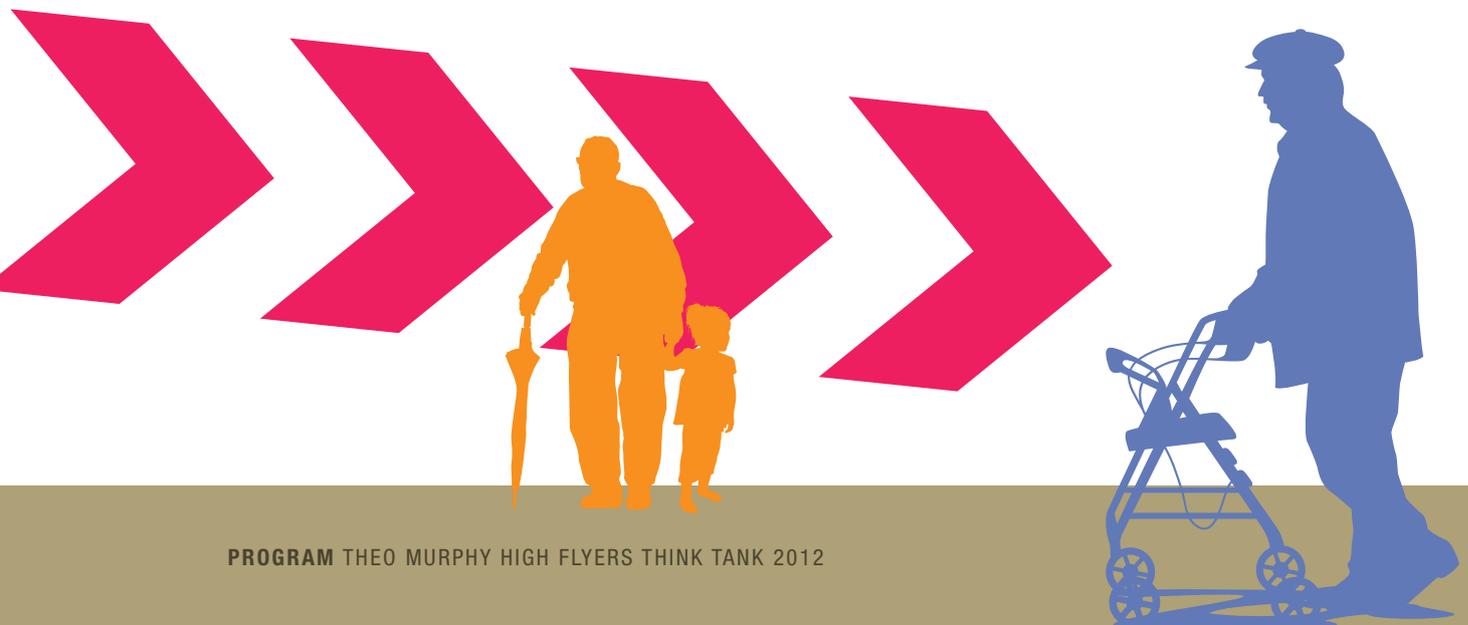
After a final review by the breakout groups, rapporteurs will present the findings of each breakout group. There will be an opportunity for questions and discussion after each presentation, during the general discussion, and in response to the final summing up.

In the afternoon, a closed session with the Steering Committee, experts, rapporteurs and Academy Secretariat will summarise the outcomes and recommendations.

OUTPUTS

Proceedings from the event, including all PowerPoint slides and transcripts of the rapporteur presentations, will be available on the Academy's website. The proceedings, available in electronic and print formats, will also provide contextual information, identify knowledge gaps and summarise the major outcomes from the Think Tank. These proceedings will offer options for a 'way forward' and subsequently can be used to underpin policy development and research prioritisation.

Please note that you can follow the Australian Academy of Science on Twitter @science_academy. If you wish to tweet about the Think Tank during the event, please use the hashtag #TMThinkTank.



BREAKOUT GROUPS

GROUP A

WHO WILL WE BE?

CHAIR

Professor Nick Martin

RAPPORTEURS

Dr Edith Gray

Professor Greg Murray

Dr Sarah Annesley

Dr Josephine Barbaro

Dr Petra Buergelt

Dr Angelo D'Amore

Dr Amanda Davies

Dr Tina Du

Dr Kim Felmingham

Dr Freya Fowkes

Dr Brooke Harcourt

A/Prof Simon Laws

Dr Juliet Pietsch

Dr Natalie Thorne

Dr Stuart Turville

GROUP B

HOW WILL WE
SHARE ACTIVITIES
AND RESOURCES?

CHAIR

Professor Graeme Hugo

RAPPORTEURS

Dr Heinz Schandl

Dr Jackie Street

Dr Marcel Dinger

Dr Nicholas Geard

Dr Munir Hanjra

Dr Christine Jacobson

Dr Rebecca Kippen

Dr Justin Koonin

Dr Blythe McLennan

Dr Samantha Meyer

Dr Rachel Neale

Dr Nathan O'Callaghan

Dr Anastasia Sartbayeva

Dr Wai-Hong Tham

Dr Stephen Wan

GROUP C

WHAT WILL WE DO?

CO-CHAIRS

Dr Cathy Foley
and Dr Kristin Alford

RAPPORTEURS

Dr Katerina Teaiwa

Dr Liam Wagner

Dr Brad Aisbett

Dr Peter Buzzacott

Dr Cara Doherty

Dr Maggie Evans-Galea

Dr Paul Gardner-Stephen

Dr Benjamin Johnston

Dr Caroline Laurence

Dr Yi Li

Dr Niamh Mangan

Dr Rintis Noviyanti

Dr Christine Steinmetz

Dr Akshat Tanksale

Dr Anne Thomas

Dr Conan Wang

GROUP D

HOW SHALL WE
LIVE IN OUR HABITAT?

CO-CHAIRS

Dr Nicky Grigg
and Dr Steve Cork

RAPPORTEURS

Dr Kristin den Exter

Professor David Watson

Dr Paul Berkman

Dr Terence Chan

Dr Katherine Daniell

Dr Nina Hall

Dr Mark Hamann

Dr Cassie Jansen

Dr Brenda Lin

Dr Jasmyn Lynch

Dr Katrin Meissner

Dr Firuza Begham Mustafa

Dr Matthew Rofe

Dr Udoy Saikia

Dr Jonathan Sobels



BREAKOUT GROUP DESCRIPTIONS AND QUESTIONS

GROUP A — WHO WILL WE BE?

Who we will be one generation hence will be shaped by the laws of population genetics, and by secular changes in health, wealth, beliefs and attitudes. The fundamental law of population genetics, advanced by Hardy and Weinberg in the early 1900s, is that in a large population with random mating and with no differential migration, mutation or selection, then gene frequencies will stay the same from generation to generation. In fact, violations of each of these provisos are likely to produce marked changes in future generations.

Foremost is differential migration, in which the steady dilution of the predominantly European gene pool will be augmented by further migration from Asia, the Middle East, and Africa. The cultural effects of these migrations are also likely to be profound since some immigrant cultures subscribe to the ideals of democracy more than others.

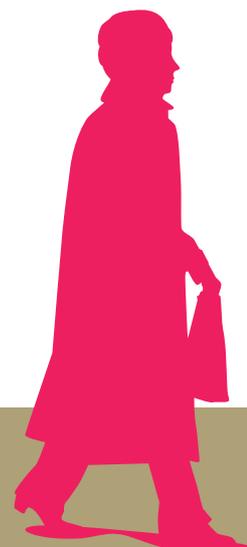
Related to this are mating patterns. In Melbourne in the 1950s there was still strong evidence of Irish marrying Irish, Scots marrying Scots etc. This 'assortative mating' (between like individuals) maintains the ethnic variation across the population and lowers the temperature of the melting pot. With such huge ethnic diversity in Australia this process is likely to continue to play an important role.

Most interesting to a geneticist is the extent to which differential selection will alter the characteristics of the next generation. Since, with the unfortunate exception of Aborigines, infant mortality is now fairly minor, most selection in modern humans is driven by differential fertility. Because almost a third of women in Australia are now reaching menopause childless (compared with only 10% in 1911, and presumably the same for men) there is ample scope for differential fertility. Gregory Clark (*Farewell to Alms*, 2007) has argued

that the occurrence of the industrial revolution in England and not elsewhere was due to the markedly greater reproduction of the entrepreneurial classes in preceding centuries. What sort of people are, and are not reproducing in our society? Data suggest that educated, socially liberal and non-religious women have mean replacement of about 0.8 whereas uneducated, socially conservative believers have replacement about 1.3. If this trend continues it is likely to have long-term consequences. Differential selection has been advanced by Levitt and Donohue to explain the dramatic fall in US crime rate, exactly 18 years after liberalisation of abortion laws although this argument has been criticised (e.g. Foote & Goetz 2005). A population geneticist's view of politics (and its partner in crime, economics) is that it is simply a mechanism of advancing or retarding the reproductive capacity of one group over another (think of all those arguments over conscription, baby bonuses, child endowment, school funding etc.). Politicians may not realise that they are the Darwinian agents of natural selection, but they are, and to that extent which genes go more or less into the next generation will be shaped by the outcome of today's political battles.

The final proviso of the Hardy-Weinberg law concerns differential mutation and even here our future population will be shaped by today's trends to much later reproduction in both women and men, with higher mutation rates in older gametes and the consequent need for more prenatal screening for birth defects. To the extent that this is unsuccessful it creates a massive burden of care on our future society.

Overlaid on these changes which can to some extent be foreshadowed from the laws of population genetics and demography, are secular changes arising from changes in prosperity, medical care, communications and technology, and education, which are unpredictable. For example, who could have foreseen the advent and consequences of the internet, or Gardasil®, or the crash in educational standards that has left many Australian PhD students unable to spell or construct a sentence.



QUESTIONS

1. What is the likely ethnic composition of Australia by 2030, including aboriginal Australians? Will this be uniform geographically?
2. What effect will assortative mating (like marrying like) have on the population structure for height, IQ, ethnicity, religious beliefs? What societal implications follow?
3. What are the likely consequences of differential fertility for education, political persuasion, ethnicity and other characteristics? Should governments make policies to try and influence birth rates? If so, what form should these take? What are the interacting consequences for migration (skilled or otherwise), and the tax base and needs for health and aged care?
4. Evidence points to correlations between increased access to abortion and lower crime rates. On such contentious issues (e.g. abortion and population policy), what other evidence can be brought to bear that would offer new and useful contributions to societal dialogue and government policy-making?
5. Previous enquiries into Australia's future population size and structure have been wildly inaccurate (the 1946 commission was worried that the population would decline). How much faith can we put in any new prognostications?
6. Some societies are not growing biologically (e.g. Japan, Italy, Russia). Who is breeding in these shrinking societies? Do they provide clues to a sustainable future?

SUGGESTED READING

Clark, G 2007 *A farewell to alms: a brief economic history of the world*. Princeton University Press.

Donohue JJ and Levitt SD 1999 *Legalized abortion and crime*. American Bar Association.

Kirk KM, Blomberg SP, Duffy DL, Heath AC, Owens IPF and Martin NG, 2001 Natural selection and quantitative genetics of life-history traits in Western women: a twin study. *Evolution* 55: 423–35.

Levitt SD 2005 *Freakonomics: a rogue economist explores the hidden side of everything*. Chicago University Press.

GROUP B — HOW WILL WE SHARE ACTIVITIES AND RESOURCES?

Australia's population in mid-2011 was 22.6 million — the 54th largest country in the world. However, with its population growing at a rate of 1.4 per cent a year it is one of the fastest growing, not only among OECD nations but also among Asia-Pacific countries. In considering Australia's future population, however, it is important to consider not only the size of the national population but also its composition and spatial distribution, since these have important implications.

Median projections by the Australian Bureau of Statistics (ABS 2008) see the total Australian population reaching 25.6 million in 2021, 28.8 million in 2031 and 34.2 million in 2050. These figures are based on an assumption of improving life expectancy, a continuation of present fertility trends and a net gain from international migration of around 180,000 a year. The major element in population change amenable to policy intervention is international migration.

However, the major challenge which Australia faces over the next two decades is not so much the size of the population but its age structure. Due to the high fertility of the 1950s and 1960s the baby boom generation (born 1946–66) comprises 27.5 per cent of the current population and 41.8 per cent of the workforce. Their passage into the older ages presents challenges with the deteriorating ratio of working to non-working population and increasing pressure on health, aged care and pension systems. The Australian Department of Treasury's Intergenerational Reports indicated that there are no silver bullets to cope with ageing, and identified three 'Ps' — Productivity, Population and Participation — as the main arenas for policy intervention.



Australia has a distinctive distribution of population with 87 per cent living in urban areas, 81 per cent within 50 km of the coast and 64 per cent in the capital cities. There is a major mismatch between the distribution of water and that of population — the Far North has 2 per cent of the population and 52 per cent of mean annual runoff, while southern Australia has 82 and 27 per cent respectively. There have been a number of limited attempts in Australia's history to influence population distribution but none have been successful. While it is clear that decentralisation of population where there are not sufficient resources to achieve economic sustainability is never justified (Daley and Lancy, 2011) we can ask whether the economic and environmental realities of the twenty-first century will be well served by the current settlement system.

The Indigenous population currently numbers about 563,000, a figure forecast to reach one million by 2040 (Biddle and Taylor, 2009). This figure is expected to grow at around twice the rate of the rest of the population. Indigenous demographics are quite different from those of the rest of the community, with most Indigenous Australians living outside the capital cities. Indigenous Australians have higher mortality, higher fertility and (as a group) a much younger age structure. There are huge gaps in welfare, education, employment and housing and a higher proportion live in poverty than the rest of the population. Convergence in socioeconomic outcomes between the Indigenous population and the rest of Australians must be a major and urgent national goal.

Inequality is an important issue. While Australia is in the middle ranks of OECD countries in the degree of inequality, poverty is concentrated in particular groups. Moreover, there are fears that the costs of economic changes like the 'two speed' economy and environmental change will fall disproportionately on the disadvantaged.

QUESTIONS

1. What are the key requirements for ensuring effective sharing of information and resources (including how finite natural resources are to be shared across generations)?
2. What research findings are available (or potentially available) to inform the design of governance mechanisms for improved sharing of information and resources?
3. What is known about interactions between wealth distribution, equity of access to resources and social outcomes such as health and wellbeing?
4. What enables the most effective knowledge-sharing for constructive, rapid response in times of emergency and disaster (e.g. characteristics of social norms, governance structures, built infrastructure, technology and communication networks)?
5. How do network structures (e.g. social networks, information networks, transport networks, supply networks, trade networks) affect the allocation and sharing of resources (physical, ecological and human)?
6. Is the performance of these networks sensitive to population density and demographic distribution?

REFERENCES

- Australian Bureau of Statistics (ABS) 2008. *Population projections, Australia, 2006 to 2101*, Catalogue no. 3222.0, ABS, Canberra.
- Biddle, N and Taylor, J 2009 Indigenous population projections, 2006–2031: planning for growth, *CAEPR Working Paper no. 56*, Centre for Aboriginal Economic Policy Research, Australian National University, Canberra.
- Daley, J and Lancy, A 2011 *Investing in regions: making a difference*, Grattan Institute, Melbourne.

SUGGESTED READING

- Hugo, GJ 2010. Report of Advisory Panel on Demographic Change and Liveability. Final Report to the Minister for Sustainability, Environment, Water, Population and Communities, the Hon. Tony Burke MP.
- Hugo, GJ and Pincus, J (eds) 2012 *A greater Australia: population, policies and governance*, Committee for Economic Development of Australia, Melbourne.



GROUP C — WHAT WILL WE DO?

The composition, size and geographic location of Australia's future population will drive and be influenced by economic and employment factors. 'What will we do' attempts to outline possible changes to workforce, consumption patterns, technology and resulting economies that may stem from population trajectories and major drivers of change.

Factors currently being considered for the near future include:

- technological change and the systems that support the inclusion of social acceptance, skills, regulatory systems and research, development and commercialisation expertise
- effects of geographic location including urbanisation, infrastructure and digital communications
- skills, education and adapting to new information and new work requirements, as well as workforce participation rates
- integration of working and personal lives
- impact of environmental change including climate change on industry and economy

Anticipating economic, social and technological change may produce a spectrum of alternatives for employment and activity in regional and urban areas for the future. This workshop will contribute to understanding of critical factors that need to be considered and the key levers for affecting change and producing alternatives as we optimise our future.

QUESTIONS

1. What is known about the anticipated gaps in future workforce needs and skills?
2. What are the major crises and barriers we need to anticipate in terms of supporting a healthy, equitable and sustainable way of life for our population into the future?
3. What are likely aspects of technological change that may occur, and may affect our society and economy in significant ways?
4. What tools and approaches that we have identified may be critical for addressing issues in the future (e.g. innovation approaches, production methods, flexibility, reskilling)?

5. Where are the critical changes likely to occur in terms of new ways of working and living and what are these likely to be a result of (e.g. urbanisation, infrastructure, health, household composition, ageing population and diversity)?
6. Given the pace of change and the resources required to skill people and provide capital resources for industry, what tools and approaches are likely to be most effective in anticipating and responding to major economic shifts or structural changes?
7. What are the consequences of failing to anticipate change in our working and personal lives?

GROUP D — HOW SHALL WE LIVE IN OUR HABITAT?

'Our habitat' refers to the natural and built environments that support the Australian population, now and into the future. The purpose in this workshop is to explore possible futures — our habitat cannot be regarded as a static entity, so the dynamics of habitat change over time and the influences on those dynamics are of key interest.

Australia's future population will follow just one of a range of possible trajectories. Any single one holds a diversity of potential influences on the natural and built environments of Australia's future. The changes to natural and built conditions will in turn affect the nature and quality of life experienced by that population. Uncertainties and limits to predictability in each of these outcomes bring important questions about useful roles for science in exploring and choosing between future options.

The dynamics of global change provide important context and influences on both population and habitat, as does the current state of the Australian environment. Global change includes changes to global biogeochemical and hydrological cycles, climate, land-use, biodiversity, population, urbanisation, food production, resource use, and energy sources and demands. The Millennium

Ecosystem Assessment, IPCC climate change assessments and recent publications on global change and the 'Anthropocene' provide important background information on the global change context. Within Australia, useful assessments include the State of the Environment reporting, integrated analyses of social, environmental and economic interactions and consequences in Australia and reports to the Prime Minister's Science, Engineering and Innovation Council, including recent reports on food security and carbon–energy–water intersections in Australia.

There is no single way to explore interactions between global change, population and the built and natural Australian environment. An important purpose of the workshop is to develop a richer appreciation of the contributions different science disciplines' make in guiding and navigating these uncertain futures.

QUESTIONS

1. What is known about the ecosystem functions or 'services' that sustain Australia's population?
2. What do different population trajectories entail for future changes in natural and built environments (e.g. material resource and built infrastructure requirements, ecological footprint)?
3. Many characteristics of future populations may be determined by current choices in managing our natural and built environment. What knowledge do we already have of these consequences (e.g. inertia inherent in biogeochemical or hydrological changes, timescales associated with the life cycle of different kinds of built infrastructure)?

4. The Australian natural environment is characterised by much temporal variability and spatial heterogeneity. What approaches allow robust monitoring of environmental changes so that human influences can be detected and tracked in an informative and useful way (e.g. in monitoring progress against environmental management targets or in meeting environmental accreditation criteria)?
5. Given the multiple sources of uncertainty, what frameworks or methods have been effective (or show promise) in handling that uncertainty in useful ways?
6. What methods or approaches have been most useful in integrating scientific knowledge into broader societal planning and decision-making for the management of our built and natural environment?
7. What innovations are apparent when reviewing the perspectives, methods and results of many science disciplines on these questions?

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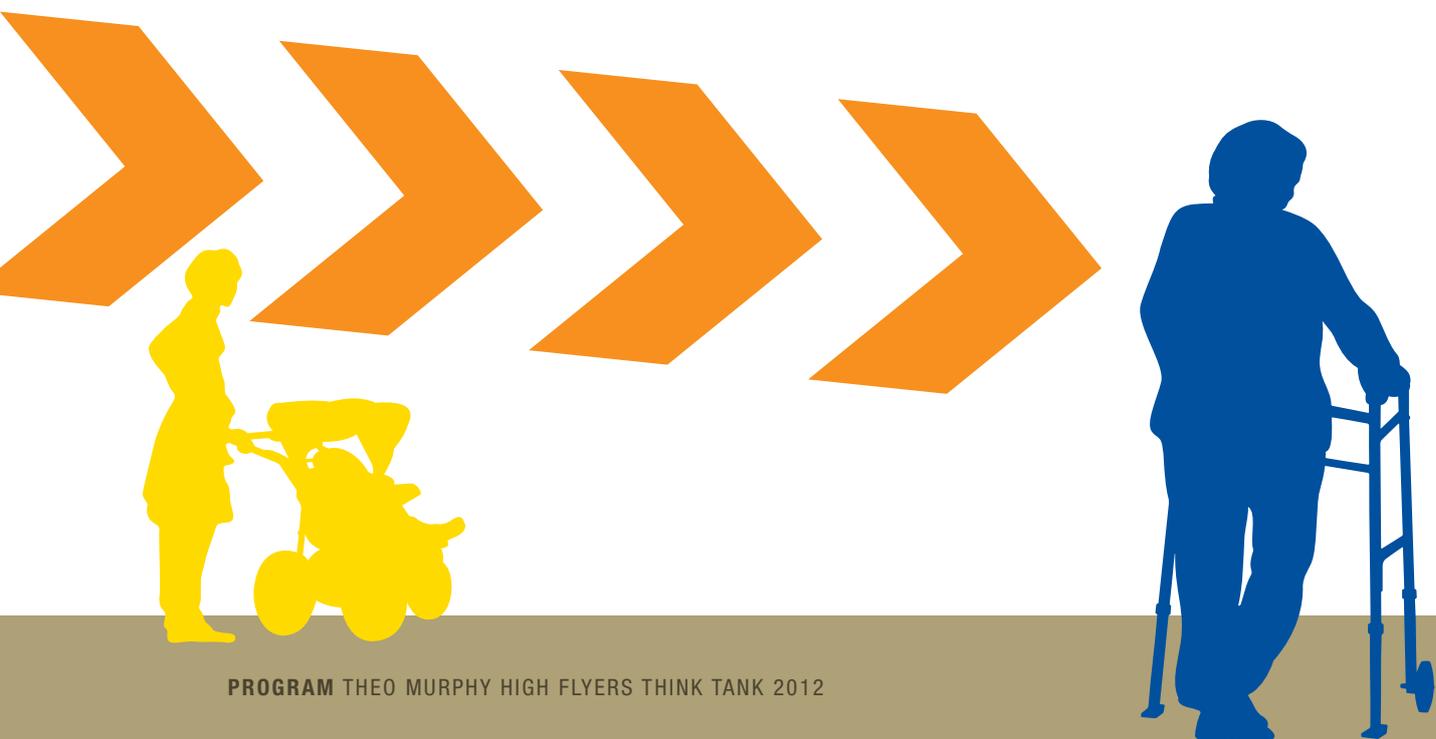
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PRESIDENT

Professor Suzanne Cory AC PresAA FRS

President of the Australian Academy of Science

Professor Suzanne Cory is one of Australia's most distinguished molecular biologists. She was born in Melbourne, and graduated in biochemistry from the University of Melbourne. She gained her PhD from the University of Cambridge, England and then continued studies at the University of Geneva before returning to a research position at the Walter and Eliza Hall Institute of Medical Research in Melbourne in 1971. From 1996 to 2009 she was

Director of the Walter and Eliza Hall Institute and Professor of Medical Biology at The University of Melbourne. She is currently a Vice-Chancellor's Fellow at the University of Melbourne and Honorary Professorial Fellow at the Walter and Eliza Hall Institute. Her research has had a major impact in the fields of immunology and cancer and her scientific achievements have attracted numerous honours and awards. In 2010 she was elected President of the Australian Academy of Science.

STEERING COMMITTEE

Dr Oliver Mayo DSc FAA FTSE

Co-Chair

Honorary Research Fellow,
CSIRO Livestock Industries

Adjunct Professor of Biometry,
Faculty of Sciences, University of Adelaide

Professor Mayo is an Honorary Research Fellow CSIRO Animal, Food and Health Sciences and an Adjunct Professor in the Faculty of Sciences, University of Adelaide, South Australia.

He is a former research leader with CSIRO, and has more than 40 years of experience in applied statistics and genetics. He was the Chief of CSIRO Animal Production from 1989 to 1998. Before that he was Dean, Faculty of Agricultural Science, University of Adelaide, 1986–87, and Head of the Biometry Section, Waite Agricultural Research Institute, University of Adelaide, 1971–89.

He has published more than 100 research papers in refereed journals and has written books on topics ranging from Australian wine through biography (of a 19th century detective story writer and eugenicist) and evolution by natural selection to the theory of plant breeding.

He is a Fellow of the Australian Academy of Science and of the Australian Academy of

Technological Sciences and Engineering, and Foreign Member of the Russian Academy of Agricultural Science.

Dr Kristin Alford

Co-Chair

Founder and Managing Director of Bridge8

Lecturer in Foresight and Social Change
and Business and Carbon Management,
University of Adelaide

Dr Kristin Alford is a futurist and Founding Director of Bridge8, a foresight agency interested in creative strategies for science and society.

Kristin holds a PhD in process engineering and a Masters of Management in Strategic Foresight. She has worked for BHP Billiton and Ansett/Air New Zealand and held various careers in engineering, human resources and product development across sectors including mining, R&D, aviation, agriculture and nanotechnology. She is a graduate of the Australian Institute of Company Directors and a Fellow of the Governor's Leadership Foundation. She holds board positions with Australian Network for Art and Technology and the Annesley College Council.



Oliver Mayo



Kristin Alford



Steven Cork



Cathy Foley



Nicky Grigg



Graeme Hugo



Nick Martin



Bob Williamson



Recent relevant projects have included industry capability research in advancing manufacturing, clean technologies, mining innovation and agriculture, as well as foresight projects in urban futures, health, sport and science engagement. She is involved in the Australian Academy of Sciences research project, 'Australia 2050', and is a member of the Australian Government's Expert Forum on Enabling Technologies.

COMMITTEE MEMBERS

Dr Steven Cork

Principal, EcoInsights: environmental policy, strategy, futures

Resilience Project Leader, Australia 21

Adjunct Professor, Crawford School of Public Policy, Australian National University

Steven Cork is an ecologist and futurist. As an ecologist he spent 25 years in CSIRO researching the interactions between humans and the natural environment around the world. As a futurist he played a leading role in developing scenarios for the World's social-ecological futures for the United Nations' Millennium Ecosystem Assessment and has run similar projects with government and non-government groups around Australia. He has worked extensively as an advisor to governments on policy issues and as a government employee developing and implementing environmental policy. He now works privately as a futurist, strategist and ecological advisor as the Principal Consultant of EcoInsights and leads a project on the resilience of Australia in the private sustainability R&D organisation Australia21. He is an adjunct Professor in the Crawford School of Public Policy at the Australian National University. He was a member of the committee that prepared the 2011 National State of the Environment Report.

Dr Cathy Foley FTSE

Chief, CSIRO Materials Science and Engineering

Dr Cathy Foley is Chief of CSIRO Materials Science and Engineering. Before this, Cathy was involved in CSIRO's Superconducting Devices and Applications Project, developing superconducting systems for mineral exploration, detection of metal for quality assurance in manufacturing, terahertz imaging, and UXO detection. This multi-million dollar project assisted with the discovery and delineation of the BHPB Cannington Silver mine and her team is currently commercialising its systems. Her group was the first team to successfully fly superconducting systems.

Cathy has a world-class reputation in her field, being a Fellow of the Institute of Physics in the UK; Immediate past President of the Australian Institute of Physics, and member of the Prime Minister's Science Engineering and Innovation Council. In 2003, she was awarded a Public Service Medal and won the Eureka Prize for the promotion of Science. In 2009 she was the NSW and National winner of the Telstra Women's Business Award for Innovation.

Dr Nicky Grigg

**Research scientist,
CSIRO Land and Water, Canberra
Australia 2050 Project**

Nicky Grigg is a research scientist at CSIRO. Her formal training included a BE (Hons, Environmental) and BSc (Applied Mathematics) from the University of Western Australia and a PhD from the Centre for Resource and Environmental Studies at the Australian National University. Her PhD research included measuring and modelling biogeochemical systems in aquatic sediments. In her Postdoctoral fellowship at CSIRO she worked on the implications of nonlinear dynamics on mathematical modelling of ecological systems. Her subsequent applied research projects involved analyses of biogeochemical responses in the Coorong to drought conditions, and modelling ecological response to stormwater harvesting plans in the ACT. In her current work she is part of a team of complex systems scientists adopting more interdisciplinary approaches to global change research. Nicky is a part of the Academy of Science's 'Australia 2050' project (www.science.org.au/policy/australia-2050/) and she is participating in the Theo Murphy Think Tank to enable cross-linkages between these two Academy of Science initiatives.

Professor Graeme Hugo

Chair, Advisory Committee on Demography and Liveability, Commonwealth Department of Sustainable Environment, Water, Population and Communities

Professor of Geography and Director of the Australian Population and Migration Research Centre, University of Adelaide

Graeme HUGO is ARC Australian Professorial Fellow, Professor of Geography, Environment and Population and Director of the Australian Population and Migration Research Centre at the University of Adelaide. His research interests are in population issues in Australia and South-East

Asia, especially migration. He is the author of more than 300 books, articles in scholarly journals and chapters in books, as well as a large number of conference papers and reports. In 2002 he secured an ARC Federation Fellowship over five years for his research project, 'The new paradigm of international migration to and from Australia: dimensions, causes and implications'. His recent research has focused on migration and development, environment and migration and migration policy. In 2009 he was awarded an ARC Australian Professorial Fellowship over five years for his research project 'Circular migration in Asia, the Pacific and Australia: Empirical, theoretical and policy dimensions'.

Professor Nick Martin FAA FASSA

Queensland Institute of Medical Research

Nick Martin graduated in genetics from the University of Adelaide in 1972 and obtained his PhD in genetics at the University of Birmingham. In 1978 he returned to a research fellowship at the Australian National University where he played a major role in founding the Australian Twin Registry. He has used this registry in a series of very large twin studies of personality, intelligence, alcoholism, asthma and endometriosis, making important findings and setting international standards for power of data and rigour. After three years in the US he returned in 1986 to the Queensland Institute of Medical Research where he heads the Genetic Epidemiology Laboratory. His current interest is in linkage and association methods to locate genes of major effect (quantitative trait loci) on complex traits including melanoma, depression and alcoholism. He has attracted major funding from the National Institutes of Health, the European Union, NHMRC, a CRC and industry.

Professor Bob Williamson AO FAA FRS

**Secretary for Science Policy,
Academy of Science**

**Honorary Senior Principal Fellow of the
Murdoch Institute, University of Melbourne
and Monash University**

Bob Williamson became Professor of Molecular Genetics and Biochemistry at St Mary's Hospital Medical School, University of London, in 1976, where he remained until 1995 when he moved to Melbourne as Director of the Murdoch Childrens Research Institute and Professor of Medical Genetics. He retired in 2004, and now is an Honorary Senior Principal Fellow of the Murdoch Childrens Research Institute, the University of Melbourne, and Monash University. Bob has more than 400 refereed career publications, including about 40 in *Nature*, *Nature Genetics*, *Cell* and *Lancet*. He was involved in the identification and cloning of genes for thalassaemia, cystic fibrosis, craniofacial abnormalities, heart disease, Friedreich's ataxia and Alzheimer's disease.

More recently he has taken a major interest in national science policy, medical and scientific ethics, and has published widely on stem cell science and the ethics of embryo research. He has advised several Premiers, Health Ministers and Ministers for Innovation. Although he has retired, until recently he still worked with a small research group trying to coax cord blood stem cells to help treat cystic fibrosis in children. Since retirement he has increased his activity for a number of medical charities, including cystic fibrosis, Friedreich's ataxia and eye diseases.



DINNER SPEAKER

Dr Paul Willis, Director, RiAus

RiAus Director Dr Paul Willis is well known as a science broadcaster with the Australian Broadcasting Corporation, presenting and producing on ABC television science shows including *Quantum* and *Catalyst*.

Paul is passionate about informing, educating and amusing people of all ages and backgrounds about science and is keen to seize the opportunity to talk about science in a variety of public forums. He was rewarded for his passion in 2000 when he was joint recipient of the Eureka Prize for Science Communication.

Dr Willis brings a solid research career in vertebrate palaeontology to his work as a science communicator and now as Director of RiAus. He has produced many academic reports and papers, has authored or co-authored seven books on dinosaurs, rocks and fossils, and has written many popular science articles for a variety of publications.

Paul was the resident palaeontologist on seven Antarctic expeditions. His enthusiasm and keen sense of adventure make him ready and willing to engage with non-scientists and to stimulate community conversations about science, life, and everything.



PHOTO: DAVID MARIUZ

RAPPORTEURS

Dr Kristin den Exter

Associate Lecturer

School of Environmental Science and Engineering, Southern Cross University

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Kristin has research expertise at the intersection of science and management, exploring the interrelated dynamics of socioecological systems. She has expertise in adaptive environmental management, action research and system dynamics modelling, including group model building and other participative approaches. She is interested in the emerging disciplines of resilience theory, and related concepts of carrying capacity, thresholds/tipping points and alternative futures. She has experience with geographic information systems (GIS), including participatory GIS. She is currently involved in research in Timor-Leste

exploring the use of GIS and remote sensing to integrate social, demographic and environmental data to assist with building capacity for governance.

She has a good knowledge of the issues being discussed and is familiar with recent literature and debate on the topic of population from a range of disciplinary perspectives. She is able to look critically at the issues from both social and ecological perspectives, across spatial and temporal scales. Kristin is able to contribute a systems view to the question: do we view Australia as an open or a closed system? A background in futures analysis will help the group to shape a vision. Kristin brings considerable experience and skills to facilitation and problem-solving, as well as skills in the graphic representation of discussions and of the knowledge-sharing/knowledge-creation.

Dr Edith Gray

Australian Research Council Australian
Research Fellow

Australian Demographic and Social Research
Institute, College of Arts and Social Sciences
The Australian National University

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Edith is a demographer who works predominantly in the area of family demography. She has been employed as a researcher and lecturer at the Australian National University since December 2001, and holds an ARC Australian Research Fellowship on a project focusing on family transitions and trajectories. Since 2001 she has been a principal investigator on the Negotiating the Life Course Survey, a longitudinal survey conducted every three years. She is the Editor-in-Chief of the *Journal of Population Research* (www.springer.com/social+sciences/population+studies/journal/12546). She has recently been working on a 'Major Works' four volume series on essential readings in population studies, which is forthcoming in the 'Critical Concepts of Social Sciences' series.

Her recent research has focused on family formation, particularly relationship formation and fertility. Australia has a relatively high fertility rate compared to other OECD countries, and Edith's research has contributed to understanding the reasons Australians have larger families. As editor of an international journal of population, she also has a very wide understanding of population theory, issues and research, not limited to family demography. Her contribution to the Think Tank will be based on intellectual scholarship in contemporary and influential studies in the field.

Professor Greg Murray

Professor and Head of Psychological Sciences
and Statistics

Swinburne University of Technology

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Greg is a productive mid-career behavioural scientist. His overarching curiosity is the relationship between human nature, behaviour and wellbeing, in the context of political and pragmatic constraints. Greg's research has three main strongly multidisciplinary themes — rural mental health, mood disorders, and sleep. As part of this work he has led multidisciplinary collaborative research teams in Australia and North America. Through national roles in the profession, he has

influenced evidence-based policy and practice in psychology.

The four questions framing the 2012 Think Tank have significant psychological components. Concepts like quality of life, identity and relationship will be important in brainstorming Australia's future population, and Greg brings a wealth of knowledge and problem-solving experience in these areas. His contributions will derive from extensive experience conceptualising, investigating and addressing motivational, behaviour change and social network components of human problems. Greg also has expertise across the range of methods in the human sciences (e.g. qualitative research, participatory research, epidemiology, randomised controlled trials, questionnaires, experimental, conceptual analysis) and related data analysis procedures. Beyond this content input, he will contribute effectively to the inquiry process. Greg is a senior clinician, award-winning educator and committed team player, so he looks forward to working with other participants towards original outcomes for the workshop. His primary motivation for attending the Think Tank is, in fact, to enhance his skills around enabling productive multidisciplinary inquiry into complex human problems.

Dr Heinz Schandl

Senior Principal Scientist

Social and Economic Sciences Program

CSIRO Ecosystem Sciences

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Heinz is a sociologist working on environmental information systems and integrated analysis of sustainability to inform policies for sustainable consumption and production and green economy in Australia and the Asia-Pacific region. His research links sociological and institutional analysis with analysis of resource use and emissions and policy analysis. It involves biophysical modelling and economic modelling as well as scenario analysis. At CSIRO, Heinz leads a research group of 25 people. He is also an adjunct professor at the ANU Crawford School and visiting professor at Nagoya University, Japan, and a council member of the International Society of Industrial Ecology.

Heinz's research interest into population and environment directly relates to the topic of the Think Tank. He was recently lead author of the report *Resource efficiency: economics and outlook for Asia and the Pacific*, commissioned by the United Nations Environment Program, and has published conceptual and empirical research to



Kristin den Exter



Edith Gray



Greg Murray



Heinz Schandl



Jackie Street



Katerina Teaiwa



Liam Wagner



David M Watson



address the questions asked by the Think Tank. He will share his research insights for Australia and Asia-Pacific on how different population and consumption scenarios result in different environmental impacts, and will be able to discuss policies that may guide sustainable consumption and production.

Dr Jackie Street

Senior Lecturer

Public Health, School of Population Health and Clinical Practice

University of Adelaide

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Jackie has qualifications and experience in biomedical and social sciences and draws on both in her work. Her research focus is the inclusion of patient and public views in decision-making for health policy, health technology assessment and clinical practice. Jackie's current interests include community participation in government decision-making processes, the use of regulations and laws to address childhood obesity, supports for ethical research practice and the improvement of cancer follow-up through patient involvement. She has considerable experience with deliberative inclusive methods such as citizen juries. Jackie is current Vice-President and immediate past President of the Public Health Association, South Australia.

A strong and vibrant Australia must provide processes whereby all people can participate in decision-making for policy and practice. In addition, we need to foster a culture which encourages and supports such participation particularly from those sectors of our society which may be disadvantaged or disengaged from the political process. Currently we lag behind many European countries and Canada in the openness with which our public services engage with the public in decision-making. We can learn from overseas experience but must adapt these lessons to Australian context. Jackie brings to the Think Tank an understanding of the barriers and facilitators to public participation in decision-making and ideas about the steps which we, as a society, need to take to foster the move to a more devolved democracy which values and supports well-informed public deliberation. Jackie's recent work means she will also bring understanding of the interaction of regulation, policy and community.

Dr Katerina Teaiwa

Senior Lecturer; Pacific Studies Co-Convener; Academic Leader: Pasifika Australia Access and Equity Program; President, Australian Association for the Advancement of Pacific Studies

Pacific Studies, Anthropology & Gender and Cultural Studies Units

Australian National University

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For 15 years Katerina has been studying the impact of mining on Banaba in Kiribati, and the ensuing artistic and political methods used by Banabans to carve out a new home in the politically challenging environment of Fiji. She has also conducted research on South Asians in the Pacific with a focus on Indo-Fijians in the islands and New Zealand. Since 2007 Katerina worked on cultural policy and cultural development through research consultancies with UNESCO (cultural diversity, Small Island Developing States, a new global Cultural Policy Profile) and the Secretariat of the Pacific Community on an EU project: national Cultural Mapping, Planning and Policy Making with 6 Pacific countries, and Cultural Policy Implementation, Monitoring and Evaluation including the development of Cultural Statistics.

Katerina's focus will primarily be on new migrant and specifically on Pacific peoples who move to Australia directly from the Islands and via New Zealand. These are some of the fastest growing populations in NSW and Queensland, and increasingly in Victoria, but the research is very thin. Islanders are visible in two arenas: popular culture including sports and the arts (especially Rugby League, Rugby Union and in all popular dance and music programs); and in the crime and justice sector. The Pacific migrant population is mainstreamed as a social category in all areas of New Zealand policy making, administration, health, education and social services. While the population here is smaller, it is growing and the lack of systematic attention to Pacific needs is problematic. Pacific communities can and are contributing in visible ways to the national character and social capital of Australia but they need more support.



Dr Liam Wagner

Research Fellow (Level B)

School of Economics

University of Queensland

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Liam's research centres on the sustainable use and delivery of energy to Australia's growing population. As a member of the 'National Energy Efficiency Initiative — Smart Grid, Smart City' expert panel for the Federal Department of Resources, Energy and Tourism (Australia), Liam has provided advice on how energy projects can best be developed to address climate, population and sustainable objectives. He has been involved in a number of energy and sustainable development projects with CSIRO, Departments of Climate Change and Energy Efficiency and Prime Minister and Cabinet via a range of expert panels and advisory roles.

The development of Australia's economy and the welfare of its population will depend on many economic and sustainability issues. With a background in science, economics and energy, Liam will contribute to questions on the allocation of resources and how those in our nation can share in its own development fairly. More specifically Australia's growing population will require innovation in the sustainable management of our energy use and delivery. Australia's population growth will place significant stress on its energy sector, with increasing demand for electricity during peak periods, being largely driven by residential usage. The development of clear strategies for the delivery of energy efficiency and management programs will shape Australia's sustainable future.

Professor David M Watson

Associate Professor in Ecology

School of Environmental Science

Charles Sturt University

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David's research is on developing solutions to habitat fragmentation, managing biodiversity in agricultural landscapes and uncovering the secret life of mistletoes and other parasitic plants. Rather

than individual species, his research addresses questions at the community scale, focusing on interactions between species and revealing the processes determining diversity patterns. David works in woodlands, forests and desert ecosystems in Australia and Central America, specialising in birds and mistletoes but extending to many other groups. He conducts his research in cooperation with private landowners, park managers, local and regional agencies, national organisations like Birdlife Australia and international organisations including the Smithsonian Institution.

During his career, David has travelled to remote areas within Australia and Latin America, learning first-hand the many approaches communities have adopted to live within their environment. From isolated subsistence farmers in the highlands of Mexico and entrepreneurial indigenous communities in coastal Panama to diminishing townships in the Riverina and enclaves of sustainability in Melbourne, David believes the most successful models balance cultural values and economic opportunities with environmental stewardship and progressive education. This insight, coupled with extensive experience in tertiary education and environmental engagement (through his alter ego 'Dr Dave') gives David rare perspective on the complex interactions underpinning the issue of Australia's human population, and the ways in which we can identify and engineer future opportunities. As a previous board member for Birds Australia, founding member of the Slopes2Summit connectivity conservation partnership and manager of the ecology program for the Safeguarding Biodiversity CRC bid, David genuinely enjoys contributing as part of a team towards a common goal. He lives on a rural property with his family, producing their own food while restoring habitat for biodiversity, and will share lessons learned with the Think Tank about how agriculture and biodiversity conservation can coexist.



EARLY AND MID-CAREER RESEARCHERS

Dr Brad Aisbett

Senior Lecturer

Centre for Exercise and Sports Science,
School of Exercise and Nutrition Sciences

Deakin University/Bushfire CRC

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Emergency service workers regularly perform their duties under extreme conditions. Heat, smoke, long shifts, sleep deprivation, stress and physical demands — these are common demands to contend with as they protect Australian communities. Brad is a national leader for the Bushfire CRC on the health and safety of emergency service workers. He has worked with 15 emergency service agencies across five Australian states investigating their workers' tasks and physiological demands and has developed job-specific health and fitness interventions. His research has attracted about \$700,000 in industry and competitive university schemes and been disseminated through 15 journal articles (together with 45 industry reports, conference and seminar presentations).

Brad is passionate about the need for safe, productive and fulfilling work for emergency service workers and volunteers. Australia places high demands on these people in times of fire, flood and other natural hazards. To continue to rely on their efforts we must ensure that everything is done to consider their overall health and to make their workplace as safe as possible. More broadly, Brad's research focus on health and safety, together with undergraduate teaching in career development (in exercise science), strongly positions him to consider the physical and psychological qualities needed for our workforce of the future. Brad is an effective contributor in group discussions through his teaching and research roles, where he is often called upon to clearly convey his message to a variety of audiences in the field, community meetings, and at industry conferences. Brad will add particular value with his perspective on the question 'What will we do?'

Dr Sarah Annesley

Lecturer

Microbiology

La Trobe University

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Sarah's research focuses on determining the underlying causes and pathways involved in the pathological outcomes of mitochondrial and neurodegenerative diseases using a simple model organism. Elucidating the proteins involved in these pathways could lead to the identification of targets for drug development. Sarah has been involved in creating a *Dictyostelium* model of mitochondrial and several neurodegenerative diseases, and she has identified several members of the pathways leading to the pathological outcomes. This research has been published in 16 research articles in excellent international outlets and her work has been presented in 18 posters and talks at international conferences.

The importance of understanding neurodegenerative diseases and the creation of pharmaceuticals for their treatment is increasing as the population ages. It is estimated that by 2040 neurodegenerative diseases will have collectively eclipsed cancer as the second most common cause of death worldwide. Sarah will be able to contribute to the Think Tank by addressing key questions in relation to how we will accommodate an elderly population and a population which has a high incidence of neurodegenerative diseases. Research towards our understanding of these diseases will benefit the community as a whole and reduce the financial burden involved in caring for such a population.

Dr Josephine Barbaro

Postdoctoral Research Fellow

Olga Tennison Autism Research Centre,
School of Psychological Science

La Trobe University

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Josephine's research interests are in the early identification and diagnosis of Autism Spectrum Disorders (ASDs) in infants and toddlers in order to facilitate developmental outcomes for children and reduce stress on the family. She is also interested



in the cognitive profiles of young children with ASDs and the predictors of diagnostic crossover between the toddlerhood and preschool period. Josephine has a particular interest in the education of primary health care professionals, and the general population at large, about these early signs and how to detect them in very young children.

Currently, ASDs affect more than 1% of the population, with latest US Centers for Disease Control and Prevention (CDC) figures finding an overall prevalence rate of 1 in 88 children (1 in 54 boys). This marks a 78% increase since the first CDC report in 2007. Consequently, we are now in a position where a large minority of the Australian population have an ASD. Josephine will contribute to this year's Think Tank by addressing the key questions from the perspective of ASDs, which will cover the lifespan. The early signs of ASD must become common knowledge amongst the general population, and strategies must be put in place to ensure these individuals have equal access to services, education, and employment to be happy, healthy, and active members of our society. In particular, we will need to put much thought into how to accommodate our ageing population of individuals with ASDs.

Dr Paul Berkman

Office of the Chief Executive Post-doctoral Fellow

Plant Industry

CSIRO

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Paul's experience and interests are in crop genome biology and complex genomes, for which he applies and develops computational analysis methods. In his recent PhD he applied new DNA sequencing technologies and a novel computational approach to analyse the highly complex genome sequence of hexaploid bread wheat, perhaps the most important crop species in the world. Paul's postdoctoral fellowship with CSIRO is examining the even more complex crop genome of sugarcane, and investigating the factors that affect genome complexity more broadly. Paul works on important crops and is interested in research commercialisation to deliver real-world outcomes.

In a world where population growth will result in 9 billion people on the planet by mid-century, a population expected to eat as if there were 12 billion, food security is a hugely important issue. The compounding effects of climate change and the continued migration from rural to urban living

will exacerbate the food security challenges of population growth, factors which challenge energy security as well. New approaches and technologies are revolutionising the way we can improve our crops by more rapidly understanding how they function and what produces the traits we want to see, whether for nutrition or energy. Having worked for the last 3 years in the application of new technologies to improve crops, He will be able to contribute an understanding of the technologies that underpin food and energy security', and his commercialisation background provides him with an understanding of the industry framework to contribute as well.

Dr Petra Buergelt

**Research Associate — Bushfire CRC Project
School of Psychology**

University of Western Australia

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Petra's doctoral research used holistic, longitudinal methodologies to analyse social, cultural and experiential influences on wellbeing in Western migrants to Australia and New Zealand. She was invited (2012) by the Intergovernmental Consultations on Migration, Asylum and Refugees to present a keynote address on this work to a UN/International Organization for Migration and the European Commission conference. Her current research on social-ecological predictors of disaster preparedness and adaptable, sustainable, resilient communities adds to her expertise in researching social change and adaptation. She has published nationally and internationally and serves on the editorial board of the *International Journal of Multiple Research Approaches*.

Petra brings experience of researching how reasons for migrating (e.g. identity, values, culture) interact to facilitate health/wellbeing, self-actualisation, and cosmopolitanism. Personal background and life experiences, such as growing up in East Germany and living in West Germany, allow her to critically compare the influence of different sociopolitical systems on well-being from both personal and research perspectives. Experience gained from extensive travels, migrating several times, living in various New Zealand and Australian towns, and experience of several cross-cultural relationships means Petra can add immigrant, cross-cultural and bilingual perspectives to the conversations. Her academic study of horticulture, psychology, sociology and anthropology gives her the cross-disciplinary





Brad Aisbett



Sarah Annesley



Josephine Barbaro



Paul Berkman



Petra Buergelt



Peter Buzzacott



Terence Chan



Angelo D'Amore



Katherine Daniell



Amanda Davies



Marcel Dinger



Cara Doherty



background required to contribute to discuss population issues in a multi-disciplinary context. She also brings in-depth understanding of lived human nature through engaging in transformative education and coaching, in diverse leisure interests, in philosophy and in environmentally sustainable living that reflect her passion in creating thriving communities.

Dr Peter Buzzacott

Research associate

School of Sports Science

University of Western Australia

peter.buzzacott@uwa.edu.au

Peter's research interests concern the interplay between recreation and population health. His research includes the growth of recreational industry, identifying risk factors that may be regulated through policy, the incidence of serious trauma and the economic burden to society of recreational injuries and deaths. He has presented original research at international conferences in Australia, Turkey, Slovenia, Poland and the USA and recently had an invited chapter accepted for the book *The epidemiology of injury in adventure sports*, comparing injury rates across adventure sports such as surfing, scuba diving and mountain biking, all of which are essential elements of Australian culture.

Peter expects to contribute to this year's Think Tank by participating fully and especially by considering the impact of population growth on recreation and management issues. In a future Australia will we limit the number of cars allowed to be registered? What about limiting the number of tickets sold to enter national parks? In many parts of Australia we already see people from a lower socioeconomic band dissuaded from visiting national parks through entry fees without available concessions. With substantial population growth we may see our wilderness areas increasingly reserved for the well-off, widening further a growing class divide. How will our next wave of migrants influence our cultural values? Will they ask for non-compulsory voting? Uniform national laws, national school dates and subjects, professional injuries? With the cost of water escalating will we witness the demise of Australian Rules football, and will our trend towards single-occupancy housing be reversed?

Dr Terence Chan

Research Fellow

Monash Sustainability Institute (concurrently at the Water Studies Centre in the Faculty of Science)

Monash University

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Terence's research interests lie in helping our society to make better environmental management decisions through improved integrated and systemic understanding, particularly with tools such as computer models. From the traditional biophysical focus of the environmental modelling field, his research has expanded into how to more fully involve stakeholders so that models and decision-making better represent and include their views and input, and the additional impact of these participatory processes on social networks and management decision-making on water resources. Terence has more than years of experience in environmental research across Australia and internationally, with a range of collaborators, stakeholders and communities.

Terence's expertise in the environment and in water resource management will contribute to the Think Tank's discussions about how we will 'live in our habitat' as well as how we share resources. Water, as a transdisciplinary issue, requires command of a wide range of fields, including those surrounding the physics (e.g. hydrology, climate), chemistry (e.g. pollutants, eutrophication) and biology (e.g. algal blooms, environmental flows) of what affects water, as well as how water affects us and our environment. Additionally, his work increasingly addresses contextual socioeconomic factors such as rising water demand from growing population and urbanisation, participatory methods to include stakeholders and improve equity and representation of cultural factors in environmental decision-making processes, and the sociopolitical environment in which decisions are made. Finally, Terence's personal status as an immigrant may provide a useful perspective — although he suspects many participants will have similar experience.



Dr Angelo D'Amore

Senior Lecturer

Department of Rural and Indigenous Health (MUDRIH), School of Rural Health, Faculty of Medicine, Nursing and Health Sciences

Monash University

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Angelo's main research interests include education and pedagogy, rural healthcare, program evaluation, and clinical research. Specifically, he is interested in ways to improve the rural health workforce shortage, and in understanding ways people from different fields and different language backgrounds learn (e.g. learning styles). Angelo has a background in lab-based cardiovascular research and has lectured Nursing and Medical students in metropolitan and rural settings. He is currently the departmental education head and the school research higher degrees coordinator, and sits on a number of Departmental, School and Faculty committees. Angelo is also involved in the Scientists in Schools program.

Angelo thinks an important factor that needs to be considered in all focus areas of the Think Tank is equity for rural Australians. He also believes that educating the population into the future requires innovation and clear understanding of the needs of students we teach. This should include education pathways within the tertiary sector for currently underrepresented groups. Angelo's background and experience in education and rural health will be important resources for this Think Tank.

Dr Katherine Daniell

Research Fellow

Centre for Policy Innovation & HC Coombs Policy Forum

Australian National University

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Katherine has a wide range of interests and experience related to sustainable development and public policy. These interests include how to enhance public policy through the use of collaborative or participatory approaches that actively involve a wide range of stakeholders including local community members, governments, researchers, businesses and NGOs. In this area, she has worked in Australia and Europe on projects with population-related components including the creation of the Lower Hawkesbury Estuary Management Plan (NSW), the AQUASTRESS European Project on participatory water management and regional sustainable

development, and sustainability assessment of housing developments including multi-agent modelling and sustainability-indicator development in South Australia.

She has broad-ranging interests and experience across the technical and social science aspects of sustainability, and political aspects of policy development (e.g. built and natural environment systems modelling, decision science theory and practice, ethics, organisational management, public policy innovation, and governance processes). She will be able to contribute to many facets of the discussions across all four proposed population-related questions. In particular, she will be able to share her decision-support research on 'values-based' decision-making approaches and how to effectively incorporate scientific knowledge on the functioning of our natural and human-made habitat into them, as well as on effectively managing conflicts over both scarce resources and competing views of the future. Through her overseas work in Europe and more recently in the Pacific, as well as her own cross-cultural family background (her husband is a recent immigrant), Katherine also has research and personal experience to share on matters of identity and culture.

Dr Amanda Davies

Early Career Research Fellow

Social Sciences and Asian Languages

Curtin University

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Amanda's research has centred on identifying the patterns and socio-economic causes of spatial unevenness in population ageing. This research has largely focused on the Australian case, drawing on qualitative and quantitative methods to investigate patterns in urban and rural populations. Her research has revealed a strong temporal dimension to migrations. Moreover, the spatial mobility of elderly populations is driven by the needs of individuals to maximise their social, economic and cultural resources. She is interested in the implications for an ageing Australian population of spatially uneven population ageing for housing, health, social care. Her recent research builds on previous studies into youth migration and peri-retirement migration in Australia.

Debate about how large Australia's population should grow usually turns to the environmental, social or economic impacts of population growth or contraction. 'Hot topics' include water supply,

housing costs and transport congestion. Contrastingly, the age structure of Australia's population has received little attention. Amanda is interested in what the age structure of Australia's projected population will be and what the driving factors of this and the implications for resource production and distribution will be. She is also interested in the spatial distribution of different age cohorts, particularly where older and younger people will live and work and whether policy could or should be used to influence this. She will contribute a detailed knowledge of the spatial patterns of Australia's age structure and projected age structure to the Think Tank, and to discussions about the factors underpinning projected change in demographic structure, and about the socioeconomic and environmental changes that may result from population expansion.

Dr Marcel Dinger

**Associate Group Leader/NHMRC
Research Fellow**

Diamantina Institute

University of Queensland

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Almost all/most genetic mutations identified in large-scale genome-wide association studies occur within tracts of the genome that do not encode protein. Little is understood about the functions of such noncoding regions, which comprise ~98% of the human genome. Marcel is interested in understanding how these regions of the genome transact biological function and ultimately lead to disease. Using skin cancer as the focus, his group investigates these roles using various approaches based on next generation sequencing technology that identifies any RNA transcribed from these regions and then explores their function using high-throughput cellular assays.

Rapid advances in DNA sequencing technology have led to exponential declines in the costs of sequencing an individual's genome, with expectations that the costs will fall to under \$1000 in 1–2 years. This technology holds tremendous promise to vastly improve our understanding of the basis of human disease, transform treatment pathways (particularly in cancer), and guide our lifestyle choices to maximise quality of life. Genomic medicine will play an important role in the future of the Australian healthcare. As an expert in the field of genomics, particularly in relation to disease, Marcel will provide an important perspective on this field to this year's Think Tank.

Dr Cara Doherty

Postdoctoral Fellow

Materials Science and Engineering

CSIRO

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Porous materials are critical for many applications in energy, water, health and the environment.

Designing and controlling the geometry, spatial positioning and properties allows these smart materials to be applied to a wide range of applications. As a material science researcher Cara has worked on:

- materials for portable energy storage devices including lithium-ion batteries, fuel cells and methane and hydrogen gas storage
- porous materials to detect, capture and remove polycyclic aromatic hydrocarbons from water systems
- optimisation of membranes for gas separation, CO₂ capture, water purification and desalination
- porous materials for biosensing devices for lab-on-a-chip or microfluidic devices.

As a multidisciplinary scientist in physics, chemistry, biology and materials science, she is fortunate enough to work across many scientific disciplines and advance technologies in areas that are of particular significance to Australia. Her experience of advancing technologies in energy, water, health and the environment will be beneficial for discussions addressing the demands on resources as the population grows. Cara is also very passionate about communicating science across the broader community. She feels that even if people do not pursue a career in science, having the background knowledge is really important to understand and enjoy the natural and technological world we live in. Having a scientifically educated population means that everyone can engage in scientific debate with confidence and insight.

Dr Tina Du

Lecturer

School of Computer and Information Science

University of South Australia

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Tina was 2010 Highly Commended Award Winner of Emerald/European Foundation for Management Development Outstanding Doctoral Research Awards in the Information Science Category for her PhD thesis on understanding web user' multitasking search behaviour (only three recipients worldwide). Her research interests are in human

information behaviour, interactive information retrieval, Web search, and multitasking. Tina is an Associate Member of the Australian Library and Information Association and an editorial advisory board member of the *Aslib Journal of Information Management*. Since her PhD was awarded in June 2010, Tina has published five refereed journal articles, seven refereed conference papers and one scholarly book chapter. Recently, she featured in an article in *The Advertiser* [Adelaide] for National Science Week on multi-tasking during people's everyday life. In February 2012, Tina was selected for the University of South Australia's Early Career Researcher Development Program.

According to the Australian Bureau of Statistics, immigrants comprise 27% of Australian population. Immigrants have substantial information needs and practical needs for help with adjusting to life in a new country. Little research has examined their predilections from an information behaviour perspective. One of the current funded projects Tina is working on is *Investigating Information Behaviour and Information Use Environment of Immigrants in Australia*. This project aims to build a comprehensive picture of how immigrants and their families construct information space by understanding their engagement of information behaviour and information use environment, and the opportunities available to share information activities and resources between immigrant and non-immigrant Australian communities. The project outcomes will provide a novel theoretical framework of information behaviour, contribute to immigrant information behaviour studies that are responsive to and accepting of the ever-shifting global dynamics, and further contribute to shaping the country's vision for the future of all Australians.

Dr Maggie Evans-Galea

Research Fellow

Bruce Lefroy Centre for Genetic Health Research (Murdoch Childrens Research Institute)/Department of Paediatrics (University of Melbourne)

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Maggie is an investigator with the Murdoch Childrens Research Institute (MCRI) and the University of Melbourne. She trained in world-leading laboratories in the USA and has a strong background in stem cell therapy and genetic health research. Her translational research program aims to develop therapies and biomarkers for neurodegenerative disease. In 2009–10, Maggie received two young investigator awards and an

MCRI leadership award. She has served on multiple institutional and government advisory committees, and lectured, mentored and supervised fellows, students and staff in Australia and the USA. She is a strong advocate for biomedical research, mentoring and career development, communicating through a variety of media and events. She engages with young researchers, currently serving on the National Health and Medical Research Council postdoctoral Reference Group and chairing the Early–Mid Career Researchers Forum with the Australian Academy of Science.

As a biomedical investigator who aims to develop effective therapies for a relatively rare neurodegenerative disease, Maggie is strongly connected with one of the most vulnerable sections of our society. These are individuals who struggle to live with severely debilitating disease every day. In addition to the enormous physical and mental hurdles they face, they also experience social and economic challenges while integrating into the 'real world'. It is essential that their voice be included when shaping our vision for Australia's future and where we will go as a community. With a background in genetic health research and stem cell therapies, Maggie can also contribute to these discussions from a broader health-related perspective. i.e. how we educate people, interact with users and implement timely public health outcomes.

Dr Kim Felmingham

Senior Lecturer

School of Psychology

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Kim is a clinical psychologist and neuroscientist who researches biological and cognitive mechanisms underlying anxiety disorders, depression and responses to traumatic events. She has conducted research identifying key processes involved in the treatment of Posttraumatic Stress Disorder (PTSD), and has identified sex and genetic differences in brain responses to trauma and treatment for PTSD. Kim is also involved in examining the range of psychological responses in adjusting to trauma, from PTSD to depression and positive coping. She has recently begun conducting research into sex differences in mental health, specifically in anxiety disorders and in the formation of emotional memories.



Tina Du



Maggie Evans-Galea



Kim Felmingham



Freya Fowkes



Paul Gardner-Stephen



Nicholas Geard



Nina Hall



Mark Hamann



Munir Hanjra



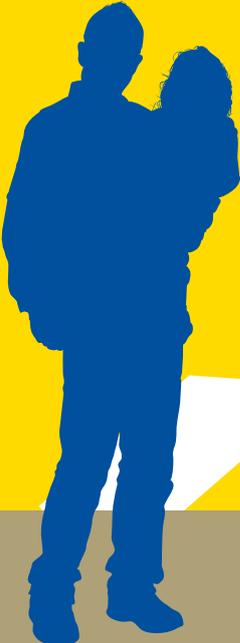
Brooke Harcourt



Christine Jacobson



Cassie Jansen



In light of the increasing rate of mass traumatic events (natural disasters relating to climate change, and terrorism), Kim will be able to provide insights into potential responses (at a community and individual level) and adjustment to these events. She will contribute her expertise on mental health and adaptive coping to facilitate recommendations regarding what we can do, and how we should exist in our habitat, in relation to climate change and mass disasters. Furthermore, she will be able to provide insight into psychological adaptation and mental health into the future, and the potentially different responses between men and women. Given World Health Organization predictions that depression will be the leading burden of disease by 2020, these insights will be highly relevant. Kim's interdisciplinary research, which spans cognitive, biological and emotional domains, will enable her to take a broad scientific approach to the fundamental questions posed by the Think Tank.

Dr Freya Fowkes

Head of Malaria Epidemiology

Centre for Population Health/

Centre for Immunology

Macfarlane Burnet Institute of Medical Research and Public Health

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Freya has spent the last 10 years of her research career investigating how chronic and infectious diseases affect large populations. Her primary interest is examining the epidemiology of malaria and in particular immunology, host genetics and susceptibility to malaria and associated morbidities. Freya has been involved in several large multinational, multicentre collaborations and has used a diverse novel array of demographic, social, laboratory and statistical approaches to answer questions of major global health significance. She is currently performing studies trying to understand how host immunity can affect the efficacy of both individual and population-level malaria interventions.

Working in the area of global public health has given Freya an international perspective on population health research, and it is this perspective she would like to contribute to this year's Think Tank. While as a nation we can look introspectively and define who we will be and what will we do, to provide a foundation for new science

to base policy responses on, we also need to think about how the Australian population and Australian science defines itself in the context of the global nation and how we can secure an international leadership position in this area.

Dr Paul Gardner-Stephen

Shuttleworth Telecommunications Fellow

and Rural, Remote & Humanitarian

Telecommunications Research Fellow

Computer Science, Engineering & Mathematics

Flinders University

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Paul's primary research interest and expertise is in resilient, open-source mobile mesh telecommunications and mobile devices. Paul is the founder and team leader of the Serval Project, a humanitarian organisation that is developing software to allow mobile telephones to communicate with each other in the absence of any infrastructure. He also has demonstrable research interests and experience in mobile communication infrastructures, disaster-resistant and attack-resilient technology, SPAM counter-measures, data compression and retrieval, networking, and scalable computing. He actively seeks applications for his research findings that will make the world a better place.

Paul is an 'ideas person'. He cannot help but constantly think about different or better ways to solve the problems he sees, and he has broad interests in scientific, philosophical and theological issues. He has repeatedly demonstrated that he can produce creative solutions to challenging problems, his current work being a prime example. The Serval Project stemmed from a realisation that current technology is now capable of mesh-telephony, and that he could see solutions to issues that had previously been preventing success. Although the genesis of this project was independent of input from colleagues, he has built an impressive team and list of productive collaborations. He will offer all of these skills to the Think Tank, as well as his specific expertise in mobile telephony and computing (two intrinsic components of Australian society), and his trademark friendliness and enthusiasm.



Dr Nicholas Geard

Research Fellow

School of Population Health

University of Melbourne

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Nicholas uses data-driven computational simulation to understand how population composition and structure influence patterns of health and disease.

Demographic changes associated with an ageing population affect the number and type of households in Australian society, which has implications for the spread of infectious diseases. He is developing innovative models of population dynamics to help optimise vaccine scheduling in diverse populations.

The link between socioeconomic status and health is well established, and strategies are urgently needed to reduce the inequalities in health outcomes. His research explores how people's health is influenced by physical, social, demographic and economic characteristics of their neighbourhoods.

Nicholas will bring to this year's Think Tank:

- a wide-ranging interest in issues relevant to the topic, including the social determinants of health, the effects of immigration and demographic change on population structure, and the social and environmental impacts of the built environment
- a 'complex systems' perspective on the challenges and opportunities arising from future trends in Australia's population
- his strong track record in crossdisciplinary teams, and ability to communicate complex ideas to diverse general and technical audiences.

Since receiving his PhD in computer science, he has collaborated with researchers in biology, social science and population health, applying computational simulation techniques to modelling complex biological and social systems. He has a methodological interest in the validation and communication of issues associated with translating simulation research into policy-relevant insights.

Dr Nina Hall

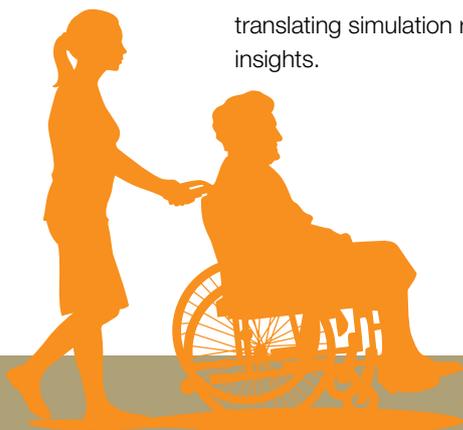
Social scientist and team leader

CSIRO Science into Society Group

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Nina works within CSIRO's applied social research group to understand community concerns in response to a changing climate. This research includes exploring acceptance of energy technologies such as wind farms; empowering community members to understand and adopt behavioural change around energy consumption and energy efficiency practices; and enhancing biodiversity conservation through agricultural changes to farming practices in Australia's high rainfall zones. Nina brings a multidisciplinary academic background to CSIRO, drawing from environmental science, social research, political science and social movements, matched with a professional background in environmental and climate change non-government organisations.

This Think Tank will examine Australia's population issues through a variety of lenses, and will gain from Nina's contributions based on both applied social research and her relevant experience working with a diversity of demographic groups in Australia. Her research specialises in decision-making, behaviour change and technology assessment around energy technologies and farming practices. These are essential tools for policymakers to gain a clear understanding of public support as the population grows and diversifies, specifically around providing energy supply to a growing population under a carbon price, managing the impacts of climate change, and feeding a larger and more urbanised citizen base. She has developed an energy efficiency program for low-income households, including new Australian arrivals, guided by social service organisations including the Australian Council for Social Services. She is the former director of the Climate Action Network Australia, representing legal, faith, environmental and Indigenous perspectives on climate change impacts and mitigation policy development.



Dr Mark Hamann

Senior Lecturer

Earth & Environmental Science

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Mark's main research is in two areas — the opportunities and barriers for the conservation of marine wildlife, and the impact, public attitudes and mitigation options for reducing plastic pollution impacts. His research work is multidisciplinary, including biological and social science (networks and attitudes), and includes work with Indigenous groups, government, the public and industry. Mark supervises an active research team of 10 PhD students and is a member of several national and international panels or committees providing advice on management of marine species and systems. He is co-vice Chair of the IUCN Marine Turtle Specialist Group, and Adviser *Indian Ocean — South-East Asian Marine* Memorandum of Understanding Marine Turtles.

A significant part of Mark's research interests involves understanding the various costs and benefits of ecosystem management, particularly as they relate to livelihoods of people from coastal communities. Through his research he works on projects that relate to:

- identity — especially traditional knowledge and social networks,
- activities and resource use — related to recreation, tourism and use of coastal resources
- innovation — related to species management and mitigating the impacts of plastic pollution and teaching
- habitat — how species use habitat, managing human-wildlife interactions and links between social systems and habitat management.

Through his research he has come to understand and work with some of the key challenges to societies using coastal ecosystems. His knowledge and skills gained from research and from the people he works with will allow him to contribute to the Think Tank.

Dr Munir Hanjra

Senior Research Fellow

Institute for Land, Water and Society

Charles Sturt University

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Munir is an economist and poverty specialist at Charles Sturt University. His professional

experience in development economics includes work in South Asia, South-East Asia, Africa and Australia. He has published widely in peer-reviewed international journals. He has worked in multidisciplinary international research teams including the International Water Management Institute's Global Research Division in Colombo, the Consultative Group on International Agricultural Research system, and CSIRO Land and Water. His recent work has argued that global change drivers including climate change, population growth, urbanisation, income growth and inequality, improvements in living standard, industrialisation, and energy-intensive lifestyle pose unprecedented challenges to humankind.

Global change drivers including population growth are posing complex challenges to peace and security in our region. They also offer fresh opportunities for human development. His recent paper (Hanjra and Qureshi, 2010) argues that global food security is at risk due mainly to population growth and demographic transformation. Investments are needed today to enhance future food security. This requires action on several fronts including preserving land and conserving water, reducing the energy footprint in food systems, modernising infrastructure, shoring up domestic food supplies, and responding to other regional challenges. In a forthcoming paper (Qureshi, Hanjra and Ward 2012) he argues that Australia's agricultural exports are of disproportionate importance within the South Asian and South-East Asian region, both in terms of volume and for strategic reasons. These works will contribute directly to this year's Think Tank, through scientific perspectives on future population and demographics as well as education, employment, health, living standard, rural-urban migration, rural infrastructure, culture and family values, socio-political and institutional settings and public policy on population.

Dr Brooke Harcourt

Post-Doctoral Research Fellow

Glycation and Diabetes Complications

Mater Medical Research Institute

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Brooke is a postdoctoral researcher at the Mater Medical Research Institute. Her research interests include the development of obesity and diabetes complications, which place great burden on our society's health and economic resources. She has been a member of the Australian Society for Medical Research (ASMR) 'Science Week'

Committee, coordinated the ASMR 'Scientists in Schools' Program, been an active member and President of the Baker IDI Heart and Diabetes Institute 'Student Committee', and an invited speaker at the Harold Mitchell Foundation, the Victorian Obesity Consortium and the Australian New Zealand Obesity Society. She received the 2011 Paul Korner AO Medal for Most Outstanding PhD Student.

In 2011, Australia overtook the USA as the most overweight and obese nation. This has big implications for the health status of our current and future population, as these are main contributing factors to diabetes and its associated mortality risk which is twice that for age-matched non-diabetics. Being overweight not only affects the health and wellbeing of a nation, it also affects our productivity and therefore economic status. Brookes feels that the 'health' of our future nation, and specifically the 'waist size' will be a large contributing factor to Australia's future values, employment, leisure activities, cultural activities, demographics, and genetics. She also feels that our idea of 'family unit' will be redefined as Australians become increasingly dependent on reproductive assistance facilities such as IVF, surrogacy and adoption. Brooke feels that she has the capacity to contribute expertise and to educated discussions in these areas.

Dr Christine Jacobson

Research Fellow

Sustainability Research Centre

University of the Sunshine Coast

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Chris is a social scientist who has been involved in research grants worth \$1.5 million, and has 16 peer reviewed publications. Her research on improving environmental management from the starting point of the practitioner uses the experiences of communities and agencies to reflect on academic wisdom. Her research has four strands:

- monitoring and evaluation for natural resource management, with a focus on the use of evaluation to inform decision-making
- cross cultural approaches to environmental management, including the role of Indigenous knowledge
- tools and processes to facilitate community engagement with science to support decision-making

- institutional learning and adaptive management.

The predicted increase in Australia's population will have implications for transport and urban design in cities but it will also cause increased pressure on natural resources, including the competing land uses of agriculture, housing development and recreation. Furthermore, the predicted increase in immigration could lead to tensions between right of place (for Indigenous communities) and cultural integration. Managing these issues will require a focus on social and planning processes that are inclusive of diverse communities and enable them to engage with decision-makers. As part of Chris's research interests and experiences she is concerned with increasing the voice of community and interest groups in decision-making. She also has experience in developing tools and techniques for engaging diverse stakeholders to form shared understandings. Her monitoring and evaluation experience provides skills in understanding the impacts of population change on natural resources, and the capacity for institutions to use the information to revise and adapt policy and planning.

Dr Cassie Jansen

Postdoctoral Fellow

CSIRO Ecosystem Sciences

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Cassie's primary research interest is mosquito-borne disease ecology, particularly in urban environments. Her experience spans industry, university and a range of levels of government. Currently, she holds a postdoctoral position in Vector Ecology with CSIRO Ecosystem Sciences and the University of Queensland. She applies ecological principles to the human health threats posed by vector-borne diseases. Her research challenges the traditional public health view of mosquito-borne diseases by employing an ecological framework to understand how environmental and demographic change influences mosquito-borne disease risk. She studies the interaction among vectors, human behaviour, and urban community structure with a view to applying science-based solutions for management decision-making and policy.

Human health and lifestyles are increasingly threatened by the emergence and resurgence of mosquito-borne diseases. Worldwide trends indicate that the threat will continue to grow, largely driven by demographic, climatic and environmental factors. A major future health challenge for Australia is to reduce the impact of emerging

infectious diseases, particularly those transmitted by vectors. These threats demand innovative research comprising a whole-of-system approach focused on translating science into preventative, rather than reactionary solutions. Within CSIRO, Cassie and her colleagues apply a multidisciplinary, multi-institutional approach to understanding and managing current and future vector-borne disease threats. At the Think Tank she will have an opportunity to contribute perspectives on emerging health threats to a changing and growing Australian population, and to contextualise her experience. She is keen to apply her experience in vector ecology and public health at a broader scale to integrate with other sectors to build human health resilience in the face of demographic and global change.

Dr Benjamin Johnston

Chancellor's Postdoctoral Research Fellow

Faculty of Engineering and IT

University of Technology, Sydney

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Benjamin is a postdoctoral research fellow in the Faculty of Engineering and IT at UTS. His dissertation on algorithms for artificial common-sense reasoning was awarded the Chancellor's Award for most outstanding PhD thesis in the University. Benjamin's research interests include artificial intelligence, robotics and intelligent systems. His research particularly emphasises applications of artificial intelligence that enhance productivity, efficiency and satisfaction both in the workplace and at home. He has also worked as a technology consultant specialising in database technology and data-warehousing for numerous Australian organisations and served in an analytics role in an Australian early-stage biotechnology venture.

Benjamin views technology and artificial intelligence as crucial to improving the lives of Australians. Robotics will assist ageing populations, provide additional leisure time to families, improve Australia's manufacturing competitiveness and overcome the challenges that presented by our small population spread over an enormous country. Artificial intelligence will power these robots and will also, more directly, improve the workflow of both Australian businesses and households by ensuring that the right information is delivered at the right time, while automatically managing the devices and sensors in our workplaces and homes for better efficiency, convenience and enjoyment. Benjamin will be able to contribute his pragmatic perspective

on these technologies.

Dr Rebecca Kippen

Senior Research Fellow and ARC Future Fellow

Centre for Health and Society, School of Population Health

University of Melbourne

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Rebecca has co-written a number of papers on possible population futures for Australia. Since the late 1990s her work with Peter McDonald has been influential in Australian population policy debates, breaking the myth that higher levels of immigration will prevent population ageing, and demonstrating that Australia cannot realistically achieve a greatly increased, nor decreased, population by the middle of the century. More recently, she and Peter have developed a new method for modelling and projecting birth rates using census data. This method is being adopted by the Australian Bureau of Statistics for use in future projections of Australia's population.

She can provide a demographic framework and range for Australia's future population, and help to address demographic aspects of the key questions. For example, what is our likely future population size, growth rate, age structure, family structure, and spatial distribution? What are the challenges facing parents who have children at older ages, and who are also caring for long-lived parents? How can we create a sustainable society in the context of a growing population? How achievable is a higher/lower birth rate, or higher/lower level of immigration, and what are the implications for Australia's population?

Dr Justin Koonin

Research associate

Department of Mathematics and Statistics

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Justin is a pure mathematician, working in the field of representation theory. He holds several roles in the social sector and is co-convenor of the Gay and Lesbian Rights Lobby of NSW (GLRL), the peak advocacy organisation for gay and lesbian people in this state. He also co-ordinates a project dealing with the issues of homelessness, disadvantage and community relations in inner city Sydney, which arose through his participation in the Benevolent Society's Sydney Leadership programme in 2011. Justin founded Little Travellers Australia, the Australian arm of a worldwide

initiative to raise awareness about HIV/AIDS in southern Africa.

Justin will be able to contribute to this year's Think Tank because his work spans both the hard sciences and the social sector. If we are to address complex issues like population growth, we need to understand as many different complementary perspectives as possible. Justin's academic work demonstrates a capacity for rigorous intellectual thinking on technical and foundational questions. His work in the social sphere sees him grappling directly with issues which affect Australian society — our values, identity, culture and demographics. In his role with the GLRL, Justin has had the opportunity to advocate for change at the highest levels. Some of his other work (for example his work with homelessness and HIV/AIDS) puts Justin in touch with the grassroots. Issues of family, community and the changing landscape of our society arise in all of these roles, and will be very relevant to the discussion.

Dr Caroline Laurence

Associate Professor

General Practice

University of Adelaide

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Caroline has a long-standing interest in primary care, medical education and the health workforce. Her research is focused on the aim of improving policies and strategies by providing evidence. Her PhD investigated the patterns of service provided by overseas trained doctors working in rural and remote Australia and included an analysis of changing immigration policy. Caroline is a current recipient of an ARC Discovery Early Career Researcher Award. She has more than 35 publications and over \$13 million in competitive grants, contract research and tenders. She works three days a week at the university and two on a GP vocational training program.

Caroline's research on health workforce planning is crucial in ensuring future provision of the most appropriate health care to the population, irrespective of their background or geographical location. The role of immigration in health workforce training and the supply pipeline has important implications for health service provision both in the short and long term and needs serious consideration. Her expertise is in the equity of medical school selection processes, and her general practice training focuses on the need to have a health workforce that reflects the diversity

of the general population. New diagnostic technologies are having an increasingly important role in health care. Patients' acceptance of such technologies is essential for effective implementation. Caroline's research in 'point of care' testing is an example of how this was managed effectively and improved patient outcomes. These areas of interest will allow her contribute significantly to the Think Tank.

A/Prof Simon Laws

**Deputy Chief Scientific Officer (CRC for Mental Health) & Genomics Leader,
Edith Cowan University**

**Centre of Excellence for Alzheimer's Disease
Research & Care, School of Medical Sciences**
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Simon's research focus is Alzheimer's Disease, a growing medical and socioeconomic challenge for Australia, in particularly methods to diagnose, predict and/or monitor Alzheimer's Disease, with an emphasis on genomic approaches. His current research combines genetics with quantitative phenotypes and investigates the role of rare variants in Alzheimer's Disease as well as utilising next-generation sequencing to uncover new genes in inherited forms of the disease. Finally, the field of pharmaco/nutri-genetics/genomics is of growing interest.

The mental health of Australians is of paramount importance considering the ageing population. In particular, dementia, with Alzheimer's disease the major cause, is a growing medical and socioeconomic challenge that must be considered when shaping any vision of the future. Through his 13 years of national/international exposure to dementia research Simon believes he can make an important contribution to this Think Tank, He will also be able to provide further input on the cultural diversity of Australia, having spent several years living and working in different cultures overseas and experienced first-hand the integration of different nationalities into Australian culture (his wife immigrated to Australia with Simon on his return from Germany). Having a young family, it is of particular importance to him that he contributes to shaping the vision of our future, which will also be his children's.



Dr Yi Li

Researcher

Computer Vision

National information and communications
technology Australia (NICTA)

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Yi received his PhD from the University of Maryland. This research, 'Cognitive robots for social intelligence', focused on visual navigation for mobile robots, optical motion capture, causal inference for coordinated groups, and action recognition and representation. Yi was the recipient of a 2008–10 Future Faculty Fellowship and received the second prize in the Semantic Robot Vision Challenge. He joined NICTA as a Researcher in 2011 as part of the Visual Processing for Bionic Eye project, and develops algorithms for visualising critical information (patent pending).

Australia is famous for its mining industry. Robotics, undoubtedly, has demonstrated its importance in mining and transporting materials all over Australia. While he continues to support the robotics research in mining, Yi argues that Australian companies and funding agencies should open up other opportunities for Cognitive Robotics. A cognitive robot consists of a system and a set of functions that facilitate the interaction with objects and humans, and eventually enable human–robot collaboration in real world tasks. Australia is behind peer countries in this research opportunity. In Europe, iCub, developed by the Italian Institute of Technology, has been deployed to more than twenty major European universities. In the US, PR2 by WillowGarage has demonstrated its usefulness in real world tasks. Japan has a tradition of developing robots for rehabilitation. This fundamental research topic will shed light on a number of research areas, especially as the population continues to grow, and bring business opportunities for the Australian economy.

Dr Brenda Lin

Research Scientist

Climate Variability and Change

CSIRO

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Brenda researches how changes in human land use have affected the ecological landscape and thus the provisioning of important ecosystem services to nearby communities (e.g. water filtration, protection from storm damage, heat regulation). With increasing human population,

urbanisation, and agricultural intensification, ecosystems are being transformed rapidly, decreasing the ability of ecosystems to provide services and increasing the vulnerability of society to environmental stressors (e.g. pollution, climate change). Brenda's research seeks to understand how natural systems can be maintained in the built environment in order to provide multiple co-benefits for human dominated landscapes.

Brenda believes she will be able to contribute to this year's Think Tank by providing a perspective on 'how we will live in our habitat' based on her research on natural and built environments. Although Brenda's research has primarily examined the combined impact of climate and land-use change on the environment, much of her research has incorporated the social, political, economic and cultural aspects of human land use and decision making in order to understand ecosystem loss patterns across the landscape. Social and cultural values have had a great impact on environmental loss and preservation, as community desires affect local policy decisions for development or conservation of key land areas. With sea-level rise and inundation occurring in many coastal communities, another set of difficult decisions will have to be made about residential land retreat or the preservation of iconic coastal habitats, exacerbating already difficult decisions of land use.

Dr Jasmyn Lynch

Assistant Professor

Institute for Applied Ecology

University of Canberra

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Jasmyn has research expertise in conservation and environmental management, including on rare and threatened species; biodiversity patterns and processes; vegetation, climate and geomorphology interactions; wetland assessments; and ecological and threatening process frameworks. Her research experience extends from the genetic scale, through species autecology, regional ecology, and global patterns of diversity, to the application of science to conservation policy and environmental management. She has over 20 years' experience on environmental issues, having worked with state and federal governments, universities and Indigenous representatives on national policy development and implementation; regional conservation programs; and field surveys, research, data compilation, analysis and reporting.

Jasmy'n's experience in a wide range of conservation and environmental management issues, as well as with a diversity of management agencies across Australia, will contribute primarily to the Think Tank question 'How shall we live in our habitat?' Of relevance are her recent work on improving threatened species assessments and management; integrating Indigenous, scientific and palaeoecological environmental knowledge; transdisciplinary research on water governance; the relative efficacy of quarantine versus surveillance to protect our environmental assets; assessing regime shifts in aquatic ecosystems; and addressing the parallel declines of rural communities and natural systems. Of necessity, her research in these areas overlaps, and enables interchange, with research and researchers working in other scientific disciplines as well as researchers of socioeconomic, cultural, governance and policy areas. These issues are fundamental to the sustainable use of our country's resources, and underlie our dependence on them.

Dr Niamh Mangan

ARC Research Fellow

Centre for Innate Immunity and Infectious Diseases

**Monash Institute of Medical Research,
Monash University**

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Niamh's research interests are in the innovation and education sectors, which are crucial for development of a 'smart Australia'. She conducts innovative research, and trains graduate students and highly skilled postdoctoral staff. She has seven years of postdoctoral research experience in Ireland and Australia, has published high-impact papers, and participates in education and training. Through interdisciplinary and transdisciplinary network approaches she aims to address gaps in our knowledge of how the immune system functions in reproduction and protection against sexually transmitted infections (STIs). Niamh has focused her research on diseases of significant health and socioeconomic impact, in Australia and internationally.

Niamh will contribute her professional insight as a postdoctoral research scientist investigating novel (Interferon) treatments of STIs. STIs such as HSV, chlamydia and HIV have devastating socioeconomic implications for our population and represent a major health concern. We still do not fully

understand how changes in population dynamics and the impact of immigration will alter the spectrum of infection and susceptibility to infections and disease. Significantly, Niamh can directly relate her own personal experience as a new resident in Australia after recently emigrating from Ireland. The multicultural demographic of today's Australia has direct impact on all aspects of society from politics to employment, education, health and day-to-day way of life. To understand where we are heading and 'to shape a vision for our future', we must respect our origins and recognise differing cultural identities and values in order to move Australia forward.

Dr Blythe McLennan

**Research Fellow – Emergency Management
School of Mathematical and Geospatial
Services**

RMIT University/Bushfire CRC

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'Shared responsibility' is a much talked about notion in Australian society. Blythe is working on a Bushfire CRC project to examine the idea and practice of sharing responsibility for community safety and disaster resilience. This has opened up larger questions about the appropriate roles of governments and citizens in Australian society. As a human geography, Blythe is interested in understanding and addressing complex landscape-scale sustainability and natural resource management issues. Her PhD examined environmental policy-making and land use management in Costa Rica under globalisation. Blythe is currently a Research Fellow in Emergency Management with the Centre for Risk and Community Safety, RMIT University.

Blythe will be able to contribute to the discussion at this Think Tank on two of the key questions: 'How will we share activities and resources?' and 'How shall we live in our habitat?'. Projected changes in demographics and climate mean that future Australian populations will be exposed to greater risk of natural disasters. This raises questions about: how to build the disaster resilience of future populations, the role of government in supporting community resilience, and people's rights to choose where and how they live? In short, it raises questions about the social contract in Australia. Blythe's research has directly explored this 'problem space'. There is not one simple answer to these questions. Rather, we need



Benjamin Johnston



Rebecca Kippen



Justin Koonin



Caroline Laurence



Simon Laws



Yi Li



Brenda Lin



Jasmyn Lynch



Niamh Mangan



Blythe McLennan



Katrin Meissner



Samantha Meyer



to focus on building relationships that cross traditional boundaries in Australian society. We can then build trust and understanding to support building resilience in a myriad of ways across diverse places and contexts within Australia.

Dr Katrin Meissner

Senior Lecturer

Climate Change Research Centre,
Faculty of Science

University of New South Wales

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Katrin is interested in abrupt climate change events as well as in thresholds and feedbacks in the climate system. She uses Earth system climate models in conjunction with palaeoclimate records to improve our understanding of the basic mechanisms underlying climate variability and climate change, particularly in the context of terrestrial biogeochemical cycles and ocean circulation.

Changes in climate and in climate variability have important effects on human health, safety, food and fresh water supply. Australia has been identified as one of the land masses most vulnerable to future climate change. We will experience important changes in precipitation and droughts, as well as an increased frequency of extreme events. Katrin will therefore be able to contribute to key questions 'How will we share activities and resources?', 'What will we do?' and 'How shall we live in our habitat?'

Dr Samantha Meyer

Level A (Teaching and Research)

Public Health

Flinders University

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Samantha is currently involved in many research areas of public health, specifically:

- trust in public/private health care
- resilience in individuals with Type 2 diabetes
- trust in food
- food regulation
- government responses to food scares
- dengue fever in QLD
- understanding how families integrate fruits and vegetables into their diets;
- social quality
- social theories of trust and risk.

She is currently a CI on 4 research projects, one of which is an Australian Research Council Discovery Grant.

The theme 'population' directly relates to her area of research. She believes that a number of social and structural factors contribute to inequities and inequalities in health within and across populations. These determinants are affected by all policy (housing, welfare, employment etc.). Samantha will contribute to this Think Tank the perspective that health should play a role within and across all national policies and priorities. This entails collaborations across disciplines, so the Think Tank is an ideal way to initiate these conversations and collaborations. The Think Tank will also provide an opportunity for her to understand the role of other disciplines in shaping policy. The future of the Australian population is complex, and her concern is for the health of the population. She can provide, from a health perspective, ideas for multidisciplinary activities and resources for the collective future of Australians.

Dr Firuza Begham Mustafa

Senior Lecturer

Department of Geography

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Firuza's research interest includes agricultural geography, aquaculture ecosystem, foreign workers, indigenous people, public participation in coastal zone management, and ecological diversity in the agriculture landscape. Her research has covered indigenous knowledge in traditional agricultural activities in Malaysia. Her PhD studied aquaculture and environmental management, including impacts on coastal people and the environment.

She will be able to contribute to the discussion and share her experiences of Malaysia's multiracial population in a different socioeconomic and cultural environment from Australia's. As Malaysia is a preferred destination for foreign workers and students, her insights will enrich the discussion and add a new dimension, leading to a better understanding of the issues and challenges in shaping a vision for our future.



Dr Rachel Neale

Senior Research Fellow

Population Health

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Rachel's primary interest is in finding ways to reduce the impact of cancer on our rapidly ageing population. Her research focuses on several components of the cancer control cycle, including prevention, early diagnosis, reducing disparities in care and optimising quality of life after cancer diagnosis. In addition Rachel has a program of vitamin D research and is a member of the Centre for Research Excellence in Sun and Health which aims to find ways to balance the risks and benefits of sun exposure.

A central issue for Australians is managing our health as the age and cultural structure of our population changes. Chronic disease, including cancer, affects individuals, families and communities. Currently one in two of us will be diagnosed with cancer, and for many cancers recent immigrants are at greater risk. Ensuring that the health of all Australians is optimised requires a whole of system approach. We need to ensure equitable educational opportunities and equal access to healthy foods and built environments. Our health system needs to accommodate the needs of people from diverse backgrounds, both those who have been in Australia for many years and those who have arrived more recently. We need to develop innovative approaches to cancer prevention and treatment. As an epidemiologist with an interest in the demographics of population health, she will make a major contribution to discussions about the future issues facing Australians.

Dr Rintis Noviyanti

Senior Scientist, Laboratory Head

Department of Malaria

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As a senior scientist and principal investigator at the Eijkman Institute, Rintis focuses her work on the pathogenesis aspects of malaria, covering host and parasite genetic polymorphisms as well as malaria vaccine development. Her combination of field and laboratory studies has allowed her to obtain findings aimed at reducing clinical malaria symptoms. Her team has obtained various research grants including L'Oréal for Women in

Science, the World Health Organization/Tropical Disease Research, Scientific Programme Indonesia–Netherlands, Endeavour Postdoctoral Scholarships, South East Asia Infectious Disease Clinical Research Network, Asia Pacific Malaria Elimination Network, and Malaria Transmission Consortium funded by the Bill and Melinda Gates Foundation through UNICEF.

Rintis undertook five years of postgraduate study in molecular biology of malaria parasites in the Infection and Immunity Division of the Walter and Eliza Hall Institute of Medical Research for her PhD from the University of Melbourne. In 1997–2000 and 2001–2004, the Eijkman Institute has successfully run an Australia–Indonesia Medical Research Initiative with Australian scientists focusing on malaria research. She will contribute to this year's Think Tank meeting by sharing ideas with Australian scientists on shaping a vision for the nation's future population.

Dr Nathan O'Callaghan

Research Team Leader

Food & Nutritional Sciences

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Nathan's research investigates how we measure and define health, and how food can optimise health in populations and individuals. The shift from health to disease in any individual is characterised by a general reduction in physiological efficiency and function, resulting in homeostatic imbalance. This is a result of non-optimal environments (including nutrient imbalance). Nathan is utilising a comprehensive suite of biomarkers as indicators of actual or possible changes of systemic, organ, tissue, cellular and subcellular structured and functional integrity, in an effort to understand how food and food components can optimise health in populations and individuals.

He uses a systems biology approach (alongside current best-practice clinical diagnostics) in a strategic, targeted way to define and measure health-related biomarkers. One of the main impacts of this research is in defining the way we measure health. A paradigm shift is currently underway in health and medical research; optimising and promoting health is now viewed as valid approach to reducing the growing burden of heart disease, obesity, diabetes, cancers. Nathan's background, experience and understanding of health and medical science, as well as his interest in how new technologies can transform medical and health

science, put him in good stead to contribute this year's discussion. He believes we need to think hard about the way in which we will live, in order to optimise population health with limited resources at hand.

Dr Juliet Pietsch

Senior Lecturer

School of Politics and International Relations

Australian National University

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Juliet's research interests lie in analysing public opinion towards issues of national importance and the politics of immigration. She is a chief investigator for the 2010 Australian Election Study, the Members of Parliament PartiRep survey, the World Values Survey and the ANU Poll. She has a particular research interest in understanding the experiences of migrants while also exploring the politics of immigration in established democracies. She has co-authored two book manuscripts and is currently working on a third book on migration pathways in Australia and Europe.

Juliet has extensive experience working with numerous political science academic surveys, which analyse Australian public opinion on issues of national importance. In particular, she has been tracking Australian attitudes towards immigration and population growth for some time. She will be able to offer political analysis on the complexities of negotiating immigration policy and economic growth when the public overwhelmingly favours a more restrictive policy. She will draw on some interesting comparisons between Australia, Europe and South-East Asia, where the politics of immigration pose a significant policy challenge for centre left governments.

Dr Matthew Rofe

Senior Lecturer

Discipline of Urban and Regional Planning,

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The central theme of Matthew's research involves unravelling the complexity of human landscapes. He is interested in the contested nature of place and the challenges this presents for governments in seeking to manage urban and rural landscapes in an increasingly heterogeneous Australia. He is trained as an urban geographer, and his research is multidisciplinary. Matthew has an internationally respected profile in the fields of urban and regional

regeneration, city marketing and governance. He is researching globalisation and its influence on planning policies, drawing on Australian-based case studies of urban revitalisation projects and the rise of the creativity city ethos.

Matthew has a high level of expertise in urban and regional planning. He has published in refereed journals of international standing and is widely cited. He has close ties with the planning profession and is a member of the Planning Institute of Australia. He has undertaken planning consultancies for clients including the Heart Foundation of Australia and the City of Adelaide, giving him a robust knowledge of planning policies and processes and has demonstrated his ability to foster a productive research/policy interface.

Dr Udoy Saikia

Senior Lecturer

School of the Environment

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Udoy's research focuses on population and sustainable development issues in Australia and the Asia-Pacific region. His research in Timor-Leste offers an insight into the future of Timor-Leste's demography and provides a sectoral analysis highlighting the implications of the future demography in the nation-building process by estimating various parameters for education, economy, health and agriculture. His collaborative research with the UN Development Program resulted in the *Human development report for the autonomous region of Bougainville, PNG*. A notable innovation of his for this report was the measurement of economic wellbeing by constructing an index of food security. He has successfully coordinated two international conferences on development and security in the Asia-Pacific region.

With his extensive experience in population and sustainable development issues in Australia, Asia and the Pacific countries, he will be able to put Australia's demographic future possibilities into a global context, particularly in relation to the current and future demographic dynamics of our neighbouring countries. This is extremely important, given the effects of climate change and its consequences — environmental refugees, for example. The high rate of population growth in some countries, coupled with political and environmental problems, can create migration issues for Australia. For example, Timor-Leste's

population is predicted to double in next 15 years due to high population growth. As an individual researcher and Vice President of the Australian Population Association, Udoj has been active in contributing to debate and discussion about Australia's current and future population (e.g. *Science behind the headlines: beyond seven billion* organised by Royal Australian Society).

Dr Anastasia Sartbayeva

Research Officer

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Ana's research interests are in the area of social policy, in particular the effect of aspirations and non-cognitive skills on choices young people make regarding employment, education and broader social engagement. More recently she has researched the impact of family relocation on married women's employment and earnings, and has analysed a cohort of Indigenous children, looking at how they were growing up and how family and community were linked with their development.

Working at the Department of Families, Housing, Community Services and Indigenous Affairs, Ana is familiar with current and emerging social policy issues and the impact these have on disadvantaged population groups. She has worked closely with major Australian longitudinal surveys, such as Household, Income and Labour Dynamics in Australia and the Longitudinal Study of Indigenous Children. These investigate economic and social phenomena in Australian society and allow her to study the underlying causes of choices made by individuals and the society as a whole. Ana will be able to contribute to the Think Tank in the area of resources and activities sharing (particularly as this topic relates to families and issues of equity) and in the area of employment, education and leisure choices.

Dr Jonathan Sobels

Adjunct Academic

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Jonathan led a multidisciplinary team through the offices of the National Institute of Labour Studies investigating the long term (to 2050) implications of net overseas migration levels on Australia's physical natural and built environments, a study

commissioned by the Department of Immigration and Citizenship. The study was transdisciplinary in its application of scale — CSIRO modelling of stocks and flows of 'stuff' at the national (macro) scale, exploration of concentrations of migrant populations in Western Sydney, Melbourne and Perth at the regional (meso) scale, and essays on the social costs of carbon, e.g. ownership of a car or congestion effects at the livelihood (micro) scale. The consumption patterns of migrants approximated existing Australian patterns, so the study is, therefore, a study of the effects of population growth on the physical natural and built environments of specific regions of Australia. Jonathan's contribution will be to bring the results of this study to the attention of a broader audience.

He will discuss scale as an emergent property of asking What? Where? — leading to theoretical considerations of how best to conduct studies in such complex uncertain arenas, yet which are vital for immanent government and private sector planning. He will report on the way in which the three scalar levels of information were triangulated to support certain conclusions and postulates on cause-effect relationships. Among the themes he will bring to the discussions is the impact of population growth on land use and food supply, water quantity and quality, biodiversity, waste management, greenhouse gas and other airborne pollutants, traffic congestion and infrastructure and energy supply. He will also talk about the broader vulnerabilities that result from known limitations in supply of oil in the near future, the implications of climate change on supply of water, the implications of rebound from increased efficiency in the use of resources, increasing scarcity of Nitrogen based fertilisers for food security, the increased area and resources needed for new suburbs, and scenarios of changing demographics and employment patterns.

Dr Christine Steinmetz

Lecturer; Director of Postgraduate

Research Students

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Christine's scholarly interests include the social construction of place on university campuses and student experience (undergraduate and postgraduate). These areas were the crux of her thesis 'Universities as place: an intergenerational perspective on the experience of Australian university students' and continue to be integral to



Firuza Begham Mustafa



Rachel Neale



Rintis Noviyanti



Nathan O'Callaghan



Juliet Pietsch



Matthew Rofe



Udoy Saikia



Anastasia Sartbayeva



Jonathan Sobels



Christine Steinmetz



Akshat Tanksale



Wai-Hong Tham



her teaching and research. Christine has been researching contentious land uses in the urban environment, particularly the adult entertainment and sex industries in Australia. The research focuses on planning and regulation around these contentious land uses, progressive and best models ‘in practice’ from a global perspective, and the significant contribution of the sex economy to a night time economy within the urban landscape.

Christine’s contribution to the Think Tank will mainly come from her knowledge and expertise of the higher education system in Australia. She will be able to comment extensively on motivations and expectations of higher education institutions from the perspective of international students and domestic students. Twenty per cent of Australia’s university student population is international students. Many of these students aspire to ‘stay on’ and become residents — it is evident that university education is often seen as another way of becoming a resident. Understanding these dynamics is critical if Australia is going to think strategically about how to increase international student intake and make visas and permanent residency more accessible. Additionally, as Christina’s research is contextualised in built environment studies, the impact of surrounding urban environments is significant to student populations and their accessibility to resources.

Dr Akshat Tanksale

Lecturer

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In Akshat’s interdisciplinary research he develops novel catalysts based on nanomaterials, and applies them in the chemical conversion of biomass into renewable liquid fuels, green chemicals and hydrogen. Akshat has worked on the photocatalytic conversion of water into hydrogen, and hydrogen storage onto magnesium hydride nanoparticles. He completed his PhD at the University of Queensland and is a Lecturer in Chemical Engineering at Monash University. He worked as a visiting scientist at the University of Wisconsin-Madison in 2007 and the National Chemical Laboratory in Pune, India, in 2010. In Pune he was the recipient of an ATSE award for Australia-India Science and Technology Research.

This year’s Think Tank topic is relevant to Akshat’s area of research which is looking at sustainable growth in terms of energy demands required by

a growing Australian population. To maintain our high standards of living, Australia needs to develop alternative sources of transport fuels. One of Australia’s advantages is its abundant resource of biomass, but the challenges are that we do not currently have ways to harness this resource in an efficient and sustainable manner for making transport fuels. At the Think Tank, Akshat will contribute his knowledge on the sustainable conversion of Australian biomass grown on marginal land. There is a need for government, private enterprise and academic partnership to develop technological pathways to make Australia self-reliant and meet our future energy demands.

Dr Wai-Hong Tham

Postdoctoral researcher

Infection and Immunity

Walter and Eliza Hall Institute of Medical Research

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Malaria is one of the most widespread parasitic diseases, with more than 40 per cent of Earth’s population at risk of contracting this devastating disease. Wai-Hong’s postdoctoral research focuses on how the malaria parasite *Plasmodium falciparum* enters red blood cells, a process critical for parasite survival. For entry, parasite proteins must recognise their cognate red blood cell receptors that then initiate a cascade of signalling events required for successful invasion. Understanding the molecular mechanisms of parasite invasion is paramount in developing rational designs for a malaria vaccine to alleviate the 300 million infections a year caused by *P. falciparum*.

Her contribution to the Think Tank will be as a malariologist and as a recent migrant to Australia. As a scientist working in malaria, she has a keen interest on how disease affects socioeconomic outcomes and migration patterns. She has lived for significant amounts of time in three countries. As a Malaysian citizen of Chinese descent, she lived in Malaysia for 17 years and finished high school there. She did her undergraduate and graduate degrees in molecular biology at University of California at Berkeley and Princeton University, respectively. In 2003, she migrated to Australia and lives here with her husband and two young children. She is a full-time working mother at the Walter and Eliza Hall Institute. From these travels, Wai-Hong has first-hand experience of negotiating and trying to understand disparate national and cultural values.

Dr Anne Thomas

Lecturer and ARC Postdoctoral
Research Fellow

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Anne works in an area of pure mathematics called geometric group theory. A group is an abstract algebraic structure which can be seen as collection of symmetries of some object, and geometric group theory uses the tools and intuition of geometry to understand groups. As with all pure mathematics, Anne's work is not motivated by applications to the 'real world', but instead by internal considerations such as generality, applications and connections within mathematics and intellectual beauty. Anne's PhD was obtained from the University of Chicago in 2007, and she has since had research or research and teaching positions at the Mathematical Sciences Research Institute in Berkeley, Cornell University and the University of Oxford, before returning to Australia to take up a lectureship at the University of Sydney in 2010. She also holds an Australian Postdoctoral Fellowship.

Mathematics is the foundation of science and technology, yet Australia faces serious shortages of qualified graduates in mathematical disciplines. The problems start early in the pipeline, with many school teachers underprepared in mathematics, and the number of school students taking advanced mathematics in decline. This affects all sciences and indeed the wider economy. Anne expects her main contribution to this year's Think Tank to be highlighting this key role of mathematics. She plans to draw on her experiences in the US and UK, where she has witnessed various strategies to address similar problems.

Dr Natalie Thorne

Senior Research Scientist

Statistical Genetics Group, Bioinformatics
Division, Department of Medical Biology

Walter and Eliza Hall Institute of Medical
Research and University of Melbourne

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Natalie is a statistical expert in the design and analysis of genomic studies such as:

- how genes vary in disease (e.g. expression profiling to find new subtypes of breast cancer)

- identifying disease-causing mutations from genome sequencing of individuals within families (e.g. DNA profiling)
- the effect of DNA rearrangements, modifications (e.g. epigenetics, environmental interactions)
- the role of junk DNA.

Her research requires a high level understanding of the complex technical and biological biases arising in genomic data which is a challenging multidisciplinary hallmark of experimental genomic endeavours.

Natalie will be able to contribute to discussions on life in the post-genome era. Some aspects of life that may be significantly affected are personalised or cyber-medicine and how this affects health care; how genetic knowledge may affect our racial and cultural identities; gene doping and the perception of elite sport; and the use of genetic technologies in food production. Issues to do with privacy, discrimination, ownership, innovation, communication, information storage, insurance, family planning choices, and education are also important. In grappling with these issues one must be able to understand 'likelihood, risk and probability' within the confines of genetic biology — all domains within Natalie's expertise. Natalie is a mother of three preschool age children, lives in a rural farming zone with interests in self-sufficiency, grew up on a large farm and worked for five years at the University of Cambridge, UK, on genomic profiling in cancer research.

Dr Stuart Turville

Research Fellow

Immunovirology and Pathogenesis Program

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Stuart's research interest and experience are on the transmission of infectious diseases, specifically HIV. His experience is based on basic and translational medical research that aims to determine how HIV spreads in our bodies and how best to prevent the initial stages of transmission, respectively. Stuart's experience in HIV prevention studies was in the use of biomedical prevention, with development of topical gels to prevent transmission during sex. In addition, his team is now investigating the basic mechanisms of how circumcision reduces HIV transmission rates in men.



Anne Thomas



Natalie Thorne



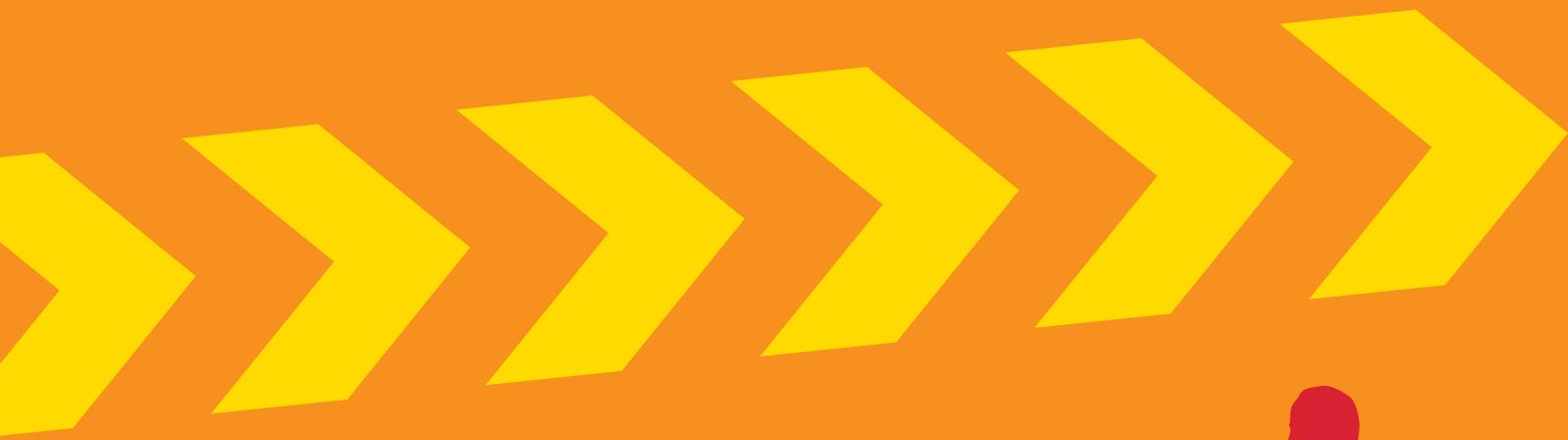
Stuart Turville



Stephen Wan



Conan Wang



The spread of infectious diseases can have profound impacts on human populations. Since recently permanent visa applicants are required to undergo HIV testing. While a HIV-positive result does not exclude applicants for permanent visas, it classifies the applicant as someone having a pre-existing medical condition. This may badly weigh their overall application. Given that HIV prevalence in Australia is low (0.1%), maintenance of this level of infection may influence immigration policy and have the potential to influence future populations in Australia. Whilst this addresses the impact that one infectious disease has on the future of immigration, we must also consider the impact on specific populations. For instance, whilst the HIV prevalence in Australia's Indigenous population has remained similar to the non-Indigenous level, the conditions for a substantial epidemic in our Indigenous population are still there. Thus any worsening of the epidemic will have a significant long-term impact on our Indigenous population.

Dr Stephen Wan

Research Scientist

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Stephen's research on social media analysis examines the relationships among different online public discussions, for example from news articles to Twitter and forums. Examining online language reveals similarities and differences in the issues affecting different communities. Stephen's research expertise in computational linguistics — computer modelling informed by linguistic theory — is well suited to social media analysis for two reasons. Firstly, computer automation is the only feasible way of tackling the information overload problems associated with the sheer volume of data. Secondly, incorporating empirical computational models of language and meaning facilitates analyses to help search, browse and understand the data.

Stephen's vision for participation focuses on how we, as researchers, can learn from social media content about the key issues that define, constrain and enrich our existence, to help answer questions around who we are, who we could be, what we could do and how we might live. His expertise in automated social media analysis can contribute to new methods for discovering and analysing these key issues. Arguably one of Australia's most important assets is its culturally and linguistically diverse population. The wealth of our contributing

backgrounds provides not only different foods, music, and cultural activities, but also richness in how we relate to one another and interact with the environment. These varying perspectives on life are reflected in the social media content we generate, making online text an indispensable data source for helping define policy positions for Australia that support a sustainable future and celebrate our multicultural heritage.

Dr Conan Wang

Senior Research Fellow

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Conan's research is focused on the development of drugs to treat neurological disorders. He is particularly interested in the discovery of peptide-based drugs to treat Alzheimer's disease. He has held research positions in various institutions in Australia and Asia including CSIRO, the University of NSW, University of Queensland and Hong Kong University of Science and Technology and in collaboration with multinational companies (e.g. Pfizer). Conan is highly enthusiastic about contributing to the development of Australian policy, particularly to policy relating to the biomedical and pharmaceutical sectors and Australia's strategic position in the Asia-Pacific region.

Conan is eager to contribute to discussions not only on how Australia's population will shape science but also on how science will shape the future population. There are many questions that he is keen to raise and address. How will the changing population affect Australia's research goals — for example, will an ageing population demand a greater focus on specific diseases? Is there the necessary research infrastructure and funding to sustain future scientists? How will we manage the changing skill distribution to maintain Australia's position as a leader in science innovation? Will the changing population present opportunities for Australia to foster strategic relationships with neighbouring countries to enhance Australia's research strengths? Conan believes that these questions should be addressed when developing policies because science research will contribute to the well-being of all Australians. His experience in different research settings will allow him to contribute to these discussions.



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SOCIETY

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