The Royal Society of NSW and Learned Academies Forum

Power & Peril
of the digital age

Australian
Academy *of* Health and
Medical Sciences

▲▲▐▐ Australian
Academy of the
Humanities

Australian
Academy of
Science

ACADEMY OF
THE SOCIAL SCIENCES
IN AUSTRALIA

ATSE   Australian Academy of
Technology & Engineering

NSW
GOVERNMENT

(•))) NSSN
NSW Smart Sensing Network

The Royal Society of NSW acknowledges
the generous support of Her Excellency
the Honourable Margaret Beazley AC QC,
Governor of New South Wales, the Office of
the NSW Chief Scientist and Engineer, and
the NSW Smart Sensing Network
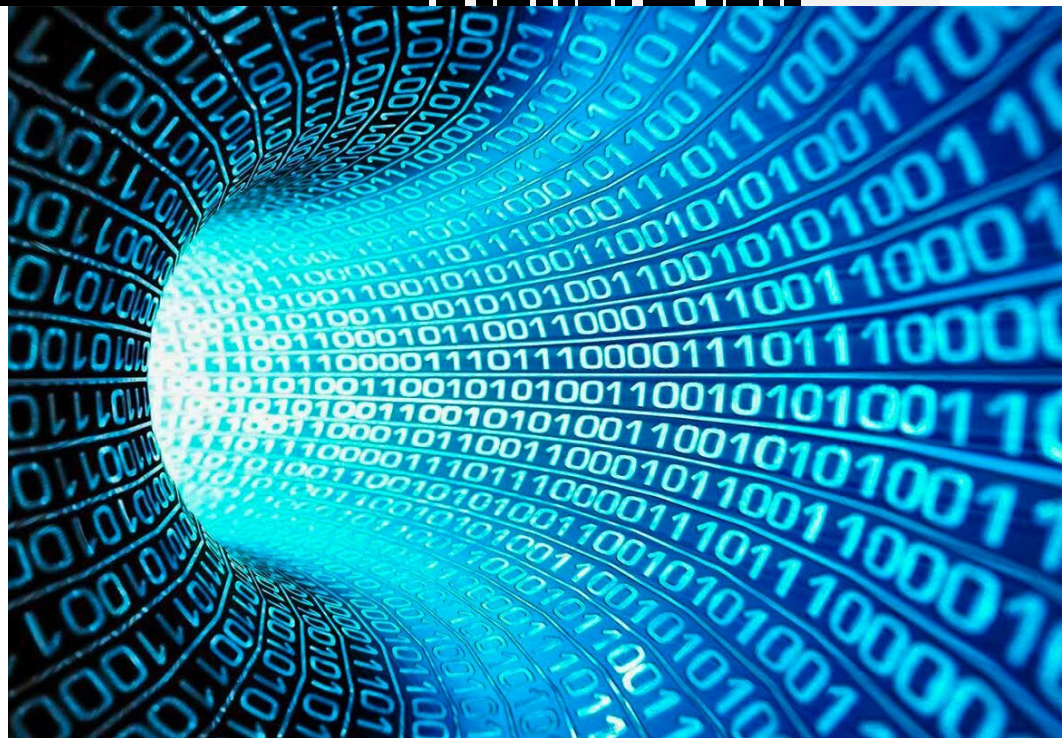
Virtual
Conference

4 + 5 November 2021
9.00am-12.30pm

A child is born 04.11.21

That child enters a complex digital world that brings both power and peril.

Join us as we explore how technology, health, security and industry in a digital age will impact our child's journey as he/she approaches 2030, 2050 and beyond.

Power & Peril
of the digital age

Virtual Conference

Free of charge

4 + 5 November 2021
9.00am-12.30pm

We are at a moment in time when we must acknowledge and address the inexorably rising tide of data use and digital services. History will categorise the early decades of the 21st Century as the digital age, the age of prodigious development and use of digital technologies that enable us to transfer and access information easily and swiftly.

So much so that digital interaction is a defining characteristic of modern human life. Societies, economies, and political processes are infused and connected by the ubiquitous use of smart machines and software that process and communicate information to us in ways that would have been unimaginable just a few years ago. The pace of digitalisation was already fast by the end of 2019 before the COVID-19 emerged.

The pandemic broke through cultural barriers and enabled implementation of digital strategies in matter of days or weeks rather than years. Digital technologies and supercomputer simulation are central to dealing with the pandemic itself as well as being the primary driver of productivity in almost every other aspect of society.

Companies, governments and organisations across the world are increasingly taking advantage of the benefits associated with data analytics and simulation, artificial intelligence, and the Internet of Things to solve problems never solved before, to undertake projects in five days that would have taken five years.
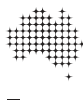
Problems such as those embodied in the United Nations General Assembly's Sustainable Development Goals and their achievement by 2030. Tangible benefits include greater social connectivity, learning opportunities, information access and usage, versatile working and transport, greater access to entertainment, and new forms of banking and finance.

Unlocking the power of the digital age also brings peril associated with concerns about data security, state based and transnational crime and terrorism, complexity, privacy, social disconnection, media manipulation, distortion of the truth, communities left behind, national defence and market vulnerabilities, and outstripping rule making and regulatory structures.

This year, the Royal Society of NSW in partnership with Australia's Learned Academies — Health and Medicine, Humanities, Science, Social Sciences, and Technology and Engineering — has chosen Power and Peril of the Digital Age as the theme for our annual Forum. Our goal is to have a grown-up conversation about digitalisation and the use of data. It will be framed around the future life of a child born on the day of the Forum, 04 November 2021. This child will be born into a world of increasingly complex digital systems that hold great value and vulnerability.

Starting with a technological framing, the Forum will explore several major aspects which will impact the journey of that child as we approach 2030 and beyond. We will explore aspects of technology, health, defence and security in a digital age, and the changing nature of industry as the world and society evolves.

Finally, our annual Forum will be a call to arms for the host Societies to focus on challenges identified during the two days that must be addressed for Australia to remain a prosperous, successful, and safe democracy in the digital world.

Thursday
4 November 2021
9.00am-12.30pm

	TIME	SUBJECT	SPEAKERS
DAY 1	09:00 – 09:20	**Welcome and Acknowledgment of Country**	**Susan Pond AM FRSN FTSE FAHMS** President, Royal Society of NSW
		Official Opening	**Her Excellency the Honourable Margaret Beazley AC QC** Governor of New South Wales
		Introduction to the Moderator and Rapporteur	**Susan Pond AM FRSN FTSE FAHMS** President, Royal Society of NSW
		Moderator and Rapporteur	**Ian Oppermann FRSN FTSE** Chief Data Scientist, NSW Government; Industry Professor, University of Technology Sydney
1.1	09:20 - 10:00	**Science and Technology Underpinning the Digital Age: Past, Present and Future**	**Cathy Foley AO PSM FRSN FAA FTSE** Australia's Chief Scientist **Hugh Durrant-Whyte FRS FREng FAA** NSW Chief Scientist & Engineer
1.2	10.00-10.30	**Digital Lifetime of a Child Born Today**	**Frances Foster Thorpe** Executive Director — Shaping Futures, NSW Department of Premier and Cabinet **Sue Bennett** Professor, Deputy Director and Connected Child Co-Leader, ARC Centre of Excellence for the Digital Child, University of Wollongong
—	10:30 - 10:40	MORNING TEA ~ 10 minutes	
1.3	10:40 - 11:10	**Avoiding a Digital Dark Age**	**Shawn Ross** Director, Digitally-Enabled Research, Office of the Deputy Vice-Chancellor; Professor of History and Archaeology, Macquarie University **Theresa Anderson** Social Informaticist, Connecting Stones Consulting; Research Fellow, School of Information Sciences, University of Illinois at Urbana-Champaign
1.4	11.10-11.40	**Health of our Digital Child**	**Zoran Bolevich** Chief Executive, eHealth NSW and Chief Information Officer, NSW Health, NSW Government **Louisa Jorm FAHMS** Professor, Faculty of Medicine and Foundation Director, Centre for Big Data Research in Health, UNSW Sydney
1.5	11:40 - 12:20	**Safety and Security of our Digital Child**	**Dale Lambert PSM** Chief of Cyber and Electronic Warfare Division, Defence Science and Technology Group, Australian Department of Defence **Rory Medcalf** Professor and Head, National Security College, Crawford School of Public Policy, Australian National University
1.6	12:20-12:30	**Set-up for Day 2 including Challenges**	**Ian Oppermann FRSN FTSE** Chief Data Scientist, NSW Government; Industry Professor, University of Technology Sydney

+ + + Conference continues tomorrow 9.00am-12.30pm

Friday
5 November 2021
9.00am-12.30pm

	TIME	SUBJECT	SPEAKERS
DAY 2	09:00 – 09:20	**Welcome and Acknowledgment of Country**	**Susan Pond AM FRSN FTSE FAHMS** President, Royal Society of NSW
		Recap of Day 1	**Moderator and Rapporteur — Ian Oppermann FRSN FTSE** Chief Data Scientist, NSW Government; Industry Professor, University of Technology Sydney
2.1	09:20 - 10:20	**The Light and Shade of Technology on our Digital Child**	**Edward Santow** Industry Professor — Responsible Technology, University of Technology Sydney (UTS); (Immediate Past) Australian Human Rights Commissioner **The Honourable Verity Firth** Executive Director, Centre for Social Justice and Inclusion, University of Technology Sydney **Marc Fennell** Journalist, Interviewer and Maker of Things **Aengus Tran** Founder and Chief Executive Officer, Harrison.ai
—	10:20 - 10:30	MORNING TEA ~ 10 minutes	
2.2	10.30 - 10.40	**Address by NSW Government Minister**	**The Honourable Victor Dominello MP** Minister for Digital and Minister for Customer Service; Member for Ryde
2.3	10:40 - 11:30	**Securing the Future of our Digital Child**	**Robert Hillard** Managing Partner, Deloitte Consulting Asia Pacific **Angie Abdilla** Founder and Chief Executive Officer, Old Ways, New Australia; Professor of Practice, Faculty of Art, Architecture and Design, UNSW Sydney **Toby Walsh FAA** Laureate Fellow and Scientia Professor of Artificial Intelligence, UNSW Sydney **David Pryor** Senior Team Leader, Energy Security Safeguard, Department of Planning, Industry and Environment, NSW Government
2.4	11.30-12.10	**Future Australia — the Role of Learned Academies**	**Tony Cunningham AO FAHMS** Australian Academy of Health and Medical Sciences **Richard Waterhouse FRSN FAHA FASSA** Australian Academy of the Humanities **Toby Walsh FAA** Australian Academy of Sciences **Deborah Lupton FASSA** Academy of Social Sciences in Australia **Annabelle Duncan PSM FRSN FTSE** Australian Academy of Technology and Engineering
2.5	12.10 - 12:30	**Wrap-up and Close**	**Moderator and Rapporteur — Ian Oppermann FRSN FTSE** Chief Data Scientist, NSW Government; Industry Professor, University of Technology Sydney

Speakers
Thursday 4 November — 9.00am-12.30pm

OPENING SESSION
Welcome and Acknowledgement of Country

Dr Susan Pond
AM FRSN FTSE FAHMS
President, Royal Society of New South Wales

Dr Susan Pond, President of the Royal Society of New South Wales, is a distinguished physician, academic and company director with deep expertise in biotechnology. She is particularly interested in creating impact by combining disciplines and working at the intersections between them. Susan is Chair of the New South Wales Smart Sensing Network, Non-Executive Director on several listed and unlisted companies, and Governor in Council of the Queensland University of Technology. Most recently, Susan was Director of Sydney Nano, a multidisciplinary initiative at The University of Sydney. She is an Adjunct Professor in the Faculty of Engineering at The University of Sydney.

OFFICIAL OPENING

Her Excellency the Honourable Margaret Beazley AC QC
Governor of New South Wales

Her Excellency the Honourable Margaret Beazley AC QC is the 39th Governor of New South Wales, commencing her five-year tenure on 2 May 2019. Prior to her appointment as Governor, Her Excellency enjoyed a long and distinguished law career spanning 43 years, during which time she served as a role model for women in law at both the State and National level. Appointed Queen's Counsel in 1989, in 1993 she was made a judge of the Federal Court of Australia, the first woman to sit exclusively in that Court. In 1996, she achieved the distinction of being the first woman appointed to the New South Wales Court of Appeal and, subsequently, the first woman to be appointed as its President. She was made a Companion of the Order of Australia in the Australia Day Honours List on 26 January 2020 for "eminent service to the people of New South Wales, particularly through leadership roles in the judiciary, and as a mentor of young women lawyers".

MODERATOR AND RAPPORTEUR

Professor Ian Oppermann
FRSN FTSE
Chief Data Scientist, NSW Government; Industry Professor, University of Technology Sydney

Dr. Ian Oppermann is the NSW Government's Chief Data Scientist working within the Department of Customer Service. He is also an Industry Professor at the University of Technology Sydney (UTS). From 2015 to 2019, Ian was also the CEO of the NSW Data Analytics Centre (DAC). Ian is considered a thought leader in the Digital Economy and is a regular speaker on "Big Data", broadband enabled services and the impact of technology on society. Ian has an MBA from the University of London and a Doctor of Philosophy in Mobile Telecommunications from University of Sydney. Ian is a Fellow of the Institute of Engineers Australia, a Fellow of the IEEE, a Fellow of the Australian Academy of Technological Sciences and Engineering, a Fellow and President of the Australian Computer Society, a Fellow of the Royal Society of NSW, and a graduate member of the Australian Institute of Company Directors.

SESSION 1.1
Science & Technology Underpinning the Digital Age: Past, Present & Future

Cathy Foley
AO PSM FRSN FAA FTSE
Australia's Chief Scientist

Dr Cathy Foley AO PSM commenced as Australia's ninth Chief Scientist in January 2021 after an extensive career at Australia's national science agency, the CSIRO. Dr Foley is an internationally recognised physicist with major research achievements in superconductors and sensors which lead to the development of the LANDTEM™ sensor system to locate valuable deposits of minerals deep underground, resulting in discoveries and delineation of minerals worth more than $6 billion. Dr Foley's scientific excellence and influential leadership have been recognised with numerous awards and fellowships, including election to the Australian Academy of Science in 2020, along with an Order of Australia for service to research science and

to the advancement of women in physics. She is also a Fellow of Australian Academy of Technological Science and Engineering (2008), a Fellow of the Royal Society of NSW and an honorary Fellow of Australian Institute of Physics (2019). Dr Foley is an inspiration to women in STEM across the globe and is committed to tackling gender equality and diversity in the science sector to embrace the full human potential of all.

Abstract: It is hard to believe that the first iPhone was released in the USA on 29 June 2007. When I did computer studies as an undergraduate, I used punch cards to input my program and data. That was in 1976. So in less than 50 years, we have progressed from PDP11s to digital technologies being a critical and consuming part of our human and societal existence. Who remembers phone numbers? How many computers are embedded in the different things used every day? Imagine having to use photographic film with chemical processing to capture images? So fast forward another 40-50 years. Will Hal be taking over our lives? Will quantum technologies be providing unbreakable cyber security or the ability to undertake computing currently not possible even with supercomputers? Will it deliver a utopian future with lots of high-skilled jobs and new industries providing an equitable society that is prosperous with wellbeing for all? I will respond to these questions while also considering the importance of good statistics, social license and art and design as part of the mix.

Hugh Durrant-Whyte
FRS FREng FAA
NSW Chief Scientist and Engineer

Hugh Durrant-Whyte is NSW Chief Scientist and Engineer and Commissioner for Natural Resources. From 2017-18 he was Chief Scientific Advisor to the UK Ministry of Defence, from 2010-2014, he was CEO of National ICT Australia (NICTA), and from 1995-2010 Director of the ARC Centre of Excellence for Autonomous Systems, an ARC Federation Fellow, and the founding Director of the Australian Centre for Field Robotics (ACFR) at the University of Sydney. Hugh is a leading authority on robotics, autonomous systems and machine learning. Hugh is an honorary Fellow of Engineers Australia (HonFIEAust), a Fellow of the IEEE (FIEEE), of the Australian Academy of Science (FAA), of

the Royal Academy of Engineering (FREng), and of the Royal Society of London (FRS).

Abstract: Can Artificial Intelligence (AI) Make the World a Better Place? Artificial Intelligence (AI) and Machine Learning (ML) provide the means to change the world through the effective use of data to build models, make predictions and take decisions. Most impactful will be the use of AI and ML to supercharge discovery in science and medicine – creating new insights, new understandings and new products from materials to medicines. AI and ML will additionally enable us to build new engineered systems with unprecedented precision and control with more efficient, increasingly integrated and more sustainable outcomes. Data-centric science and data-centric engineering will make the world a better place for all.

SESSION 1.2
Digital Lifetime of a Child Born Today

Frances Foster-Thorpe
Executive Director – Shaping Futures, NSW Department of Premier & Cabinet

Frances leads a foresight function based in the NSW Department of Premier and Cabinet called Shaping Futures. This function aims to support NSW agencies by giving them access to robust trends analysis, scenario development and other foresight capabilities, as well as to deliver strategic projects. For 2020-21, Shaping Futures hosts a national project team that supports all nine governments in Australia to share and use data to improve services and outcomes for people with a disability, the National Disability Data Asset. Frances' academic and professional focus has been on how to drive strategic reforms within federal structures. She has worked on the NDIS, Gonski education funding reforms, national data reforms and the Murray Darling Basin Plan for the Commonwealth and NSW governments. She has a doctorate from Oxford University focused on how national policy reforms are influenced by Australia's public accountability processes.

Abstract: Governments are keen to ensure that a child born today has better outcomes across their life because decisions that influence the supports they can access and outcomes they aspire to are more data-informed. These could be government decisions about services generally, decisions by teachers or nurses about what supports to discuss with the child's parents when it becomes clear they have a specific need– and later with the child themselves. Beyond better supports, more accessible data and a digital life could change how the child learns, connects to others, makes their own decisions about the paths in life they choose to pursue and become a citizen with a voice on issues they care about. Australia is behind most comparable countries in the maturity of the data systems used to support decisions, and digital resources available to governments and communities, because of the way that health and human services are split across multiple levels of government. There is significant work underway to remedy this, which includes considering the institutions that need to be in place to ensure the ethical use of data and the involvement of communities in decisions about how data is used. This raises interesting questions about how children and young people could become involved in these decisions.

Sue Bennett
Professor and Deputy Director and Connected Child Co-Leader, ARC Centre of Excellence for the Digital Child, University of Wollongong

Professor Sue Bennett is an internationally recognised expert in the field of technology in education and society. Her research explores how individuals experience digital technologies across their lives from the early years through to adulthood. She draws on psychological and sociological theory, and quantitative and qualitative methodologies to develop a more holistic understanding of how we live and learn with technology, with the aim of advancing research, practice and policy. Sue has extensive governance experience, and a strong track record in research capacity building and successful industry and community partnerships. She is currently Executive Dean of the Faculty of the Arts, Social Sciences and Humanities at the University of Wollongong, co-editor of the journal Computers & Education, and the Deputy Director of the ARC Centre of Excellence for The Digital Child.

Abstract: A child born today is growing up in a world transformed by our digital cultures. Data about children is collected, stored and analysed from even before they are born. And data from across the everyday life experiences of children has the potential to shape their development in new ways with ongoing consequences – both positively and negatively. Children are a particularly vulnerable group in society, with their own rights to freedoms and protections. 'Big data' is increasingly used to monitor individual and collective behaviours, inform decision-making by and about individuals and groups, and influence behaviour and effect change. This 'datafication' is entering all facets of daily life and shaping outcomes for all citizens. The pervasive nature of digital technologies means that the consequences of datafication will occur in ways not immediately apparent, particularly for those who actively avoid them or those who actively avoid them. As a society we face practical questions about how the uses and consequences of datafication for children and their families can be made apparent, how privacy can be preserved, how
rights and freedoms are protected from data profiling, how harms can be avoided and how benefits can be maximised.

SESSION 1.3
Avoiding a Digital Dark Age

Shawn Ross
Director, Digitally Enabled Research, Office of the Deputy Vice-Chancellor; Professor of History and Archaeology, Macquarie University

Shawn A Ross, FSA (Ph.D. University of Washington, 2001) is a Professor of History and Archaeology and the Director of Digitally Enabled Research at Macquarie University. Prof Ross' research interests include digital archaeology, the history and archaeology of pre-Classical Greece, oral tradition as history (especially Homer and Hesiod), the archaeology of the Balkans (especially Thrace), Greece in its wider Mediterranean and Balkan context, and the application of information technology to research. Since 2009, the focus of Prof Ross's work has been fundamental archaeological research in central and southeast Bulgaria, where he supervises the Tundzha Regional Archaeology Project, a large-scale archaeological survey and palaeoenvironmental study. This project culminated in an edited volume published by Oxbow Books in 2018 (The Tundzha Regional Archaeological Project: Surface Survey, Palaeoecology, and Associated Studies in Central and Southeast Bulgaria, 2009-2015). Since 2012 Prof Ross has also directed the Field Acquired Information Management Systems (FAIMS) project developing data capture and management systems for field research. Previously, Prof Ross worked at the University of New South Wales (Sydney, Australia), the American University in Bulgaria (Blagoevgrad), and William Paterson University (Wayne, New Jersey).

Abstract: Lessons from the past for a digital future. A child born today will live in a world shaped by new communication and information technologies, some of which we cannot foresee. Such change is not new. The transitions from orality to literacy, from scroll to codex, manuscript to print, print to mass media to internet to social media, all posed real challenges and fostered anxieties. On the cusp of literacy, Plato's Athens adopted but distrusted the written word. They worried about sophists and rhetoricians separating persuasion from truth — 'fake news' has a long history. Athens' response fostered sophisticated approaches to discovering truth, but also kindled a moral panic that included the execution of Socrates. Or consider the development of the city some 6,000 years ago. Cities accelerated the transfer of information by bringing people into unprecedented physical proximity, but at the cost of epidemic disease. Eventually, people learned to thrive in this environment, but it

took millennia. Virtual interaction likewise incubates social contagions, to which we have not yet adapted. This talk will explore what we can learn from past encounters with novel interconnectivity and changing technologies of communication, and how that reflection might help prepare a child born today for an ever more digitised and interconnected world.

Theresa Anderson
Social Informaticist, Connecting Stones Consulting; Research Fellow, School of Information Sciences, University of Illinois at Urbana-Champaign

Theresa Anderson uses creative, compassionate and contemplative practices to help communities build better digital and data futures. For more than 20 years, her award-winning work as an educator and researcher has engaged with the ever-evolving relationship between people and emerging technologies when working with data and making decisions. A social informaticist with a PhD in Information Science, she served as inaugural Director and Associate Professor of the Master of Data Science & Innovation program at UTS from 2014-2018, leading development of a uniquely transdisciplinary and human-centred curriculum. Currently Theresa contributes to government, industry and NGO efforts advancing socially-just data policies, building processes for gaining and maintaining a community's trust in data/ AI use. She is Vice Chair of the Australian Computer Society (ACS) NSW Branch Executive Committee and sits on NSW Government's inaugural Artificial Intelligence Advisory Committee. Theresa also contributes to international initiatives related to data use, including contributing to an international standard. She sits on the Resilient and Healthy Cities Working Group for the International Science Council's Committee on Data (CODATA) and is a Research Fellow for the University of Illinois Information School. Prior to her academic career, Theresa worked as a political research analyst in research centres and think tanks and served as a diplomat.

Abstract: Imagining data and digital futures by reflecting on sociotechnical past. The child born today is born into a world increasingly datafied and digitalised. To try to imagine and embrace both the potential promises and possible perils facing this child in her future, it can be helpful to look into our sociotechnical past. Our fear and fascination with technology is as old as our history. It is also worth remembering that every technology present in our lives today was at some point new and emerging. What can stories about this experience of technologies past reveal about possible future entanglements with the digital machines taking shape in our present worlds? As we have been shaping these technologies to fit into our lives, they also have been shaping us. This talk will draw on some of the

opposing tensions that have been shaping our present and near future worlds to help us imagine future possibilities, both utopian and dystopian. What cautionary tales should we be offering to today's child to prepare them for the challenges of that future? How could stories of wonder inspire them? In looking at potential futures both bright and dark, this talk will invite reflection on ways we might harness the positive potential of emerging technologies whilst remaining alert to the risks and potentially destructive paths they could enable. Most importantly, the talk will explore what we should be doing right now to ensure that the child born today will have a say in shaping the data and digital worlds that lie ahead.

SESSION 1.4
Health of our Digital Child

Zoran Bolevich
Chief Executive, eHealth NSW and Chief Information Officer, NSW Health, NSW Government
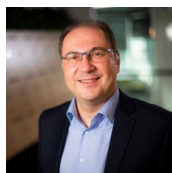
Zoran is the Chief Executive of eHealth NSW – the dedicated health IT agency responsible for planning, implementing and supporting the digital transformation of NSW Health. He is also Chief Information Officer for NSW Health. Leading a team of over 1,600 staff, Zoran is focusing on building on current strengths, streamlining governance of eHealth NSW's key programs and activities and developing the eHealth Strategy for NSW Health. He is passionate about improving the health system through meaningful and effective use of digital technologies, data analytics, research and innovation in partnership with patients, clinicians, health organisations, government departments and industry partners. In 2019, Zoran was ranked fifth in the CIO Australia CIO50 which recognises Australia's top 50 technology and digital chiefs who are driving innovation and influencing rapid change across the public and private sectors.

Abstract: A child born today will grow up in a rapidly evolving, responsive, multifaceted digital environment full of new opportunities and challenges. The digital health experience that this child will have will define a very different relationship with health care than any generation before. This child's experience will form the foundation for the way in which future generations will interact with the health system. Consumers in the future digitally-enabled health system will be health-literate, informed and active partners in achieving their health outcomes. Virtual health care clinics and virtual home visits will complement face-to-face care, forming new approaches to delivering routine health care. A child born today can be registered for a digital health record that follows them through life, informing their health care wherever they

are, and whatever system or service they use. Currently we have digital solutions that help us to track our fitness, our finances, and even our food delivery. Our vision for a child born today embraces digital solutions that increase equity of access to care and allows them far greater control of their future health. These solutions will offer this child the power to anticipate and avoid vulnerability to the early onset of chronic disease and increase quality and longevity in life.

Louisa Jorm
FAHMS
Professor, Faculty of Medicine and Health and Foundation Director, Centre for Big Data Research in Health, UNSW Sydney
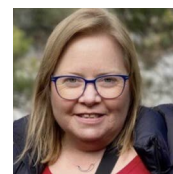
Professor Jorm has worked in senior leadership roles in both government and academia, giving her unique opportunities for translational research impacts. She is an international leader in health 'big data' research and specifically in applying advanced analytic methods to large-scale routinely-collected data, including hospital and medical and pharmaceutical claims data. Her main current research interests are in application of advanced analytics to large-scale electronic health data to create real-world evidence about topics including cardiovascular risk prediction, disparities in cardiovascular disease care and outcomes, variation in surgical outcomes and healthcare at end-of-life. She has played a leading role in the establishment of major infrastructure and capacity for 'big data' health research in Australia, including the E-Research Institutional Cloud Architecture (ERICA) secure data analysis facility. Professor Jorm has published >160 scientific papers and been awarded >$30 million in research grants. She is a high-profile advocate for more and better use of routinely-collected health data for research.

Abstract: The increasing presence of digital technologies in every aspect of our lives, in concert with environmental forces, will have profound implications for the health of the child born today. Increasing screen time is already contributing to the prevalence of physical health problems in children including obesity, short-sightedness, neck and back pain. Climate change, environmental degradation and rolling new waves of pandemics will potentially exacerbate these problems by further reducing the time our child spends outside and being physically active. Furthermore, these forces will impact not only on her physical health and wellbeing, but also on language, cognition and social and emotional development, all with potentially negative consequences for mental health. Conversely, digital technologies present unparalleled opportunities to improve health care, health and wellbeing. Technologies such as smart bottles and smart nappies will ensure

that our child receives optimal nutrition and stays comfortable. Telehealth will support provision of specialised health care, including mental health support, wherever she lives. AI technologies, using detailed data collected through monitoring and sensors, will be used to build a digital 'avatar' for our child that grows and develops alongside her. The avatar will enable the choice of medications, surgery and other health interventions that are personalised to her specific physiology, and simulation of how well these will work, optimising benefits and minimising harms. However, there is disturbing potential for increasing digitisation to further increase the already substantial inequalities in health through an ever-widening 'digital divide'.

Dale Lambert
PSM

Chief of Cyber and Electronic Warfare Division, Defence Science and Technology Group, Australian Department of Defence

Dr Dale A. Lambert enjoys a world-class reputation for higher-level data fusion research and, amongst other things, was contracted from Australia to design and implement an artificial intelligence system for Sweden's airborne defence that was subsequently on sold to several countries. Until recently Dr Lambert was the administrative Chair of the largest cooperation on defence science and technology between Australia, Canada, New Zealand, the United Kingdom and the United States. He additionally performs a number of roles with universities and industry. He is a recipient of the IEEE Harry Rowe Mimno Award for "excellence in technical communication" and was awarded the Public Service Medal for "outstanding public service in the use of artificial intelligence in surveillance and reconnaissance, command and control, intelligence and autonomous platforms".

Abstract: The Industrial Age is a two-tiered system comprising a Human Domain and a Physical Domain in which people directly control their physical-industrial world. The Information Age is a three-tiered system in which the Human and Physical Domains are now separated by an Information Domain. In the Information Age, people instead issue commands to information environments that directly control the physical-industrial world. Our digital child is born as the Information Age eclipses the Industrial Age. In the Information Age, all three tiers have a total reliance on information environments that control our physical power supply, transportation and telecommunications; our information based commerce and ownership records; and our human truth through streamed news and social media. If someone controls our society's information environments, then they control our society! Our digital adult's security will depend on automated contests conducted within information environments. The Automation Principle will see a Virtual Age of virtual people, societies and environments surpass the Information Age as our digital child transitions from adulthood to middle age. What should we secure as the Information Age ability to see something else becomes the Virtual Age ability to be something else?

Rory Medcalf

Professor and Head National Security College, Crawford School of Public Policy, Australian National University
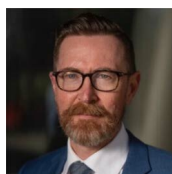
Rory Medcalf's career spans diplomacy, intelligence analysis, think tanks, academia and journalism, including as founding director of the security program at the Lowy Institute. In government, Professor Medcalf was a senior strategic analyst with the Office of National Assessments, Australia's peak intelligence agency, and a diplomat with service in India, Japan and Papua New Guinea. He now plays a lead role in informal diplomacy among a range of Indo-Pacific powers. He has contributed to three landmark international reports on nuclear arms control and was an adviser for Australia's 2016 Defence White Paper. Professor Medcalf is recognised globally as a thought leader on the Indo-Pacific strategic concept, as articulated in his acclaimed 2020 book Contest for the Indo-Pacific (published internationally as Indo-Pacific Empire). He is a member of the ASEAN Regional Forum Register of Experts and Eminent Persons, the board of the National Foundation for Australia-China Relations, and the Scientific Advisory Council of the Finnish Institute of International Affairs.

Abstract: Growing up with Australia's horizon of risk: the 2030s and beyond. Australians growing up in the 2020s and 2030s face a crowded horizon of risk. Already, in 2021, strategic competition among powerful states has reasserted itself as a security challenge, alongside transnational threats like pandemics, terrorism and the overarching hazard of climate change. Advancing authoritarianism, notably from the Chinese Communist Party, raises disturbing questions about the durability of the liberal value system that has underpinned our rules-based global order and Australia's own federal democratic experience. In parallel, disruptive and socially atomising technologies are fraying confidence in democratic institutions and evidence-based policy – even the idea of a generally-accepted 'truth' that enables political consensus and societal cohesion. This is all cause for concern, but not despair. Australia has extensive national capabilities and a wide network of allies and partners in the international system. The challenge ahead is harnessing and mobilisation of such strengths, without fundamentally undermining the democratic, inclusive and civilian ethos at the core of national identity. This involves creative reimagining of what constitutes the Australian citizen of tomorrow, her or his skills, opportunities and worldview. It also involves reconciling tensions between ideas of 'security' and 'prosperity' into a more holistic concept of the national interest, underpinned by a test of the intergenerational sustainability of policy decisions.

Power & Peril
of the digital age

Speakers
Friday 5 November — 9.00am-12.30pm

Edward Santow

Industry Professor — Responsible Technology, University of Technology Sydney

Edward Santow leads UTS's new initiative on building Australia's capability on ethical artificial intelligence. Ed's areas of expertise include human rights, technology and regulation, public law and discrimination law. From 2016-2021, Ed was Australia's Human Rights Commissioner, where he led the Commission's work on AI and new technology; refugees and migration; human rights issues affecting LGBTI people; national security; and implementing the Optional Protocol to the Convention Against Torture (OPCAT). Ed is a Fellow of the Australian Academy of Law, a Visiting Professorial Fellow at the University of New South Wales (UNSW), a member of the World Economic Forum's Global Future Council on Human Rights and the Fourth Industrial Revolution and serves on a number of boards and committees. In 2009, Ed was presented with an Australian Leadership Award, and in 2017, he was recognised as a Young Global Leader by the World Economic Forum. Ed previously served as chief executive of the Public Interest Advocacy Centre and was a Senior Lecturer at UNSW Law School, a research director at the Gilbert + Tobin Centre of Public Law and a solicitor in private practice.

Abstract: The right to privacy enables us to create a dividing line between our public and private selves – something that is fundamental to preserving human dignity. No-one wants to live in a panopticon. No-one wants to be constantly monitored or surveilled for commercial or other purposes. Yet our personal information is the fuel that powers artificial intelligence. We are often warned that without us – or, more specifically, without the often-intimate details of our personal lives – the development of AI could stall. Scientific and technological progress cannot come at the expense of human dignity. Now is the time to re-articulate the principles that will enable responsible innovation: the kind of innovation that upholds, rather than undermines, humans and our basic rights.

The Hon. Verity Firth

Executive Director, Centre for Social Justice and Inclusion, University of Technology Sydney

Verity Firth has many years' experience in government, the not-for-profit sector and the education sector in Australia. In her roles as NSW Minister for Woman, Minister for Education and Training and CEO Public Education Foundation she has influenced education policy and practice across primary, secondary and tertiary sectors; diversity and inclusion policy and practice; gender policy and analysis; public sector governance and innovation; and technology and human rights. Verity now leads the University of Technology Sydney's Centre for Social Justice and Inclusion, overseeing delivery of the University's Social Impact Framework, a first of its kind in the Australian university sector.

Abstract: With every technological revolution there has always been massive social, political and economic upheaval. Every technological revolution creates new sources of power in a society or an intensification of existing sources of power to which there needs to be a political and social response, to curb excesses. Now we are in the heart of a technological revolution where, as Marina Gorbis writes "technologists are no longer just developing apps, they're developing political and economic systems." This is a problem because this lack of democratic control strikes at the heart of representative democracy, leading to declines in popular trust. Like all technological revolutions, we need to ensure that the 'fruits' of technological advancement are more equally shared. For example, advanced technologies – including AI – have the potential to transform education. AI can give educators quicker and more precise analysis of data to understand what their students need, can offer greater personalised learning, and support, and enable more engaging ways to learn. Yet the unequal distribution of access to these technologies has already exposed a crushing divide in our education system. This came into stark relief during the pandemic. While just 3 per cent of high-income households don't have access to the internet, that rate increases to 33 per cent among the lowest income households – presenting a major barrier for low socio-economic status students

accessing education remotely. We cannot allow existing inequalities in our society to be replicated as we adopt new technologies. For public trust to be maintained it is vital that the benefits of AI are experienced equally. This is particularly so for our education system which partners with learners to develop human knowledge and capability, ultimately leading to increased agency and power for individuals and communities. Without this, the future of democracy is uncertain.

Marc Fennell

Journalist, Interviewer and Maker of Things

Marc Fennell is a Walkley-winning journalist, interviewer, author and documentary maker. Marc has been honoured internationally by The Webby Awards and twice nominated for Europe's prestigious Rose d'Or. He is a recipient of America's coveted James Beard Foundation Award, an Asian Creative Academy National Award, plus gold and silver world medals at the New York Festivals. In 2019, Marc was named one of the 40 Under 40 Most Influential Asian-Australians. The host of Mastermind Australia (SBS TV) The Feed (SBS TV) The School That Tried to End Racism (ABC TV) and Download this Show (ABC Radio), Marc also created the hit podcast documentaries It Burns (Audible), Nut Jobs (Audible), and the chart-topping Stuff the British Stole (ABC). Marc has worked with the BBC, Audible, Showtime, Monocle, triple j, Network Ten, ABC, SBS, Beyond Blue, Telstra, Red Bull and The Sydney Opera House. He has reported around the globe on topics ranging from sex in Japan to survivors of ISIS torture. His documentaries and interviews with the likes of Al Gore, Tom Cruise, Julian Assange, Jennifer Lawrence have generated over 30 million online views. Fennell has written two books and can also be seen on Network Ten's The Project, SBS's Dateline and heard on top-rating ABC Radio Sydney. Marc is the father of two kids, lives in Sydney and is also the Creative Director of the not-for-profit advocacy group Media Diversity Australia.

Abstract: There are a grand total of two things I think I can confidently predict for a child born in 2021. Firstly, that you probably won't every have to sit in the front passenger seat and have a coronary while trying to teach them to drive a car. Pretty sure driverless will

the norm in the next two decades. Secondly? That child will undoubtedly spend their life paying off our terrible debts. They will inherit a world where attacks will be made on our digitised infrastructure. They will be faced with the the consequences of our inaction on climate change. They will face an information diet where truth and objectivity are merely quaint relics of a more genteel past. It won't be all bad but my generation — and yours too — have spent a lot of time extracting value from this small blue dot and, well, someone has to foot the bill. And they're being born right about now.

Aengus Tran
Founder & CEO, Harrison.ai
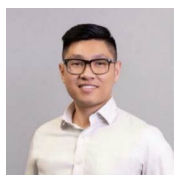
Trained at UNSW, Dr Tran is a medical doctor and an AI engineer. He invented IVY, the breakthrough AI model that uses machine learning to assist in selecting the best embryo for IVF treatment. In 2018, Dr Tran and his brother, Dimitry founded harrison.ai; an AI company dedicated to making healthcare more efficient and affordable for patients through meaningful collaboration with clinicians.

Abstract: High-quality healthcare is a fundamental human right. It should be accessible to all, no matter where we are in the world. Given the growing demand for healthcare globally, most health systems will soon face immense pressure to produce the necessary expertise for the safe and timely delivery of health services. The world needs a system of intelligence (AI) that can infinitely scale to meet the health crises of today or tomorrow. These tools can support frontline clinicians with meaningful and actionable clinical insights while being seamlessly integrated into their workflow. In this talk, we cover how my team at harrison.ai and I are building and deploying these AI-as-a-medical-device solutions across the world from right here in New South Wales. Our audacious goal is to improve the standard of care for 1 million lives every day through the collective reach of the devices that we built.

SESSION 2.2
Address by NSW Government Minister

The Hon Victor Dominello MP

The Hon. Victor Dominello MP is the inaugural NSW Minister for Digital. He is also Minister for Customer Service has served as the Member for Ryde since 2008. Previously, was responsible for the Office of Fair Trading and the NSW Government's ICT Strategy as well as leading on a range of open government, data analytics, innovation and regulatory reform initiatives. Other former roles include Minister for Aboriginal Affairs, Minister for Citizenship and Communities, Assistant Minister for Education and Minister for Veterans' Affairs. Before his election to Parliament, Mr Dominello worked as a lawyer, including eight years as a partner in a commercial law firm. He was a councillor on Ryde City Council from 1995 to 2004.

SESSION 2.3
Securing the Future of our Digital Child

Robert Hillard
Managing Partner, Deloitte Consulting Asia Pacific

Robert Hillard has spent many years as a leading thinker in relation to the information economy, an innovator and leader in consulting in Australia, Asia Pacific and globally. He has played a prominent role in the technology profession with a particular focus on information. Robert has held many eminent roles including leading Deloitte Consulting across Asia Pacific, serving on Deloitte's global board (Deloitte Touche Tohmatsu Limited), serving as Chair of the Australian Information Industry Association and being appointed to the Digital Expert Advisory Committee advising the Department of Prime Minister and Cabinet in Australia. Robert has been involved in many public forums and presentations related to the information economy. He has written extensively, including authoring Information-Driven Business (Wiley 2010) and co-authoring Information Development using MIKE2.0 (Motion 2013). Robert's contributions to the Australian technology industry were recognised in 2014 with his admission as a Fellow of the Australian Computer Society.

Abstract: Technology is the monster that steals our children's innocence by exposing them to horrific material. It is the informer that allows governments to track our every movement. It is the temptation that distracts families from valuing each other. But technology also means access to information that empowers our every day. It is the source of entertainment that our families can share. It opens-up the potential for more inclusive financial services. On a good day, I am grateful for the public safety benefits of the monitoring of our city streets, convenience of digital maps and learning support of electronic tutoring. With so much to gain, how could I not be in favour? Our challenge is to use all the tools available to realise the best of our digital lives while minimising the downsides. Our toolbox includes yet more technology to manage the technology, the culture we evolve to navigate our digital world and the laws we use to set boundaries. We shouldn't give-up on using technology to regulate and manage our digital breadcrumbs and emerging digital currencies, we are all the better for a responsible digital culture, but we know all of this isn't enough and our laws need to catch-up.

Angie Abdilla
Founder and Chief Executive Officer, Old Ways, New Australia; Professor of Practice, Faculty of Art, Architecture and Design, UNSW Sydeny

Professor Angie Abdilla is a palawa~trawlwoolway woman. She is the founder and CEO of Old Ways, New and works with Indigenous knowledges and systems in the design of places, experiences and deep technologies. As a consultant, she works as a designer; as a published researcher, she presents topics such as human technology interrelations and Indigenous design in the built environment. She is a member of the Global Futures Council on Artificial Intelligence for Humanity as part of the World Economic Forum, co-founded the Indigenous Protocols and Artificial Intelligence working group (IP//AI) and is a Professor of Practice for the UNSW Faculty of Art, Architecture and Design.

Abstract: In this discussion I share our journey starting with an international group of Indigenous technologists at the inaugural workshop series in Hawaii in 2019, leading to the IP//AI Incubator in March 2021. Key learnings from the foundations of these works were the need for Indigenous AI to be regional in nature, conception, design and development, to be tethered to localised Indigenous laws inherent to Country, to be guided by local protocols to create the diverse standards and protocols required for the developmental processes of AI, and to be designed with our future cultural interrelationships and interactions with AIs in mind. Through Country Centered Design we established some broad principles and protocols and then moved towards a test case, running some preliminary trials applying an Aboriginal kinship system as a selection framework in genetic computing. Our findings throughout this process were encouraging, indicating that there is potential for Indigenous Knowledge to guide the design and engineering principles and practices of AI, bridging the current ontological and epistemological divides between machines, humans and the environment.
Photo credit: James Horan

Scientia Professor Toby Walsh
FAA
Laureate Fellow and Scientia Professor of Artificial Intelligence, UNSW Sydney
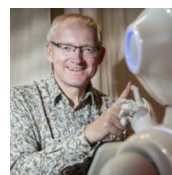
Toby Walsh is a Laureate Fellow and Scientia Professor of AI , University of New South Wales and CSIRO Data61, and Adjunct Professor at QUT. He was named by the Australian newspaper as one of the "rock stars" of Australia's digital revolution. Professor Walsh is a strong advocate for limits to ensure AI is used to improve our lives. He has been

a leading voice in the discussion about autonomous weapons (aka "killer robots"), speaking at the UN in New York and Geneva on the topic. He is a Fellow of the Australian Academy of Science and recipient of the Humboldt Prize and the NSW Premier's Prize for Excellence in Engineering and ICT. He appears regularly on TV and radio and has authored two books on AI for a general audience, the most recent entitled "2062: The World that AI Made."

Abstract: Some may argue that the battle for our digital privacy is already lost. We have already irrevocably given up too much of our private information to Facebook, Google, Amazon and others. But we will shortly give up our analog privacy too. The challenge is that we are connecting ourselves to smart watches, fitness monitors, and other devices that monitor our analog selves: our geographical location, our heartbeat, blood pressure, etc. In addition, advances in technologies like facial recognition are powering ever more surveillance of our analog selves. The benefits our obvious. Monitoring our vital signs 24/7 will permit us to live longer and healthier lives, while surveillance of our physical movements promises smarter and greener cities. Such analog information is far more invasive than the digital information we have already given up. The challenge is that the more our analog and digital selves are tracked, the more that people can be targeted with personalized and persuasive adverts. The reality is that humans can be hacked. We like to think that we make rational decisions but new technologies like machine learning, when combined with vast amounts of personalized digital and soon analog data, permit those decisions to be changed at scale. This can distort not just what we buy, but whom we elect and what we believe. The very future of our democratic institutions will be called into question. Digital manipulation of the population may prove to be a mere aperitif for what happens if we give up our analog privacy.
Photo Credit: TU Berlin/Press/Christian Kielmann

David Pryor
Senior Team Leader, Energy Security Safeguard, Dep. of Planning, Industry and Environment, NSW Government

David Pryor is a Senior Team Leader in the Sustainability Programs branch of the NSW Department of Planning Industry and Environment. He leads the team developing rules for the NSW Energy Security Safeguard (Safeguard), a market-based energy efficiency and peak demand reduction scheme that is part of the NSW Government's plan for implementing a reliable, affordable and sustainable electricity system. With the Safeguard recently legislated to run until 2050, he is actively investigating opportunities to modernise and scale scheme delivery to meet future needs – using Rules as Code and advanced energy measurement and verification to improve digital delivery and add value for energy users. His team recently won a Good Design Award for Public Sector Services for co-designing, prototyping, and testing an Alpha project to define critical features for a new energy savings platform to support the Safeguard. David studied materials engineering and environmental management and has worked on the Greenhouse Gas Abatement Scheme (GGAS) and NSW Energy Savings Scheme at Independent Pricing and Regulatory Tribunal and the Department over the last 15 years.

Abstract: A shared sustainable future based on trusted open data. Today's digital native children live with a joy of experience shared online that is unknown to us. They thrive in the mass of data, learning to code at school and shaping their own online universes. They seek and manipulate interconnected datasets to tell their own stories. They make sense of a carbon-constrained world as they search for prosperity in scarcity. Our job is to start building the data sets. We need to create a connection between our online universes and the natural and built environments using data. The good news is that we've started already. By coding the rules that support legislation we can create the building blocks that speed up data sharing. By tracking resource lifecycles, through material passports and digital twins, we can end unnecessary consumption. By tracking and sorting our trash we can bring resources back into the economy. By tracing supply chains, we can help to abolish modern slavery. Shared data leads to shared metrics. They allow us to build a trajectory towards a shared, sustainable future where we all have enough. Our children know that open, trusted data is the key to a net zero future and our shot at fulfilling the Sustainable Development Goals. Now we need to make it happen.

SESSION 2.4
Future Australia - the Role of Learned Academies

Anthony Cunningham
AO FAHMS
Academy of Health and Medical Sciences

Professor Anthony (Tony) Cunningham AO, FAHMS, MD, FRACP, FRCPA is a scientist, infectious diseases physician and clinical virologist. He is Director, Centre for Virus Research, Westmead Institute for Medical Research (WIMR), where he was founding director 1996-2019; Director, Australian Centre for HIV and Hepatitis Virology Research (ACH2); and Professor, Faculty of Medicine and Health at the University of Sydney. His major research interests are in HIV and Herpesviruses biology and immunology, especially in relation to the development of vaccines and antivirals, with a more recent interest in COVID vaccines and immunology. He was awarded Officer of the Order of Australia (AO) in 2010 and elected as an inaugural Fellow of the Australian Academy of Health and Medical Sciences in 2015. He is currently NSW/ACT Chair and a Council member of the Academy.

Richard Waterhouse
FRSN FAHA FASSA
Australian Academy of Humanities

Emeritus Professor of History at the University of Sydney, Richard was formerly Bicentennial Professor of Australian History and Head of the School of Philosophical Inquiry at the same institution. The author of five books and more than70 chapters and articles in United States and Australian history, he is a Fellow of the Australian Academy of Humanities, the Australian Academy of Social Sciences and the Royal Society of NSW.

Deborah Lupton
FASSA
Academy of the Social Sciences in Australia

Deborah Lupton is a SHARP Professor in the Centre for Social Research in Health and the Social Policy Research Centre and Leader of the Vitalities Lab at UNSW Sydney. Professor Lupton is also the UNSW Node Leader, Health Focus Area Leader and People Co-Leader of the Australian Research Council Centre of Excellence for Automated Decision-Making and Society. She has a background in sociology and media and cultural studies, and her research combines qualitative and innovative social research methods with sociocultural theory. She was elected as a Fellow of the Academy of the Social Sciences in Australia in 2017. Deborah is the author/co-author of 18 books and editor/co-editor of nine book collections, as well as over 200 book chapters and articles. She blogs at This Sociological Life.

Annabelle Duncan
PSM FRSN FTSE
Academy of Technology and Engineering

Emeritus Professor Annabelle Duncan is the Chair of the NSW Physical Sciences Fund, Chair of the Sydney School of Entrepreneurship, Chair of the Australia Pacific International College and Chair of College of Health Sciences. She is a Microbial Ecologist by training, who was educated at Otago University in New Zealand, La Trobe University and Monash University. Annabelle spent 16 years at CSIRO, initially as a research scientist, later in science management and was the Chief of CSIRO Molecular Science for 6 years. She has served as adviser to the Department of Foreign Affairs and Trade on biological weapons control and as a Biological Weapons Inspector with the United Nations in Iraq. From 2010 she worked at the University of New England, initially as Deputy Vice-Chancellor (Research) and from 2014 – 2019 as Vice Chancellor.

The Royal Society of NSW and Learned Academies Forum

Power & Peril
of the digital age

Virtual Conference

Free of charge

4 + 5 November 2021
9.00am-12.30pm

HOW TO REGISTER
Via the Royal Society of NSW website
Scan the QR code below or click here.

RECORDING
All sessions from will be recorded and made available after the conference.

Scan to register   **royalsoc.org.au**

THANK YOU
The RSNSW expresses its gratitude to all members of the 2021 Annual Forum Planning & Program Committees

Susan Pond AM FRSN FTSE FAHMS
Chair, Planning and Program Committee
Lindsay Botten FRSN
Virtual Production, Planning Committee
Anne Castles FASSA
Program Committee
Tony Cunningham AO FAHMS
Program Committee
Annabelle Duncan PSM FRSN FTSE
Program Committee
Robin King FRSN FTSE
Secretary, Planning Committee
Toby Walsh FAA
Program Committee
Richard Waterhouse FRSN FAHA FASSA
Program Committee

Australian Academy *of* Health and Medical Sciences

Australian Academy of the Humanities

Australian Academy of Science

ACADEMY OF THE SOCIAL SCIENCES IN AUSTRALIA

ATSE Australian Academy of Technology & Engineering

NSW GOVERNMENT

NSSN NSW Smart Sensing Network