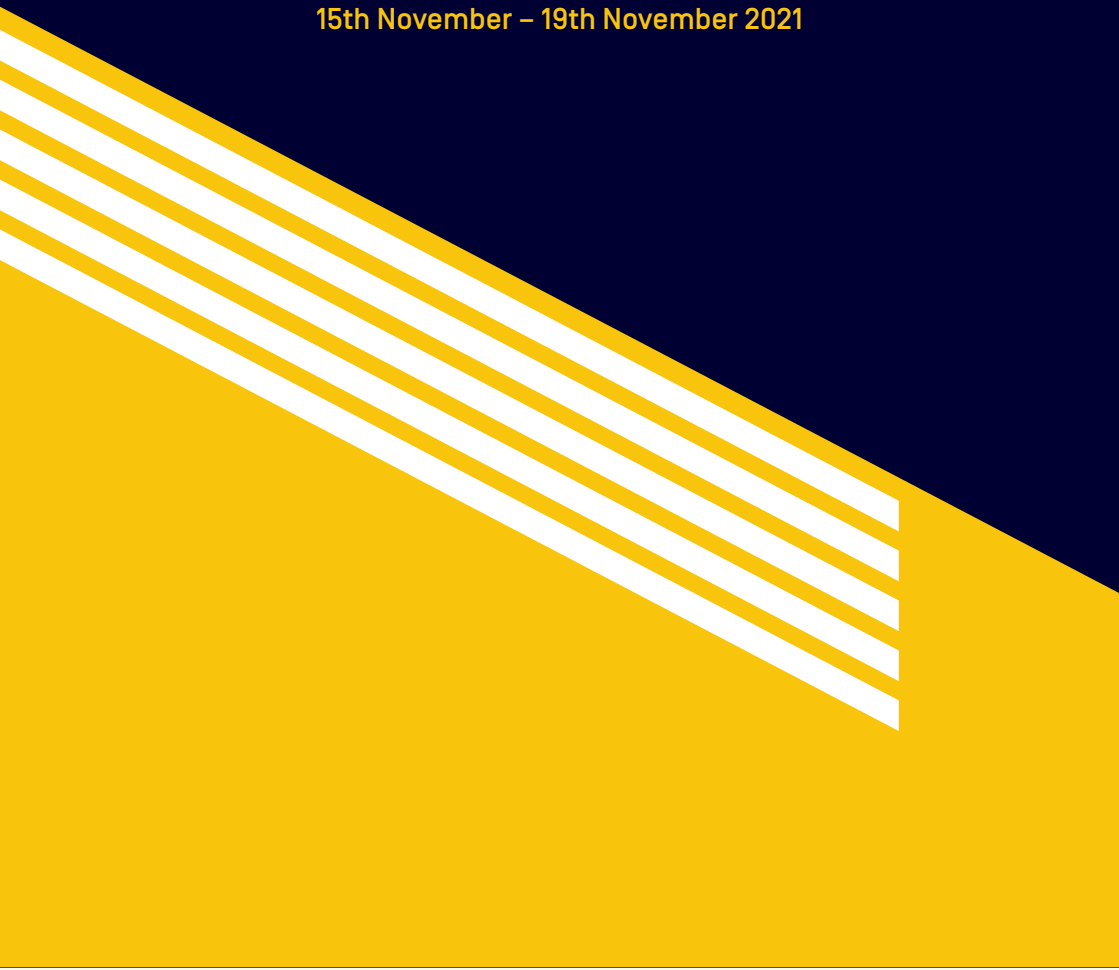


**AIS**

**SPORTS TECHNOLOGY & APPLIED  
RESEARCH SYMPOSIUM**

**15th November – 19th November 2021**



# 'Gold Medal Winning Moment – What does the very pointy end look like?' Q&A with Jess Fox and Myriam Fox

SESSION 1 – MONDAY 15<sup>TH</sup> NOVEMBER 2021, 9:00AM–10:00AM AEDT

Very few will ever experience waking up one morning with the opportunity to win an Olympic Gold Medal for your country. In this presentation, and hot on the heels of their remarkable Tokyo Olympic campaign, Jess and Myriam Fox will take the STARS audience through waking up on Thursday 29<sup>th</sup> July 2021, the day of the Olympic Slalom Canoe final. The presentation will seek insight into 'the very pointy end' of Olympic competition including the routines, communication between athlete and coach, and the techniques used to deliver a gold medal winning performance. The presentation will ask how much of what Jess and Myriam did is teachable to our Australian athletes, coaches, and sport scientists, and prompt our thinking about how technology and innovation might support Australia at future Olympic and Paralympic Games.

PRESENTED BY:



Jess Fox OLY

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Jess is a 3x Olympian (London, Rio, and Tokyo) winning gold (C-1), silver (K-1), 2x bronze medals (K-1), and 8-time World Champion including the most recent inaugural Extreme Slalom World Championships.

Born in France and moved to Australia with her family when she was 4 years of age. Both parents Richard and Myriam are Olympians in the sport, representing GBR and FRA respectively. Sister Noemie is also competing in the sport at the international level.

*"It's artistic, it's poetic, it's graceful and it's playful. We play with the features. You want to be able to dance on the water, you want to use your body in conjunction with the water to get as much speed and power as possible"* Jess Fox



Myriam Fox-Jerusalmi OLY

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Myriam Fox-Jerusalmi is a 2x Olympian (Barcelona and Atlanta) winning a bronze medal (K-1) and 8 time World Champion (2 gold in K-1 and 6 gold in the K-1 TEAM). One of the most successful slalom athletes of all time. She is also one of Australia's most successful Olympic Coaches of all time. As the National Coach of Paddle Australia's highly successful women's Canoe Slalom program and one of the few female coaches on the international stage. She is also Jess and Noemie Fox's coach and mum.



# Collective Intelligence – How some organisations benefit by systematically gathering insights from people to create new and innovative approaches to solving problems.

SESSION 2 – MONDAY 15<sup>th</sup> NOVEMBER 2021, 12:00PM–1:00PM AEDT

The Australian high performance sport system and its external networks is made up of a rich tapestry of people with a variety of backgrounds, experiences, capabilities, and skills. Within that vast kaleidoscope of expertise are the potential solutions to some of the high performance sport problems that will need to be tackled heading towards 2032. But how can that vast network be harnessed to solve those problems, and create the kind of progressive high performance sport system our athletes and coaches deserve?

In this presentation, John Fowlie will provide insight into the methods that some companies use and provide STARS participants with the opportunity to see some of those methods in action by harnessing ‘the STARS’ collective intelligence.

John Fowlie has been part of the system. As a swim coach, John guided athletes to represent Australia at three Olympic campaigns. His athletes won 75 international medals including 9 Olympic medals (4 gold) and set 7 world records. After leaving coaching, John has worked with organisations to harness collective intelligence.

PRESENTED BY:



John Fowlie

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John's passion is in driving and creating genuine high performance teams and environments. Before joining ThinkPlace John was an Olympic level swimming coach at the Australian Institute of Sport where his athletes won 9 Olympic medals, including 4 golds. He was awarded ASCTA Coach of the Year on two occasions and has won the Don Talbot Medal three times.

John is the Head of High Performance at ThinkPlace and drives their internal knowledge sharing, learning culture, global leadership development, and high performance services. These practices have contributed to ThinkPlace being shortlisted for The Australian Financial Review's Most Innovative Company Awards on two occasions. He has worked extensively in coaching, team performance, organisational culture, and individual performance design.

John has co-facilitated a number of large-scale innovation labs and design forums including with the Royal Australian Airforce (90+ people from across industries and academia), and with Energy Queensland (simultaneous event in Mt Isa, Roma, Townsville, and Cairns).



# The Digital Athlete – An Update

**SESSION 3 – MONDAY 15<sup>th</sup> NOVEMBER 2021, 4:00PM–5:00PM AEDT**

Mention the words, ‘digital athlete’, and the mind gravitates towards a digital avatar of real-life athletes, that enable coaches and their support people to ask and get answers to questions like, ‘What if we did this?’ or ‘What would be the outcome if we did that?’

The ‘Digital Athlete Project’ is a highly ambitious endeavour, seed funded by the AIS, QAS, VALD, and business.gov.au, that seeks to develop personalised digital human models by combining a range of data inputs including high-resolution movie VFX scans, motion capture, depth cameras, surface EMG, and ground reaction forces with a full body model and move quality animations to assess movement biomechanics, and other performance related metrics. The project embraces complexity with the sophisticated use of science, technology, engineering, mathematics, and design. However, this is not a science fiction project – it’s a project that has real potential to impact during the 2032 trajectory.

In this presentation, Professor David Lloyd will update STARS attendees on the latest developments and where the future of performance modelling might lie.

PRESENTED BY:



Professor David Lloyd

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David is a Biomechanical Engineer in the School of Allied Health Sciences, Griffith University, Australia. He worked in the aeronautical industry before completing a PhD in Biomechanical Engineering, then receiving a prestigious NIH Fogarty International Post-doctoral fellowship in computational biomechanics and neurophysiology at the premier Rehabilitation Institute of Chicago and Northwestern Medical School (USA). With more than 30 years experience in biomechanics research, David has recently co-founded both the Griffith Centre for Biomedical and Rehabilitation Engineering (GCORE) and Griffith's Advanced Design and Prototyping Technologies Institute (ADaPT), and now leads GCORE and ADaPT Medical.

David is a Fellow of the International Society of Biomechanics, recipient of the 2020 Geoffrey Dyson Award by the International Society of Biomechanics in Sport, ranked the 2019 Field Leader in Biophysics in Australia, and led Griffith University to be the Australian 2020 Lead Institution in Biophysics. David and team have developed computer simulation and AI methods to study the causes, prevention, and management of various neuromusculoskeletal conditions. These methods and technologies are now being adopted worldwide in laboratories, orthopaedic, and neurorehabilitation industries. David and team are currently developing accurate personalised digital twins of humans and devices that operate in real-time by combining data from laboratory-based instrumentation, multimodal medical imaging, and wireless wearable devices.



# When Ash Met Ashton – Athletes discussing training, competing, life, and the role of technology in their sport.

SESSION 4 – TUESDAY 16<sup>TH</sup> NOVEMBER 2021, 9:00AM–10:00AM AEDT

It is a rare occasion when an athlete gets to meet their idol. For Ash Maloney, hot on the heels of winning Australia's first ever Olympic medal in Decathlon, this is an opportunity to pick the brains of his idol, two-time Olympic Gold Medalist, Ashton Eaton.

Decathlon has long been regarded as the toughest challenge on the Olympic program. Held over two grueling days, athletes compete in ten events: 100m, long jump, shot put, high jump, 400m, 110m hurdles, discus, pole vault, javelin, and the 1500m. The winner is often regarded as the greatest athlete in the world.

Ashton Eaton is, by any measure, a remarkable person. His athletic career is unparalleled. From a stellar collegiate athlete and two-time NCAA Decathlon Champion, Ashton set his sights on an international career that would not only yield two Olympic Gold medals, but also multiple world championships and world records. Post athletic career, Ashton is studying engineering, while working with Intel Corporation as a Product Engineer. The insights he delivers to his Intel team is creating cutting edge technology that will enhance our understanding of athletic performance.

Ash Maloney's Tokyo performance will be etched in Australian sporting folklore. The image of teammate Cedric Dubler screaming Ash on to win the Olympic bronze medal in the final grueling 1500m of the Decathlon captured the imagination of the Australian public. As the youngest Decathlete at Tokyo, Ash Maloney will be 32 at his home Olympics in Brisbane. This session is an opportunity for Ash to engage with a man who has twice reached the pinnacle of their sport. As a STARS audience, we get to eavesdrop on a discussion between a master of his sport, and a rising star.



PRESENTED BY:



Ashton Eaton OLY

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Ashton Eaton entered the Pantheon of Olympic greatness by winning two Olympic gold medals in London and Rio in arguably the toughest of all events, the Decathlon. Along with two World Championship golds, Ashton was also the second athlete ever to break the 9,000 point barrier in Decathlon. In 2017 he retired from sport, moved to San Francisco, and joined a software start-up to learn how companies and products are built. Ashton left in 2019 and started studying engineering. At the same time, he joined Intel as Product Development Engineer in the Olympic Technology Group where he works to make technologies that advance human performance.



Ash Moloney OLY

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Ash made Australian sporting history by being the first to win an Olympic medal in the Decathlon. At age 21, Ash was the youngest competitor in the field. To win the Bronze, Ash needed to set a personal best, that also broke his own Australian record. For many Australians the image of Ash's teammate Cedric Dubler urging him to push through the pain barrier in the final 1500m event of the Decathlon will be the lasting memory of the Tokyo Olympics. Most decathletes peak in their late twenties and early thirties as it takes years to perfect 10 events and have the strength for the throwing events. Ash will be 32 when the Olympics are hosted in Brisbane.



# The Potential Rise of the Athlete Mum – Common or rare by 2032?

SESSION 5 – TUESDAY 16<sup>TH</sup> NOVEMBER 2021, 12:00 PM–1:00PM AEDT

The great New Zealand athlete Dame Valerie Adams rated her bronze medal at the Tokyo Olympics as one of her greatest achievements because she did it as a mum. “If you want to have a kid and you want to come back and be at the top of the world, you can – you can absolutely do that”, said the five time Olympic great. In interviews prior to Tokyo, Adams spoke of ‘mum guilt’ and the pain of leaving her kids behind as she successfully pursued winning her fourth Olympic shot put medal.

In this presentation, Dr Melanie Hayman from Central Queensland University, will talk about some of the barriers that female athletes endure in their desire to be both an athlete and a mother. Importantly, through research supported by the QAS and AIS, more information is being gathered to better understand these issues, and the consideration by our national high performance sports system to support female athletes with these critical life decisions. As a result of this work, could the Australian Olympic and Paralympic teams in Brisbane 2032 see the largest cohort of athlete mums in history?

PRESENTED BY:



Dr Melanie Hayman

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Dr Hayman's research has made a significant contribution to her field, leading the development of critical industry documents. Most recently, her work involves the co-authorship of the 2020 Australian Exercise during Pregnancy Guidelines (on behalf of the Australian Government) and the 2021 Australian Physical Activity Screening Tool for pregnant women (endorsed by peak industry bodies). Dr Hayman has delivered presentations and workshops for the Australian Institute of Sport, QLD Academy of Sport, Sports Medicine Australia, and Exercise and Sport Science Australia, and is named investigator on \$1m+ in research grants. She collaborates with leading researchers and industry leaders (including exercise and health professionals), both nationally and internationally, in closing the gap between research and practice towards improving health outcomes for pregnant women.

Her current research projects include: longitudinal and observational research of HIIT and resistance training during pregnancy, establishing frameworks to support elite athletes during pregnancy and in their return to competitive sports, exercise during pregnancy apps, social media and the association between influencers and exercise behaviours among pregnant women.



# Data, data everywhere, but how much can a coach and athlete drink? – The pipeline of information from data to Ash Barty.

SESSION 6 – TUESDAY 16<sup>TH</sup> NOVEMBER 2021, 4:00PM–5:00PM AEDT

Unobtrusive technologies are making the collection of data easier and easier in high performance sport. However, this does not necessarily mean that the insights generated are giving coaches and athletes a competitive advantage. In this presentation, we explore the interaction between Tennis Australia's Performance Analyst Darren McMurtrie and Coach Craig Tyzzer as they support the number one tennis player in the world, Ash Barty.

Using Ash's phenomenal Wimbledon campaign, this session will case study the interaction between Performance Analyst, Coach, and Athlete. In a competition format where the next opponent may be largely unknown, how is performance data distilled into the critical points delivered to the athlete by the coach?

PRESENTED BY:



Craig Tyzzer

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Australian tennis coach Craig Tyzzer began his partnership with Ash Barty in 2016 when she was ranked above 300 in the world. Soon after, Ash won her first title in Kuala Lumpur. Under Craig's guidance, Ash has climbed the tennis mountain to be world number one, and she's lifted two Grand Slam trophies, the French Open 2019 and Wimbledon 2021. He also helped her achieve a doubles ranking as high as No. 8 in the world. Craig also won the WTA Coach of the Year Award in 2019.



Darren McMurtrie

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Darren cut his teeth as a Performance Analyst in AFL with a six-year stint at North Melbourne, and a three-year spell at Carlton, before getting a job with the AIS. As an AIS Performance Analyst under Dr Keith Lyons, Darren was exposed to a range of sports, but mostly worked with the highly successful AIS Basketball programs. In 2008, Darren returned to Melbourne to become Tennis Australia's Performance Analysis Manager where he has spent thirteen years supporting Australia's globe-trotting tennis players.



# The launch of the AIS VML Pipeline – An opportunity to access DIY video machine learning tools.

**SESSION 7 – WEDNESDAY 17<sup>TH</sup> NOVEMBER 2021, 9:00AM–10:00AM AEDT**

Video continues to be the weapon of choice for many sports in our national high-performance sports system. With large companies investing huge amounts of dollars into video machine learning and artificial intelligence, how might Performance Analysts in our system utilise those tools to gain greater insights for our athletes and coaches?

The AIS is building an online computer vision pipeline for release across the network that will allow sports science practitioners to design and deploy their own custom video analysis systems using pretrained AI models.

In this presentation, Stuart Morgan and Ash Hall will take STARS participants on a tour of the AIS Video Machine Learning (VML) Pipeline, explaining how the pipeline works, what's currently available and what might be available in the future. There will also be an opportunity for performance analysts to sign up for early access and be the first to trial tools for their own work when the application enters its beta rollout.

PRESENTED BY:



Associate Professor Stuart Morgan

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Stuart Morgan currently leads the AIS Applied Technology and Innovation's Machine Learning, Artificial Intelligence and Data Innovation department. Stuart completed his PhD in sensory neuroscience at Swinburne University of Technology (SUT), in 1999, and became a Research Fellow at SUT in 2000. He worked as a performance analyst at the Victorian Institute of Sport for six years, developing next-generation game analysis techniques, before joining the AIS in 2007. Stuart has worked with numerous high profile international teams including the Australian Hockey team at the 2008 Beijing Olympic Games. His current work focuses on research and development in computer vision for sports, including using data mining and machine learning techniques to gain competition and training insights.



Ash Hall

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As the Research Engineer Lead for the AIS Applied Technology and Innovation's Video Machine Learning group, Ash works on artificial intelligence (AI) projects for sport, with a primary focus on computer vision. Ash received double bachelor's degrees in computer science and mathematics at La Trobe University, before completing an honours degree in computer science with a thesis on artificial neural networks. During and after his studies, he collaborated on a number of AI projects with multi-disciplinary teams across Australian universities and the AIS, with his work being put to use in the 2020 Tokyo Olympics and Paralympics, before finally joining the AIS in 2021.



# Trajectory 2032 – Is the time right for a National Sport Data Analytics Hub?

SESSION 8 – WEDNESDAY 17<sup>TH</sup> NOVEMBER 2021, 12:00PM–1:00PM AEDT

The demand from high performance sport to generate data in the field, rather than in the laboratory, has led to the development and deployment of more and more technology to collect data. Vast amounts of data from wearable sensors, instrumented equipment, and the increasing use of computer vision to extract more granular information from video, the competitive nature of high performance sport has seen an explosion in the amount of data that can be collected. However, there are compelling questions as to whether our capabilities to analyse and action data has kept pace with technology hardware development?

In this presentation, Professor Kerrie Mengersen from QUT's Centre for Data Science will provide STARS participants with examples of how other industries are organising themselves and reaping the benefits of greater insights from data. As our national high performance sport system heads toward 2032, the question arises: 'Is the time right for a National Sport Data Analytics Hub'?



PRESENTED BY:



Professor Kerrie Mengersen

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Professor Kerrie Mengersen is an applied statistician with around 30 years of experience in areas of modelling and analysis of data in health and medicine, environment and ecology, biosecurity, business, and industry. She has developed close engagements with government and private organisations. As Director of QUT Centre for Data Science, Kerrie also links to experts in data science from other domains across the University and to other Centres of Data Science through our Australian Data Science Network.

In 2016 Professor Mengersen received two prestigious awards: the Statistical Society of Australia's Pitman Medal, the highest award presented by the Society and the first time it has been presented to a woman, and the Research Excellence award by the Cooperative Research Centre for Spatial Analysis (CRCSI).

In 2018 Professor Mengersen has been elected a Fellow of the Australian Academy of Science (AAS); a Fellow of the Academy of Social Sciences in Australia (ASSA); and an Invited Fellow of the Queensland Academy of Arts and Sciences (QAAS).



# Validation of Wearable Technologies in Relation to Sleep – Update and findings.

SESSION 9 – WEDNESDAY 17<sup>TH</sup> NOVEMBER 2021, 4:00PM–5:00PM AEDT

The benefits of good quality sleep to elite athletes have been well documented in the scientific literature. Yet, sleep is often a 'blind spot' for those supporting athletes as they try to navigate the rigours of an elite training and competition schedule, while trying to live a 'normal' life. The effects of 'bad sleep' can be seen though, as athletes wander into training sessions looking like the cast from *The Walking Dead*. Wearable devices are offering the opportunity to gain more insight into sleep in elite athlete populations, but how accurate are they? Is it possible to utilise these devices to support our athletes to get the quality sleep they deserve?

In this presentation, Dr Greg Roach from the Appleton Sleep Lab at CQU will update STARS participants on the latest information on the validation of wearable technologies including Apple Watch, Oura Ring, Whoop, Somfit, and Garmin.

PRESENTED BY:



Professor Greg Roach

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Greg is a Professor at the Appleton Institute for Behavioural Science, based at CQUniversity's Adelaide campus. His research interests relate to sleep and circadian rhythms, including the effects of sleep restriction/deprivation on neurobehavioural performance. Greg has conducted numerous research investigations, including the relationships between training loads, sleep quality/quantity, and sports performance in elite athletes. Greg's research is focused on understanding the short-term and long-term consequences of poor sleep and circadian disruption, development of strategies to optimise the amount and quality of sleep, and implementing countermeasures to minimise the impact of sleep loss.



# Science and Technology on a Shoestring – How 4 lads from ‘Derbados’ became nation killers – The KGF/HUUB Wattbike Story

SESSION 10 – THURSDAY 18<sup>TH</sup> NOVEMBER 2021, 9:00AM–10:00AM AEDT

In 2016 Dan Bigham was targeting the British National Individual Pursuit championships. As the Team Pursuit is basically an Individual Pursuit with some pals (spoiler, it's not) he thought he may as well coerce three of his friends into setting up a team. To the surprise of everyone (except Dan) the four lads from Derby (affectionately known as Derbados) beat the GB national squad and became national champions. Over the next three years things got very carried away. They set-up a UCI Trade Team allowing them to compete at Worlds Cups against the best teams in the world. With only a shoestring budget (and a few credit cards), the four lads from Derbados set about changing the way nations will race Team Pursuit forever.

In this talk Dan Bigham and Jonny Wale will talk about developing their own equipment, adopting novel race strategies, and how creating a team culture of rapid innovation and clarity of purpose allowed them to become nation killers.

PRESENTED BY:



Dan Bigham

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Dan Bigham received a Master of Engineering Degree from Oxford Brookes University specializing in Motorsport Engineering. After University he spent some time during an industrial placement as a Junior Aerodynamicist with Mercedes AMG Petronas Formula One Team. Since then, and while progressing his career as a professional athlete, Dan has worked as Aerodynamicist and Product Design Engineer with WattShop, as well as being the self-employed Team Principal and Rider with HUUB Wattbike. Dan's expertise in aerodynamics led to him being contracted as a 'Performance Engineer' for Team Denmark's Cycling Team prior to Tokyo. Dan is the current British Hour Record Holder.



Jonny Wales

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Jonny Wales is a British and Scottish track cyclist who took up cycling while studying for a Psychology degree at Loughborough University. Wales became British champion when winning the time trial Championship at the 2020 British National Track Championships, and he represented Scotland at the 2018 Commonwealth Games where he placed 5th in the 1km Time Trial. Jonny won gold with HUUB Wattbike at the 2018 World Cup in Minsk, just two months after breaking his collarbone in a training accident.



# Trajectory 2032 and the Female Athlete

**SESSION 11 – THURSDAY 18<sup>TH</sup> NOVEMBER 2021 12:00PM–1:00PM AEDT**

The Olympics have not always been friendly towards female athletes. The original modern Olympic Games in 1896 excluded female athletes, and while female participation at the Olympics Games has steadily increased, the issues that female athletes endure continue to challenge notions of equality. With the announcement of the 2032 Brisbane Olympic and Paralympic Games, there is an opportunity for Australia to not only lead in issues of gender equality, but also the applied scientific understanding of female athletes.

The Female Performance and Health Initiative (FPHI) meets at the intersection of knowledge generation and innovation, facilitating a positive impact and a performance advantage for Australian female athletes. Australian female athletes continue to excel at Olympic and Paralympic Games, but there is much to learn. There has been limited high performance research specifically targeting knowledge of female athletes in the past, and the FPHI is gathering an exciting team of researchers to address this issue. This presentation will provide the STARS audience with insight on the FPHI, and where Australian female athletes are likely to benefit from its activities – both now and into the future.

In this presentation, Associate Professor Clare Minahan from Griffith University, Dr Rachel Harris from the AIS FPHI and Professor Louise Burke from Australian Catholic University will provide STARS participants with an overview of the Initiative, what has been completed so far, and some exciting work for the future.

PRESENTED BY:



Clare Minahan

Clare Minahan is an Associate Professor at Griffith University, Queensland Australia, and has led the Griffith Sports Science group since 2002. She has documented unique responses to exercise in female athletes including locomotor movement patterns, muscle damage, thermoregulation, and immune function. Clare has published over 85 peer-reviewed scientific articles, has successfully supervised multiple post-doctoral fellows and PhD students to completion, and is currently supervising numerous post-graduate students embedded in Australian high performance sport organisations. These context specific partnerships provide the avenue for vigorous academic research and direct applied sports-science translation. In 2021, Clare was recognised by Exercise & Sports Science Australia as one of three Female Leaders in Exercise & Sports Science. Clare's research continues to influence a new generation of exercise and sport professionals to seriously consider the physiology unique to female athletes.



Rachel Harris

Dr Rachel Harris is a Sport and Exercise Physician based in Perth at the Perth Orthopaedics and Sports Medicine Centre. Rachel has been the Project Lead for the AIS Female Performance & Health Initiative (FPHI) since it began in 2019. She is the Chief Medical Officer for Paralympics Australia, and the Chief Medical Officer for Water Polo Australia for the Tokyo Cycle. She swam for Australia at the Sydney Olympics and is a Gold Medalist from the Kuala Lumpur Commonwealth Games in the 800m Freestyle.



Louise Burke

Louise is a sports dietitian with 40 years of experience in the education and counselling of elite athletes. She worked at the Australian Institute of Sport for thirty years, first as Head of Sports Nutrition and then as Chief of Nutrition Strategy. She was the team dietitian for the Australian Olympic Teams for the 1996-2012 Summer Olympic Games. Her publications include over 350 papers in peer-reviewed journals and book chapters, and the authorship or editorship of several textbooks on sports nutrition. She is an editor of the International Journal of Sport Nutrition and Exercise Metabolism. Louise was a founding member of the Executive of Sports Dietitians Australia and is a Director of the IOC Diploma in Sports Nutrition. She was awarded a Medal of the Order of Australia in 2009 for her contribution to sports nutrition. Louise was appointed as Chair in Sports Nutrition in the Mary MacKillop Institute of Health Research at Australian Catholic University in Melbourne in 2014 and took up this position in a full-time capacity in 2020.



# Barriers to Technology Adoption – What might we learn from a new Australian Research Council Training Centre?

SESSION 12 – THURSDAY 18<sup>TH</sup> NOVEMBER 2021, 2:00PM–3:00PM AEDT

In July 2021, a new Australian Research Council Training Centre was announced. The Behavioural Insights into Technology Adoption ARC Training Centre, or BITA for short, will be led by QUT Professor Uwe Dulleck, and it involves three Universities, and a range of industry partners including those from health and agriculture. In the announcement, Professor Dulleck stated:

“Adoption of new technologies can result in higher productivity and at the same time greater sustainability, but we must ensure that innovative technology has a clear customer value proposition. If customers cannot see the value in a technology, they will not adopt it, regardless of how useful the technology might be. Perception is reality.”

Do these sentiments have applicability in our national high performance sport system, and if so, what might we learn from BITA?

**Please Note: For this session to be applicable to STARS participants, we will be sending out a small survey after registration for STARS.**



PRESENTED BY:



Uwe Dulleck

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Uwe obtained his PhD at Humboldt University Berlin in 1999. Before Uwe joined QUT he was a Professor of Economics at the University of Linz, Austria, and an Assistant Professor at the University of Vienna. His publications can be found in the 'American Economic Review', 'Journal of Economic Literature', the 'Economic Journal', the 'Journal of Public Economics', the 'International Journal of Industrial Organization', and the 'Scandinavian Journal of Economics', among others. His research has been discussed in the Economic Focus of 'The Economist', the Sydney Morning Herald, and the 'Frankfurter Allgemeine Sonntagszeitung' (the Sunday edition of Germany's leading quality newspaper), among others. Uwe was awarded several ARC Linkage Grants and one ARC Discovery Grant. He is a co-investigator of two Austrian Research grants. In total his research funding exceeds AUD 2,500,000). In 2015 Uwe was the Chairman of the Programme Committee for Australia's Conference of Economists, the leading and largest conference for research and applied economists in Australia. He is an active public speaker on Behavioural Economics and its applications to Public Policy, Business Decision Making, and Regulation.



# Training and Competing on the Edge

**SESSION 13 – THURSDAY 18<sup>TH</sup> NOVEMBER 2021, 3:30PM–5:00PM AEDT**

What is the edge? How to be aware of the edge (and shift it)? How to understand why pain may or may not be present as the edge nears? How to not fall over the edge? During this session we will present data- and theory-driven ideas to propose a future model to answer these questions and enhance individualised, precision training and elite-level competition to push the boundaries of pain without reaching the tipping point of injury. The session will close with an interactive panel discussion with the speakers and with world record holder, Michael Roeger, and Paralympic Coach of the Year, Dr Philo Saunders.

PRESENTED BY:



Professor Mark Hutchinson

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Director of the ARC Centre of Excellence for Nanoscale BioPhotonics (CNBP)

Mark is an Australian Research Council Future Fellow and a Professor within the Adelaide Medical School at the University of Adelaide. Mark is also President-elect to Science and Technology Australia, the peak body in Australia that represents 88,000 scientists.

Professor Hutchinson's research explores the "other brain" or the other 90% of cells in the brain and spinal cord. These immune-like cells are termed glia. Mark's research has implicated the brain immune-like cells in the action of drugs of dependence and the negative side effects of pain treatments. He has pioneered research which has led to the discovery of novel drug activity at innate immune receptors. His work has enabled the translation of compounds at the lab bench to clinical agents used at the bedside.



Dr Melissa Day

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Associate Professor in Clinical Psychology, University of Queensland

Dr. Day completed her MA and Ph.D. in Clinical Health Psychology and post-doctoral research fellowship in pain psychology at the University of Washington. She is now an endorsed Clinical Psychologist and Health Psychologist in Australia and works as an Associate Professor in the School of Psychology at The University of Queensland. Dr. Day's program of research has focused on implementing randomised controlled trials to evaluate the efficacy and mechanisms of cognitive-behavioural and mindfulness-based interventions for pain. She recently published a sole authored book with Wiley titled, "Mindfulness-Based Cognitive Therapy for Chronic Pain: A Clinical Manual and Guide".



PRESENTED BY:



Dr Paul Hodges

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Paul is a neuroscientist and physiotherapy researcher from the University of Queensland in Australia. He has three doctorates and is a Fellow of the Australian Academy of Science. Paul's research has unlocked new understanding of pain, how it relates to how we move, and its rehabilitation. He uses diverse approaches to research from studies of single cells to humans, clinical trials, and translation into practice. For this work Paul has won the premier international prize for back pain (the ISSLS Prize) 5 times. He has authored almost 500 peer reviewed papers that have been cited more than 52,000 times and has received more than \$52 million in research funds to undertake this work.



Dr Manuela Besomi

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Dr Manuela Besomi completed Physiotherapy undergraduate and Clinical Epidemiology Master's degrees in Chile before moving to Australia in 2017. She has recently completed her PhD in Rehabilitation Sciences at The University of Queensland and currently works as a Research Fellow in the School of Biomedical Sciences and School of Health and Rehabilitation Sciences at UQ. She is also affiliated with the Universidad del Desarrollo where she leads running-related clinical and epidemiological research in Chile and is a Speaker/Researcher for the Running Clinic ©. Dr Besomi's research seeks to understand and inform the design, implementation, and uptake of rehabilitation interventions in the context of running injuries. She has a particular interest in the neuromuscular and biomechanical mechanisms that underlie pathological conditions and pain, and strategies to optimise a sustainable and healthy practice of running.



# Gene Doping – Should we be worried about 2032?

SESSION 14 – FRIDAY 19<sup>TH</sup> NOVEMBER 2021, 9:00AM–10:00AM AEDT

In 2010, the then Director of the AIS, Professor Peter Fricker delivered a presentation at the AIS after his return from 'The Third WADA Symposium on Gene Doping in Sport'. The subtitle for that presentation was, 'From genes and therapy to genetic enhancement'. In that presentation, there was a slide, 'How might one apply genetic modification in sport?' The answer was clear in that gene therapy represents an exciting and promising step forward in medical research, but its use to enhance athletic ability is as wrong as any type of traditional doping.

Over a decade later, we are honoured and privileged to have Professor Matthew Porteus attend STARS to update us with the latest science in the area. Apart from his world leading work at Stanford University that is helping people with genetic disorders, Matthew also sits on WADA's Gene and Cell Doping Expert Advisory Group. With Australia hosting the Olympics and Paralympics in another decade's time, it's timely to ask whether gene doping will be an issue of concern?

PRESENTED BY:



### Professor Matthew Porteus

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Stanford University and WADA's Gene and Cell Doping Expert Advisory Group

After completing a degree in 'History and Science' at Harvard University, Matt completed his PhD at Stanford Medical School with his PhD focused on understanding the molecular basis of mammalian forebrain development. Matt did his post-doctoral research where he worked with Dr. David Baltimore at MIT and CalTech on studies in developing homologous recombination as a strategy to correct disease causing mutations in stem cells as definitive and curative therapy for children with genetic diseases of the blood, particularly sickle cell disease. Matt's work has been the first to demonstrate that gene correction could be achieved in human cells at frequencies that were high enough to potentially cure patients and he is considered one of the pioneers and founders of the field of genome editing—a field that now encompasses thousands of labs and several new companies throughout the world.



# How might blockchain technology enhance Olympic and Paralympic sport towards 2032?

SESSION 15 – FRIDAY 19<sup>TH</sup> NOVEMBER 2021, 12:00PM–1:00PM AEDT

Most of us have heard about ‘blockchain technology’, and there’s a high probability you associate it with cryptocurrencies like Bitcoin. However, blockchain technology has the potential to revolutionise industries from finance, to agriculture, to health and education. But what about high performance sport? In this presentation, members of the RMIT Blockchain Innovation Hub will provide a digestible snapshot of how blockchain technology is being used in other industries and propose ways that the technology could be used by high performance sport as we lead into the 2032 Olympic and Paralympic Games. As the recently awarded second highest ranked University globally for blockchain, members of the RMIT Blockchain Innovation Hub will challenge, disrupt, and also clarify the potential of this technology.

PRESENTED BY:



Jason Potts

Jason Potts is a Distinguished Professor of Economics at RMIT University and Co-director of the Blockchain Innovation Hub at RMIT. He is also a chief investigator on the ARC Centre of Excellence for Automated Decision-Making and Society.

His work is broadly centred about the study of the creation and use of new knowledge (i.e., technological change) and its institutional context as the core explanation of long run economic transformation. His work is highly interdisciplinary, extensively collaborative, mixed methods, and draws together several distinct themes about the dynamics of, and interaction between, technological, institutional, and cultural change.

Potts has developed new methods and theories to explain long-run economic transformation and pioneered several new fields of analysis. These include network-theory based approaches to evolutionary economics (for which he won the 2000 Joseph A Schumpeter Prize); Cultural Science (jointly with John Hartley); behavioural innovation economics; the theory of 'social network markets', theory of the 'innovation commons'; and recently 'institutional cryptoeconomics'.

He has written 5 books and published over 80 articles on topics including growth theory, creative industries, economics of cities, innovation commons, and recently on crypto- economics and blockchain.

Potts is an editor of the Journal of Institutional Economics, Vice President of the International Joseph A Schumpeter Society, a Board Member of Australian Digital Commerce Association, and a Fellow of the British Blockchain Association. He is also a member of the Steering Committee of the Australian Government's National Blockchain Roadmap.





PRESENTED BY:



Stuart Thomas

Stuart Thomas is an Associate Professor and the Director of Education Development at RMIT Blockchain Innovation Hub, RMIT University

His remit within the Blockchain Innovation Hub is to build RMIT's Blockchain education offerings. Stuart is an established university learning and teaching leader, an experienced senior educator, and is an active researcher. He has driven successful strategic initiatives higher education programs in Australia, Southeast Asia and in Europe and provided operational and policy leadership for a suite of undergraduate and postgraduate programs in business. Stuart also has extensive teaching and operational leadership experience in higher education programs delivered in Singapore, Malaysia, Vietnam, and Hong Kong.

Stuart's philosophy of learning and teaching is grounded in application and meaning, bringing theory and practical relevance together. His approach to research is very much applied and directly connected to current industry problems and policy issues. As a senior academic in RMIT's College of Business, Stuart maintains an active, diverse, multidisciplinary research program. His work has been published in A\* and A-ranked international journals, he regularly presents his work at international conferences, and engages with industry leaders.



Vijay Mohan

Vijay Mohan is a research fellow at the RMIT Blockchain Innovation Hub. Before coming to RMIT, Vijay worked in universities and business schools across Australia, the US and India.

His research, teaching and private consulting interests focus on various aspects of industrial organization, international trade, and innovation. He is currently working on projects related to the microeconomics of blockchains, technological exclusion, decentralized finance, and the use of blockchains to curb academic misconduct and doping in sports.



# Converging our collective intelligence in an End of Week Tie Up – The STARS Collective Intelligence.

**SESSION 16 – FRIDAY 19<sup>TH</sup> NOVEMBER 2021, 2:00PM–3:00PM AEDT**

In this session, Olympic Swim Coach John Fowlie will lead an interactive session to pull together the thoughts you as a STARS participants have generated throughout the week. The week has provided us with sessions that have provoked ideas, concepts, and reflections, and it is important going into the Paris Cycle that we capture some of that value for consideration in our policies, practices, and projects.

Even if you consider yourself outside of the national high performance sport system, we value your contribution as bringing a fresh set of eyes.

This is the ‘people’s session’ and is not to be missed!

PRESENTED BY:



John Fowlie

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John's passion is in driving and creating genuine high performance teams and environments. Before joining ThinkPlace John was an Olympic level swimming coach at the Australian Institute of Sport where his athletes won 9 Olympic medals, including 4 golds. He was awarded ASCTA Coach of the Year on two occasions and has won the Don Talbot Medal three times.

John is the Head of High Performance at ThinkPlace and drives their internal knowledge sharing, learning culture, global leadership development, and high performance services. These practices have contributed to ThinkPlace being shortlisted for The Australian Financial Review's Most Innovative Company Awards on two occasions. He has worked extensively in coaching, team performance, organisational culture, and individual performance design.

John has co-facilitated a number of large-scale innovation labs and design forums including with the Royal Australian Airforce (90+ people from across industries and academia), and with Energy Queensland (simultaneous event in Mt Isa, Roma, Townsville, and Cairns).



# Connected Sensors – The potential future of sensors in high performance sport.

SESSION 17 – FRIDAY 19<sup>TH</sup> NOVEMBER 2021, 4:00PM–5:00PM AEDT

There has been a history in sports science of pioneers and innovators who seek to measure the performance of athletes in the field, rather than the confines of a laboratory. A drive to understand the specific demands on athletes of training and competition, has led some sports scientists to use biosensors in training and competition environments over the years. The development of new mobile and small-scale biomedical sensors, with the possibility of rapid results, can potentially augment the information available to athletes and coaches on a range of performance measures.

In this session, Professor Allan Hahn will provide a brief background of the history of the development and use of biomedical sensors in Australian high performance sport. Professor Chun Wang, Head of the School of Mechanical and Manufacturing Engineering at UNSW, will then talk about a new Australian Research Council funded 'Research Hub for Connected Sensors for Health', with NSWIS as one of the industry partners. The Hub will conduct research into biophysical, biochemical and energy sensors, as well as data analytics, app development, and the important issue of security and regulatory approvals.

This session will be an opportunity for STARS participants to explore and suggest high performance sport measures which might be useful in the future, and how emerging sensor technologies might support developing those measures.

PRESENTED BY:



Professor  
Chun  
Wang

Chun Wang is currently a professor and the Head of School of Mechanical and Manufacturing Engineering at the University of New South Wales (UNSW), Sydney, Australia. Having held leadership appointments in government and university sectors over the past thirty years, he works at the interface of fundamental discovery research and translation to practical applications in partnership with diverse companies. He was elected Fellow of the Australian Academy of Technology and Engineering in 2018 in recognition of his achievements and leadership in research and impact. He currently leads a research group focused on multifunctional composite materials for sensors, actuators, energy storage, and high-performance structures under extreme environments. He is currently the Director of the ARC Research Hub for Connected Sensors for Health, which was awarded in 2021 to bring together over 30 companies and 63 investigators to co-design, verify, and certify connected health sensors.



Professor  
Allan  
Hahn OAM

Allan Hahn was appointed by Dick Telford as a senior physiologist at the AIS in 1984. After the success of Allan's talent identification work, he turned his attention to altitude training where he and his colleagues conducted research that eventually led to altitude training becoming a mainstay in athlete preparation in Australia.

In 1994, Allan became Head of AIS Physiology and was part of a team of scientists that undertook extensive research into maximising performance in the hot conditions expected at Atlanta. This led to the first use of cooling vests by Australian athletes. In 1998, AIS Physiology commenced a major research project to develop a test for EPO. The work resulted in IOC approval of the test for the Sydney Olympics.

After the Sydney Olympics, Allan recognised the potential for emerging technologies to enable increased measurement of athletes in the field. He successfully led the AIS into a CRC for Microtechnology that yielded the first combined use of inertial sensors and GPS in Australian high performance sport and laid the foundation for the establishment of spin off company Catapult Sports. Allan continues his work today in a role that guides research at the Queensland Academy of Sport.





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