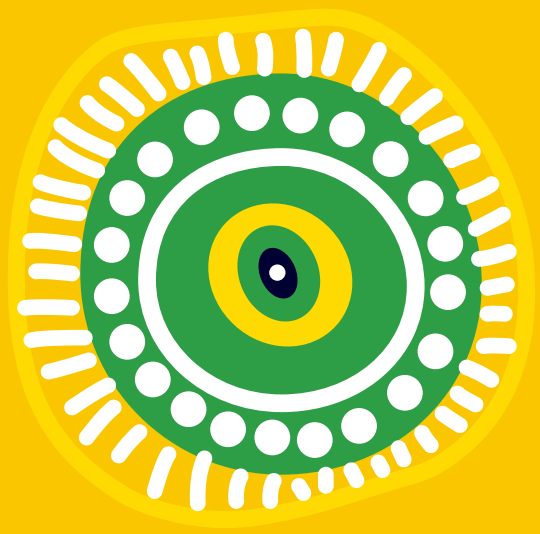
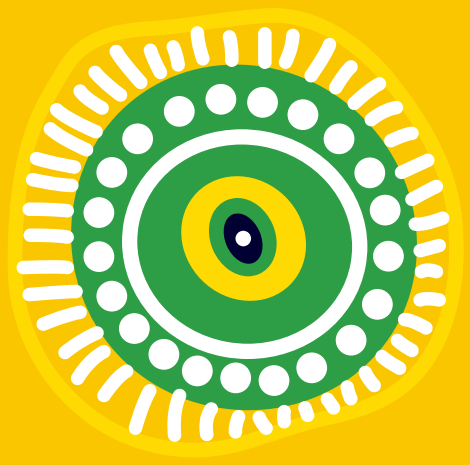
AIS

SPORTS TECHNOLOGY & APPLIED RESEARCH SYMPOSIUM (STARS)





Australian Sports Commission Acknowledgement of Country

The Australian Sports Commission (ASC) acknowledges the Traditional Custodians of the lands where its offices are located, the Ngunnawal people and recognise any other people or families with connection to the lands of the ACT and region, the Wurundjeri Woi-wurrung people of the Kulin Nation, the people of the Yugambeh Nation and the Gadigal people of the Eora Nation.

The ASC extends this acknowledgment to all the Traditional Custodians of the lands and First Nations Peoples throughout Australia and would like to pay its respects to all Elders past, present and future.

The ASC recognises the outstanding contribution that Aboriginal and Torres Strait Islander peoples make to society and sport in Australia and celebrates the power of sport to promote reconciliation and reduce inequality.

STARS Sessions

Date & Time (AEDT)	Theme	Presenter/s
DAY 1 - Wednesday 15 November		
9:00am – 10:00am	**Q&A with Pat Howard, ASC EGM Strategy, Insights, and Innovation.**	**Pat Howard** ASC
11:00am – 12:00pm	**Building an Innovation Hotspot - Possibilities Towards Brisbane 2032**.	**Lucy Cameron** CSIRO
1:00pm – 2:00pm	**Olympic Battle Plans: The Story Behind the AIS Combat Centre**	**David Martin** Apeiron Life
2:30pm – 3:30pm	**Metascience in Sport - Research Quality and Risk of Bias in Sports Science and Medicine**	**John Warmenhoven** UTS/AIS
4:00pm – 5:00pm	**The Australian Centre for Sports Aerodynamics - Getting Ready for Take Off**	**Kevin Tabotta** SASI
DAY 2 -Thursday 16 November		
9:00am – 10:00am	**A Life in coaching**	**Iryna Dovoskina** Athletics Australia
11:00am – 12:00pm	**Longitudinal Research: Might we longitudinally research athletes entering our pathways, into their sporting careers and beyond?**	**Mick Drew** Joint Health Command
1:00pm – 2:00pm	**Driving Innovation in Rowing**	**Martyn Binnie** WAIS
2:30pm – 3:30pm	**If I knew then, what I know now – How might NSOs better engage with Australia's $4.2 billion sports tech sector?**	**Cam Vale** ASTN
4:00pm – 5:00pm	**Defence Science Technology Group (DSTG) – Research into optimising human performance**	**Renee Atwells** DSTG
DAY 3 - Friday 17 November		
9:00am – 10:00am	**Wild Ducks - The Art of the Performance**	**Andy Walshe** Liminal Collective
11:00am – 12:00pm	**Quantum sensors – how realistic is it that we'll be using quantum sensors in sport before 2032?**	**Warwick Bowen** UQ
1:00pm – 2:00pm	**Little Red Riding Hood: Enhancing athlete characterisation - unlocking individualised training while promoting interdisciplinary engagement.**	**Kate Slattery & Jamie Stanley** UTS
2:30pm – 3:30pm	**Automating the collection of spatio-temporal and kinetic performance parameters using computer vision**	**Marion Mundt** UWA

Q&A with Pat Howard, ASC EGM Strategy, Insights, and Innovation

9:00am – 10:00am | Wed 15 Nov | Day 1

The Australian Sports Commission has established a new group called, ‘Strategy, Insights and Innovation’ that will focus on enabling sports to deliver on their plans and strategies through data, innovation, and cross collaboration.

The new Executive General Manager of that group is Pat Howard. This Q&A session with Pat will explore his background, the changes he’s witnessed in the use of science and technology in sport, and how his new role functions within the ASC.

Presented by **Pat Howard**

Pat Howard is the new Executive General Manager of Strategy, Insights, and Innovation at the Australian Sports Commission. Pat has a background as an elite rugby player having played for the ACT Brumbies, Leicester Tigers and twenty caps for the Wallabies where he followed in the footsteps of both his grandfather and father.

After his playing career, Pat successfully transitioned into coaching where he took Leicester to a Premiership title in 2007, before returning to Australia for a highly successful career in business. He also undertook very high-profile sports administration positions with Rugby Australia and Cricket Australia. Just prior to taking this position at the Australian Sports Commission, Pat was CEO of Sports Tech company MSL Solutions.

Building an Innovation Hotspot - Possibilities Towards Brisbane 2032

11:00am – 12:00pm | Wed 15 Nov | Day 1

An innovation hotspot is a town or city, state, precinct, or well-defined and connected group of regional businesses, which can be seen to be growing and innovating disproportionately faster than its peers in the same country. Obviously, Silicon Valley has become synonymous with the idea of an innovation hotspot, to the point where any other similar endeavours are labelled, ‘the Silicon Valley of …’.

In terms of sports technology, there are examples both globally and domestically where the combination of skills, finance, culture, mission, technology, and place combine to produce some interesting capabilities. However, they fall short of being globally recognised as an innovation hotspot.

Lucy Cameron has studied innovation hotspots, and her book, ‘Building an Innovation Hotspot – Approaches and Policies to Stimulating New Industry’ can be read as a ‘how to’ guide to establishing an innovation hotspot. In this session, Lucy will provide a snapshot of the key ingredients to an innovation hotspot, and opening discussion as to whether building an innovation hotspot in sports technology is a consideration as part of a Brisbane 2032 legacy.

Presented by **Lucy Cameron**

Lucy is a digital transformation and new industry development expert with CSIRO’s Data61 group. Her book, 'Building an Innovation Hotspot' outlines the policy levers used by governments and industry to support new industry development and local innovation. She is also a leading proponent of foresight, digital transformation, and innovation in the Asia Pacific region.

Lucy has been the leader and convenor of the Asia Pacific Foresight Group, she led the Vietnam's Future Digital Economy project, a major collaboration between CSIRO and Vietnam's Ministry of Science and Technology, and was one of just four Australian women named as GovInsider's Women in GovTech in Asia in 2018. She was also the inaugural speaker in the Australian Women in Blockchain series.

As a previous Queensland Government Smithsonian Fellow, Lucy has a special interest in policy leading to innovation hot-spots. Commissioned reports, keynote talks, and workshops conducted as part of the Data61 Insights team have advised government and industry on policy and actions to exploit new technology for productivity gains and local business development. This involves combining digital transformation policy with foresight techniques.

Prior to working at CSIRO's Data61 Lucy worked for 10 years in digital economy and productivity policy in the Queensland Government. Her PhD from the University of Queensland studied the impact of broadband on regional development.

Her professional interest lies in determining the geographic patterns of innovation, and what governments and businesses can do to effectively and cost-efficiently promote and exploit innovation.

Olympic Battle Plans: The Story Behind the AIS Combat Centre

1:00pm – 2:00pm | Wed 15 Nov | Day 1

Australia did not win any Gold Medals at the 1976 Summer Olympic Games in Montreal. As a country, Australia is geographically isolated, has a small population of 25.7 million and celebrates many non-Olympic sports such as netball and AFL that attract talent away from Olympic sport. Thus, the odds that Australian Olympians will be successful are low. However, for a nation that takes their sport seriously, science and innovation have come to the rescue to give coaches and athletes an edge. Today, many of Australia's elite athletes enjoy state-of-the-art facilities, experienced coaches, and well-trained Sport Medicine and Sport Science expertise. Australian ingenuity and commitment maybe responsible for recent success in the 2020 Olympic Games in Tokyo where 17 Gold medals were awarded to Australia (6th on the medal table). It appears that innovative thinking is allowing Australia to "punch above its weight" in international sport.

The story of the Combat Centre begins with informal discussions between AIS sport scientists committed to "making a difference". More specifically, scientists were asking the question "What can the AIS do to increase Australian Olympic Success?" A preliminary review of Olympic Combat sports revealed many relevant findings such as 1) 53 Olympic Gold medals were awarded to Combat athletes (judo, wrestling, boxing and taekwondo), 2) in 2012, Australia was the only country ranked in the top 10 that didn't win any Olympic Combat medals, 3) the diversity of nations winning combat medals is high, 4) many "favorites" did not win gold in combat sports due to injury and upsets, 5) costs required to support Olympic combat athletes is relatively low, 6) both men and women compete in combat sports and 7) many sport science and sports medicine themes are shared across combat sports (e.g., intermittent high-intensity exercise, injuries, concussion, making weight, skill development, competition analysis). The rationale for why Australia should commit to Combat Sports was strong, the AIS had the facilities and expertise available to help, but progressing this idea relied upon funding opportunities and timing.

The arrival of a new AIS Director in 2012 created a receptive environment for bold initiatives. A Combat Centre proposal was developed that was compatible with Winning Edge and Sports Draft initiatives. Once the project met approval by AIS leadership, individual combat sports were contacted to secure their support and AIS sport science talent was recruited from other programs to work within the Centre. The final step was to secure a location on site and recruit PhD students to connect with coaches and drive many of the special projects. In a few short years the Australian Combat Centre began to partner with other organizations (2nd Commando Regiment, Universities) and make contributions to the international Combat Sport Research Community (published papers, ACSM Symposium). International collaborations were made possible through IOC Solidarity Grants (Japan). The Combat Centre generated positive publicity and importantly, international results began to improve. Over the past 10 years, The AIS Combat Centre has grown into the Combat Institute of Australia (Combat AUS) who remain focused on international results. Upon reflection, the AIS Combat Centre is a unique example of how AIS sport scientists can "think big" and make a substantial impact on Australian Olympic success.

Presented by **David Martin**

Dr David T Martin has more than 30 years of experience working with Olympic and Professional coaches and athletes as an applied sport scientist and high-performance director. During this time, Dr Martin has published 120 peer-reviewed scientific publications investigating topics such as talent identification, training load, fatigue management, competition analysis, altitude training, and thermoregulation. At the Australian Institute of Sport, Dr Martin was a Senior Physiologist, a National Sport Science Coordinator for Cycling, and the inaugural Director of Performance for the AIS Combat Centre. More recently, Dr Martin worked in the NBA as the Director for Performance for the Philadelphia 76ers (2015-2019) and currently is Chief Scientist/Director of Performance for Performance Health Science a Bay Area start-up company focusing on health and fitness throughout decades of life. Dr. Martin continues to consult with high-performance sport organizations including the Queensland Academy of Sport.

Metascience in Sport - Research Quality and Risk of Bias in Sports Science and Medicine

2:30pm – 3:30pm | Wed 15 Nov | Day 1

In a first, the AIS has commissioned a Post Doctoral research fellow to conduct research focused on metascience in sport science and medicine studies. Specifically, the project will explore avenues for improving the quality of scientific research in competitive sport. This project will introduce the concept of meta-science to the sport community, demonstrate why this is necessary for sport, and provide some potential avenues for how sport science and medicine research could progress in the future.

Presented by **John Warmenhoven**

John is a research fellow in meta-science in sport at the University of Technology, Sydney and the AIS. John comes originally from an applied background in sports biomechanics and human movement research, before transitioning into analytical and data-science roles inside and outside of sport. He is interested in communication and knowledge transfer of different analytical concepts and processes between theoretical and applied areas of work. His research fellowship is focussed on improving the quality of research and science conducted in sport, to help scientists and coaches make better decisions.

The Australian Centre for Sports Aerodynamics - Getting Ready for Take Off

4:00pm – 5:00pm | Wed 15 Nov | Day 1

The Australian Centre for Sports Aerodynamics (ACSA) will soon be commissioned, and the final preparations are being made on Australian sports' newest high performance infrastructure. In this STARS session, Kevin Tabotta, the HP Manager of the South Australian Sports Institute SASI) will provide information on the features of the wind tunnel and the value that sports will obtain from wind tunnel testing. While wind tunnel testing is common for some sports, this new infrastructure offers opportunities other sports may not have considered. As a critical part of the national HP sports infrastructure, ACSA may provide opportunities for athletes to shave off precious seconds to their performances in ways never considered.

Presented by **Kevin Tabotta**

Kevin is the High Performance Manager at the South Australian Sports Institute. He is currently leading the technical design and development of two state-of-the-art sporting infrastructure projects: the new Australian Centre for Sports Aerodynamics (Wind Tunnel) and SASI's new High Performance Centre at Mile End, Adelaide. Both projects are scheduled to be completed in the next 12 months.

Kevin has over 27 years of international experience in high-performance sport coaching and leadership roles. He has served as Performance Director for the Australian Cycling Team and campaign cycling team lead for three Olympic cycles until 2016. In 2017, Kevin moved full-time back to Europe for five years to take on the role of Performance Director for the World Tour men's and women's team of Team Jayco-Alula (GreenEDGE), pursuing success in the world's biggest cycling events, including the Tour de France and Giro d'Italia.

A life in Coaching

9:00am – 10:00am | Thu 16 Nov | Day 2

Many countries would be happy with 70 international medals won at Paralympic Games, World Championships and Commonwealth Games. As a coach, Iryna Dvoskina achieved medals 69 and 70 with her athlete James Turner's stunning double gold medals in the 100m and 400m at the recent Paris Athletics World Championships. This achievement ranks Iryna as among the truly great coaches in Australian sporting history.

In this Q&A session, Iryna will be asked about her life prior to coming to Australia from the Ukraine, how she became a coach, and her coaching philosophy. As a Paralympics coach, Iryna has had to master the integration of science, technology, engineering, and data to achieve her outstanding performances, along with all the human factors related to coaching.

The session will be an opportunity for the audience to engage with one of the great Paralympic coaches of all time.

Presented by **Iryna Dvoskina**

Iryna has two Masters degrees, the first one in neurophysiology and second one in coaching. She was a head coach of Ukrainian National Paralympic athletics team from 1995 to 2002.

Iryna came to Australia in 2003 to be closer to her mother Fira, herself an accomplished track and field coach of Australian athletes like Steve Solomon. Iryna was recruited by the Australian Institute of Sport to coach Paralympic Track and Field sprints and jumps athletes. At the 2004 Athens Paralympics, she coached athletes including Heath Francis, Lisa McIntosh, and Amy Winters who combined for nine medals.

At the 2008 Summer Paralympics, she was the coach of five Australian athletics competitors who combined for an incredible thirteen medals. Of note in 2008 was Iryna's coaching of the great Evan O'Hanlon who would go on and win an incredible seven Paralympic medals over four Paralympic Games, including five gold.

In 2012, Iryna coached Evan O'Hanlon and Scotty Reardon to Paralympic medals, and at Rio, Scotty broke through for a memorable Paralympic gold medal. At the Tokyo Paralympics, Iryna coached Vanessa Low to a gold medal, and James Turner to one gold and a silver.

Iryna is married to Paralympic Swim coach Yuriy Vdovychenko whose athletes have won 47 international medals.

Longitudinal Research: Might we longitudinally research athletes entering our pathways, into their sporting careers and beyond?

11:00am – 12:00pm | Thu 16 Nov | Day 2

The establishment of the Athlete Management System in 2013 enabled the Australian sporting system to collect data on elite athletes in a centralised digital system. While not perfect, the AMS at least captures parts of an athlete's journey, and depending on the sport, it may be as early as when they first enter an elite pathway. Longitudinal research is a type of research study that involves collecting data from the same group of individuals or subjects for an extended period. This approach allows researchers to track changes and developments within the group over time and is particularly valuable for studying various aspects of human life, behaviour, health, and development.

Our friends at Defence have embarked on longitudinal research, and a former member of our system Dr Mick Drew oversees this research endeavour. In this session, Mick will provide an overview of the research, the potential benefits, and the challenges. As a former part of our system, Mick will challenge us as to whether this kind of research might be considered in sport.

Presented by **Mick Drew**

Dr Drew has dedicated his career to improving the health and performance of Australians. Dr Drew has a Bachelor of Physiotherapy (Honours), Master of Clinical Epidemiology, PhD in Physiotherapy Contribution), Fellow of the Australasian Institute of Digital Health, and a Fellow of the Australian Sports Medicine Federation. Dr Drew is an adjunct Associate Professor at University of Canberra and has supervised 16 PhD and 1 Masters Students across physiotherapy, infectious disease, health economics, nutrition, biomechanics, sport science, epidemiology and sports performance.

Dr Drew commenced as Assistant Secretary Health Protection and Policy in Joint Health Command on 23 January 2023. This branch supports ADF capability through health surveillance, research, policy and senior technical/medical advice aimed at preserving the force to maintain capability while optimising members' health over their life-course. He was previously the Director of Health Research within Joint Health Command from 2022-2023. Prior to that he worked at the Australian Institute of Sport for over a decade in various roles including Senior Sports Physiotherapist, research manager, team physiotherapist, which included many overseas competitions and leading an innovations program to improve Australian Olympians' health and performance. Some key outcomes of this innovation program included demonstrably reducing injury rates and retraining a workforce to deliver performance-driven prevention and healthcare services. Prior to his AIS role, he worked in Private Practice in Newcastle and worked as a Physiotherapist and Data Analyst for the Newcastle Knights.Since 2018 Dr Drew has worked with the University of Canberra to develop the Master of Applied Clinical Epidemiology (Sport) program which was a world first degree program to give practitioners the skillset to prevent health problems in high performance environments. Dr Drew has over 75 peer-reviewed publications and presented over 60 conference presentations including invited and keynote presentations. In 2018, his team at the AIS received an Australia Day Award for their work in improving athlete health.

Driving Innovation in Rowing

1:00pm – 2:00pm | Thu 16 Nov | Day 2

As a sport, Rowing offers the kinds of technical and scientific challenges that attract cutting edge minds. International competitive rowing has become a site where national science, technology, engineering, and data science play out competitively as the margins between winning and losing can be literally centimetres at the end of a 2000m race. In Australia, there is a coordinated effort to drive innovation in Rowing, to ensure that Australian athletes, coaches and their support personnel are keeping pace with their international competitors. In this STARS session, Martyn Binnie (WAIS) will share some of these innovation projects, and how they are nationally coordinated. The session will also detail where Rowing's research directions are headed after Paris.

Presented by **Martyn Binnie**

Martyn is an applied sport scientist with over 13 years of experience in high performance sport. He completed his PhD with the Western Australian Institute of Sport (WAIS) in 2013, and since then, has been a strong contributor to the WA High Performance Sport Research Centre, supervising 9 PhD projects, 14 honours/master projects, and contributing to 35 applied research publications. In 2021, he moved into his current role as the full-time performance scientist for the WAIS Rowing program where he is responsible for Physiology and Biomechanics servicing to the program. In his time with WAIS Rowing, he has also been heavily involved with the National program, contributing to the preparation and competition support for numerous age category and senior level teams.

If I knew then, what I know now – How might NSOs better engage with Australia's $4.2 billion sports tech sector.

2:30pm – 3:30pm | Thu 16 Nov | Day 2

Cam Vale has 20 years' experience as a sports administrator, including interim CEO of North Melbourne Football Club, CEO of Hockey Australia, CEO of Baseball Australia, and is the current President of the Oceania Hockey Federation. He has experienced the ups and downs of being an NSO CEO and has an intimate knowledge of the pain points.

His current role as General Manager of the Australian Sports Technology Network has given him visibility of around 700 companies in Australia that identify as sports tech companies. Collectively, the Australian sports tech sector is valued at $4.2 billion. Through his time at the ASTN, Cam has reflected on how he may have extracted more value from Australia's sports tech sector when he was an NSO CEO, if he had had more time to consider where various benefits may have been possible. Time is something that few NSO CEOs have, and the time to consider various sports technologies is not usually a high priority.

Australian sport is on the 'green and gold' decade, and NSOs could be riding a wave of increased interest in their sports as Brisbane approaches. Might Australia's burgeoning sports tech sector offer NSOs possibilities to co-create sustainable value to future participants, revenue streams, and affordable solutions to constant pain points? In this session, Cam Vale will take us through his journey, and challenge the STARS audience to look at Australia's sports tech sector as an opportunity to create sustainable value across Australian sport.

Presented by **Cam Vale**

With 22 years of sports administration experience as an executive leader across four sports, Melbourne based Cam Vale has a proven history at the highest levels of sports administration in Australia. A Chartered Accountant, Vale has been CEO of two National Sporting Organisations – Baseball Australia and Hockey Australia, and COO of North Melbourne Football Club in Australia's biggest sport, Australian Football League, where he was awarded the prestigious Graeme Samuel Scholarship from the AFL in 2012. Across these roles, Vale had a proven record in leadership to deliver commercial, high performance, international stakeholder and grassroots success.

Since October 2021 Vale has been running his own sports management company – GLO Sports, which is focused on International and Domestic Sporting Event placement in Oceania, Sports Technology and assisting international entities with their business operations in Oceania.

Since August 2022, Vale has been working with Spring Media on creating their Oceania office and presence, to complement their extensive reach already in Europe, North America, Asia and Africa.

- GLO Sports Clients:
- Australian Sports Technologies Network
    - Spring Media
- Sports Marketing Australia
- IMPACT Wrestling
- FITE TV
- Aside from GLO Sports, Vale holds other key roles as:
- General Manager of Australian Sports Technologies Network (ASTN)
- President of Oceania Hockey Federation (OHF) and Board Member of the Federation International Hockey (FIH)
- Majority owner of Oceania Pro Wrestling (OPW)
- Board Member as Finance Director for Sports Environment Alliance (SEA)
- Sub-Committee Member of Lacrosse Australia's Finance & Audit Committee

Defence Science Technology Group (DSTG) – Research into optimising human performance

4:00pm – 5:00pm | Thu 16 Nov | Day 2

Defence Science and Technology Group (DSTG) brings together interdisciplinary expertise from across Australia and around the world to address Defence and national security challenges.

DSTG's role is to work closely with the Australian science, technology and innovation eco-system to deliver scientific advice and solutions that provide capability enhancement for Defence and the national security community.

In carrying out their role, research carried out by DSTG can sometimes overlap with the interests of the elite sporting community. Endeavours that seek to optimise human performance will often have interest among organisations that are charged with preparing humans to perform when it matters most. It is through this lens, that this STARS presentation will explore DSTG, their strategy and how they go about their business, including research projects that seek to optimise human performance during some of the most critical scenarios that humans can encounter.

Presented by **Renee Atwells**

To be confirmed

Wild Ducks – The Art of the Performance

9:00am – 10:00am | Fri 17 Nov | Day 3

As a company, IBM frequently emphasizes the importance of cultivating 'wild ducks'. This concept draws inspiration from a story by the Danish philosopher Soren Kierkegaard, in which he narrates the tale of a man who fed wild ducks until they lost their wildness. The underlying message is clear: **while it's possible to domesticate wild ducks, once tamed, they lose their innate sense of adventure and exploration.**

According to IBM's philosophy, all successful businesses require individuals who embody the spirit of wild ducks, and effective leaders understand the value of preserving their untamed nature.

In the realm of sports, unconventional thinkers often serve as catalysts for genuine transformation. Be it creative athletes like Dick Fosbury and Simone Biles, who pioneer new movement, or the unorthodox coaches like Phil Jackson, who achieved success through the principles of Zen Buddhism, or even the visionary engineers and scientists behind innovations like winged keels, Paralympic blades, and sharkskin swimsuits—sport inherently demands creativity.

It's important to recognize that sport itself is a testament to human creativity.

In this session, Andy Walshe will embark on a journey through some of his work, which has been driven by a lifelong fascination with human performance. He has steadfastly resisted attempts to conform him to convention, choosing instead to roam freely within the realm of creative possibilities. The presentation will include Andy's time with Red Bull, his involvement in the development of the new San Antonio Spurs Human Performance Centre, and his work with US Special Operations Command to support creativity as they reimagine the future battle space.

At the very least, this session promises to challenge and provoke conventional thinking.

Presented by **Andy Walshe**

Dr. Andrew Walshe (Andy) is a globally recognized leader and expert in the field of elite human performance. For over 20 years the Australian native has been focused on the goal of "de-mystifying talent" by researching and training individuals and teams across a vast network of world-class programs in sport, culture, military and business settings.

Dr. Walshe is currently the Director of High Performance for Red Bull, where he works with hundreds of international athletes and cultural opinion leaders; supervises a team of industry-leading scientists, engineers, physicians and technologists to develop and implement elite performance models. Dr. Walshe was the Performance Manager for Red Bull Stratos, leading the performance plan for Felix Baumgartner's record-breaking jump to Earth from the stratosphere in 2012.

In 2013, Dr. Walshe was awarded 'Outstanding Contribution to Performance Innovation Award' at the prestigious Leader's in Performance Conference.

Dr. Walshe founded "Glimpses", the annual Human Potential Red Bull conference, which is now in its third year. This conference is a two-day symposium that brings together world-class talent from all areas of life to illuminate our understanding of human potential. The highly interactive symposium is designed to challenge our belief systems and shift the paradigm of what we think is possible.

Prior to joining Red Bull, Dr. Walshe designed a highly successful performance program for the U.S Olympic ski and snowboard teams, guiding their athletes to victories on the world stage. Dr. Walshe has also held Senior consulting roles at the Australian Institute of Sport, NSW Institute of Sport, and Queensland Academy of Sport

Quantum sensors – how realistic is it that we'll be using quantum sensors in sport before 2023?

11:00am – 12:00pm | Fri 17 Nov | Day 3

On 10th August 2023, a landmark event entitled, 'Quantum Meets Sport' was held at the AIS in Canberra. This was Australia's first ever event bringing together world leading quantum experts and representatives of the sport sector. In this STARS session, the Chair of that event, Professor Warwick Bowen, explores the potential integration of quantum sensors into sports, assessing its feasibility and practicality.The session delves into several key aspects:

1. Quantum Sensor Technology: A brief introduction to quantum sensors, explaining their working principles and highlighting their unique capabilities. Quantum sensors are incredibly sensitive and can detect subtle changes in physical properties, such as acceleration, magnetic fields, and temperature.
2. Potential Applications in Sports: Examining the potential use cases of quantum sensors in sports, including athlete performance analysis, injury prevention, and equipment optimization. Quantum sensors could provide coaches and athletes with real-time data on biomechanics, allowing for more informed training decisions.
3. Challenges and Barriers: Discussing the challenges and barriers that must be overcome for quantum sensors to be integrated into sports effectively. These challenges may include cost, miniaturization, and data interpretation.
4. Timeline and Future Outlook: Speculating on the timeline for the adoption of quantum sensors in sports and the realistic potential for widespread use by 2032. Factors such as technological advancements, investment, and regulatory approval will play a significant role in determining the pace of adoption.

Ultimately, the session aims to provide a balanced perspective on the feasibility of integrating quantum sensors into sports by 2032. While the potential benefits are promising, various challenges and uncertainties must be addressed before quantum sensors can become a staple in the world of sport.

Presented by **Warwick Bowen**

Warwick Bowen is recognised both nationally and internationally for research at the interface of nanotechnology and quantum science; including bioimaging, nanophotonics, nanomechanics, quantum optomechanics and photonic/quantum sensing. He is a Fellow of the Australian Institute of Physics, is Director of the Australian Research Council Centre of Excellence in Quantum Biotechnology, and leads the Quantum Optics Laboratory at UQ.

The research in Professor Bowen's lab spans from the very fundamental, e.g. how does quantum physics transition into our everyday world at large scales? to applied, e.g. developing next generation sensors for medical diagnostics and navigation. To pursue this research, his lab works in close partnership with industry and uses state-of-the-art facilities for nanofabrication, nanoanalysis, precision optical measurement and deep cryogenic refrigeration available in-house or on campus at UQ.

Warrick has supervised more than thirty postgraduate students, who have been recognised with prizes such as Fulbright Scholarships, an Australian Youth Science Ambassadorship, a Springer PhD theses prize, the Queensland nomination for the Australian Institute of Physics Bragg Medal, the Australian Optical Society Postgraduate Student Prize and UQ Graduate of the Year.

Little Red Riding Hood: Enhancing athlete characterisation - unlocking individualised training while promoting interdisciplinary engagement.

1:00m – 2:00pm | Fri 17 Nov | Day 3

An accurate and effective framework for athlete characterisation is the foundation of any impactful individualisation in training prescription to improve performance. To date, such a framework that encompasses a holistic view of athlete performance does not exist. By creating a robust framework for athlete characterisation, this project aims to enhance individualisation of training and promote interdisciplinary engagement to maximise performance outcomes. Led by SASI, UTS and a range of other partners including AusCycling, this project has potential to refine best practice systematically across multiple able-bodied and para sports.

At the core of high-performance sport, coaches are looking to evaluate athlete potential, assess their current status, and understand how athletes are responding to a training program while maintaining a performance focussed lens. The critical role of the sport scientist is to support this endeavour by providing innovative solutions to enhance training and performance.

In this session, Jamie and Katie will provide the STARS audience with details of the 'Little Red Riding Hood' project, as well as how they plan to implement its findings.

Presented by **Jamie Stanley**

Jamie is a sports physiologist specialising in performance and recovery optimisation working with current world record holding, Olympic, Paralympic, Commonwealth, and World champion athletes. He is passionate about developing next practice in the daily training and competition environments and influencing transformational change at a system level that will have a lasting performance impact over time. Jamie is in a unique position holding roles with three different organisations. He is currently the Lead Physiologist for the Australian Cycling Team, Training Insight Lead for the Swimming Australia High Performance Unit and Senior Physiologist at the South Australian Sports Institute. Jamie also holds an adjunct research position at the University of South Australia and was the 2020 Exercise and Sport Science Australia Accredited Sport Scientist of the year

---

Presented by **Katie Slattery**

Dr Katie Slattery is a lecturer at the School of Sport, Exercise and Rehabilitation, UTS. A UTS alumni who began her sports science career as a physiologist at the NSW Institute of Sport (NSWIS) and then supported the women's track endurance cycling squad to the 2016 Rio Olympics as a performance scientist.

Her job as a performance scientist with an Olympic team took her to the highest levels of sport.

"We were going for gold in the team pursuit. Using a performance-centred approach, I worked closely with the coaches to forecast the

Katie Slattery bio continued…

performance required to win and then developed strategies that were in line with the team ethos and philosophy to best prepare the athletes."

"To do this, we leveraged the existing scientific literature and my own research to translate and apply these findings to our high-performance setting."

It was also her job to quantify training and provide in-competition support to the team. This included race analysis and scouting of competitors' performances to inform the coaches and athletes on how to best optimise our race strategy.

"The satisfaction is when all the pieces come together for the athletes. Looking back to when the team won the 2015 World Championships in a world record time, it was magic. Seeing the athletes in a state of flow. Knowing that they've done all the hard work and were in the best possible state of readiness to perform." Katie said.

Returning to the NSWIS as the coach of the endurance squad, she discovered the importance of holistic athlete development and the relational side of coaching. "If you look at the physical, technical, tactical and mental constructs in isolation you're not getting a full picture on how well the athlete will perform," she said.

Katie has now shifted her focus to concentrate on conducting research at UTS and teaching the next gen of sport and exercise practitioners. Taking her learnings as a sports scientist and a coach to explore how to optimise performance using both quantitative and qualitative research methods

Automating the collection of spatio-temporal and kinetic performance parameters using computer vision

1:00m – 2:00pm | Fri 17 Nov | Day 3

The collection of spatio-temporal and kinematic performance data is currently a manual, laborious and time-consuming post hoc process that relies on biomechanics domain knowledge to define the correct frames to analyse, annotate joint centres, and calculate relevant performance parameters.

Dr Marion Mundt was successful in an AIS grant application that seeks to develop an automated computer vision-based assessment tool, drawing on advanced machine learning techniques, to provide spatio-temporal and kinematic performance parameters of the high jump approach from 2D video.

To achieve this, the detection of gait events from 2D videos and the accuracy of pose estimation keypoints need to be assessed and the influence of those on performance parameters established. Using this information, a biomechanically-informed pose estimation model can be developed to provide relevant performance parameters required by the athlete, coach, and performance support staff.

Presented by **Marion Mundt**

Dr Marion Mundt is a Research Fellow in the UWA Tech & Policy Lab at The University of Western Australia, working with the Australian Institute of Sport to use and validate machine learning techniques to estimate kinematic and kinetic motion parameters from standard two-dimensional video. She received her PhD in Sport Science from the German Sport University Cologne for the application of artificial intelligence to motion analysis using inertial sensors. In 2022, she received the Hans Gros Emerging Researcher Award from the International Society of Biomechanics in Sport for her work in ‘bridging the lab-to-field gap’

Australian Government

Australian Sports Commission

ausport.gov.au

Leverrier Street Bruce ACT 2617
PO Box 176 Belconnen ACT 2616
+61 2 6214 1111