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Producing actionable data-driven insights to improve athlete and team performance

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BOND UNIVERSITY

INTERDISCIPLINARY

COLLOQUIUM ON SPORT

NEW FRONTIERS IN SPORT AND TECHNOLOGY

13 - 14 February, 2020

Thursday, 13 February

5.00pm - 7.00pm **Welcome Cocktail Function**
University Club, Bond University

Friday, 14 February

8.30am - 8.45am **Registration and Morning Coffee**
Lounge & Hallway, Level 3, Faculty of Law (Building 4), Bond University

8.45am - 9.00am **Opening Address and Acknowledgment to Country**
Case Study 2, Level 3, Faculty of Law (Building 4), Bond University
Professor Keitha Dunstan
Deputy Vice Chancellor (Academic), Bond University

9.00am - 10.00am **Keynote Speaker**
Dr Eric Windholz
Governing eSports: Public Policy, Regulation and the Law

10.00am - 10.30am **Morning Tea**

10.30am - 12.30pm **Presentations**

Peter Reaburn and Justin Keogh
Can new technology enhance sport performance and athlete wellbeing?: An academic perspective

Braedan van der Vegt, Adrian Gepp, Mark Johnman, Bruce Vanstone
Producing actionable data-driven insights to improve athlete and team performance

Chantal Simons, Lisa Martin, Luke Balcombe, Peter Dunn
Amendment of a validated screening tool to be implemented in athlete monitoring technology

Paul Smith, Anthony Bedford, Brendan Burkett
Automated classification of athlete movement in an elite sports match, methodology and application

12.30pm - 2.00 pm **Lunch**
Level 2, Faculty of Law (Building 4)

2.00pm - 2:30pm **Danny O'Brien**
The social impacts of a disruptive technology: Surf parks, and the importance of getting it right

2.30pm - 3.00pm **Sneha Raut and Metanshu Pawan**
Howzat! – The Evolution of Cricket with Technology

3.00pm - 3.30pm	**Afternoon Tea**
3.30pm - 4.00pm	**Daniel Brennan** *Making Waves: Surfing and Wave-pool Technology.*
4.00pm – 4.30pm	**Craig Dickson** *The Use of Video Technology in Sports Adjudication*
4.30pm – 5.00pm	Interdisciplinary Discussion and Closing Remarks
5.00pm – 6.15pm	**Closing Reception** Available in hallway outside Case Study 1 & 2

KEYNOTE PRESENTATION

ERIC WINDHOLZ

Eric Windholz is a Senior Lecturer and Associate with the Monash Centre for Commercial Law and Regulatory Studies.

Eric's research focuses on regulatory theory and practice, or what he describes as the science and art of modern regulatory practice. Through this research, Eric explores how regulation, public policy and the law intersect to inform regulatory regime design and implementation. Eric's research has been applied to the examination of regulatory regimes in important social and economic domains including occupational health and safety, disability services, the environment and most recently sport where he is currently researching the sophisticated national and transnational regulatory and legal orders through which sport is governed and regulated.

A strength of Eric's research is that it is not undertaken through one dominant discipline or perspective alone. Eric brings to his research a multi-disciplinary perspective, combining and connecting concepts across law, regulation, governance, public policy, public administration, business administration and economics. He also brings to it a unique combination of perspectives born from more than 25 years' experience working, first, in heavily regulated industries (in Australia, Hong Kong and New York), second as a regulator of industry and, now, as an academic specialising in regulatory theory and practice. This combination gives his research both a strong policy and practical orientation, enabling him me to bridge the gap between theory and practice, and between the law as written and the law as practiced.

Eric's multi-disciplinary and practical perspectives also are reflected in the wide variety of journals in which he has published. They include general law journals, specialist law journals (including in labour, business, environment and sports law), as well as journals specialising in public policy, public administration, health and safety policy and practice, and labour history. Eric also recently published his first book, Governing through Regulation: Public Policy, Regulation and the Law, with Routledge.

Eric has a PhD from Monash University, a MBA from Melbourne University, and a Bachelor of Economics and Bachelor of Laws (First Class Honours), also from Monash University. Eric also has a Graduate Diploma in Company Secretarial Practice and a Graduate Certificate in Academic Practice. Eric is a barrister and solicitor of the Supreme Court of Victoria and High Court of Australia, and a licensed legal consultant in the State of New York, USA.

KEYNOTE ABSTRACT

Title: Governing eSports: Public Policy, Regulation and the Law

Abstract: eSports is an enigma – at once a sport; a technological innovation; and a profit maximizing business. As a sport, it has much in common with traditional sports. It has leagues and franchises, teams and skilled players, competitions and tournaments, sponsors and spectators. At the elite level, it also has significant prize money and all the temptations and risks that come with it. As a technological innovation, it has created new markets and new value networks outside the control of sports' traditional hegemony. It also has developed faster than policy-makers and the law can keep up. And while many sports today generate significant revenues, eSports differ because of the primacy of its profit motive. Unlike traditional sports, it does not see itself as the custodian of artefacts of great social and cultural importance. All of this gives rise to a plethora of governance, policy, regulatory and legal issues. The purpose of this paper is to examine these issues through the lens of regulatory scholarship. Regulatory scholarship recognises that society today is both more diverse and increasingly complex, with legal and regulatory functions being undertaken by a variety of different actors (state and non-state; public and private) across multiple sites (local, national and international) and through a variety of different mechanisms (rule based and non-rule based). Importantly for purposes of this paper, regulatory scholarship provides a rich literature that enables us to look beyond traditional doctrinal law to debate how regulatory and legal systems can best be designed to address the many complex issues and multiple perspectives inherent in the phenomena that is eSports.

PRESENTERS

PETER REABURN and JUSTIN KEOGH

Title: Can new technology enhance sport performance and athlete wellbeing?: An academic perspective.

Abstract: Internationally, the use of new technologies by high performance sport has increased exponentially in the last five years. Moreover, as big data becomes increasingly available, athlete management software databases are being widely used to collect, analyse and report on athlete performance, recovery and health status, reduce the risk of injury, and monitor player welfare. University exercise and sport science programs are being required to embrace and implement new technologies in order to deliver programs that are attuned to industry and market needs. Currently, three major technologies have been embraced by high performance sport. First, wearable GPS technology such as Catapult or Statsport that uses GPS tracking to monitor player movements and workloads in real time during both training and competing. Second, video-analysis technologies such as Sportscode or Nacsport that can identify and analyse technical aspects of performance during both training and competition. Finally, Athlete Management Systems such as Edge10 or Smartabase that enable data related to both performance and wellbeing to be collated, analysed and reported to inform decision making for coaching and support staff. The aim of this presentation is to present a brief overview of these technologies and discuss both the strengths and weaknesses of adopting new technologies within both the sport and a university setting.

BRAEDAN VAN DER VEGT, ADRIAN GEPP, MARK JOHNMAN, BRUCE VANSTONE

Title: Producing actionable data-driven insights to improve athlete and team performance

Abstract: In the continuing search for a competitive advantage, the collection and usage of data have become increasingly important to sports organisations, athletes and coaches. Data-driven analysis in sports has historically been focused on sports science pursuits but now, with increasing capabilities due to more advanced data collection in conjunction with the further development of relevant data analytics tools, there is room for further exploration into other aspects of sports, such as gameplay tactics. There is an opportunity to develop user-friendly tools that can translate the volume and variety of data available into actionable insights. This presentation sheds insights into how business intelligence applications, such as Microsoft Power BI, can be used to produce such actionable insights that can help improve team and athlete performance. By utilising AFL gameplay data, examples of actionable insights that can be produced, both pre-match and in-game, will be shown through an example dashboard. Additionally, while business intelligence applications are typically used by sports teams to display the results of descriptive analysis, we highlight their potential to display the results of more complicated statistical analyses and machine learning techniques for predictive analysis. We also discuss the potential of these techniques in helping sports teams optimise gameplay strategy and performance.

CHANTAL SIMONS, LISA MARTIN, LUKE BALCOMBE, PETER DUNN

Title: Amendment of a validated screening tool to be implemented in athlete monitoring technology

Abstract: Elite athletes are at high risk for mental health disorders (Gouttebarge et al., 2017). Stress may be a factor contributing to disorders such as psychological distress and athletic burnout. However, research regarding the monitoring of stress and stressors in relation to the mental health of this population is in its infancy. A mental health diagnosis concerned with the adjustment to stressors, is that of Adjustment Disorder (AjD). Limited research has been performed on AjD in athletes, with only one case study of a collegiate athlete with AjD reported (Shell & Ferrante, 1996). Knowledge of the stressors commonly experienced by athletes, and athletes' adjustment to these stressors, could form the basis of stress-related mental health monitoring. To investigate the types of stressors experienced by athletes and to screen for AjD, the validated Adjustment Disorder New Module 20 questionnaire (ADNM-20, Glaesmer, Romppel, Brähler, Hinz, & Maercker, 2015) was amended. The ADNM-20 consists of a list of stressors and screening questions. An athlete-specific list of 76 potentially stressful life and sport events was compiled. Four athlete specific screening questions were developed. Seven experienced sport psychologists reviewed the amendments. Based on their feedback, no stressors were removed, and 17 stressors were added. Some stressors were reworded or merged with existing

items, resulting in a list of 87 stressors. Three sport-specific screening questions were slightly reworded and all four were maintained in the questionnaire. The final amended ADNM-20 will be used to monitor elite athletes' adjustment to stressful events in life and sport.

PAUL SMITH, ANTHONY BEDFORD, BRENDAN BURKETT

Title: Automated Classification of Athlete Movement in an Elite Sports Match, Methodology and Application

Abstract: The purpose of this study was to demonstrate a novel method to automatically detect and classify human movement in an elite sports match. Recently there has been great interest in fitness tracking and movement in the health and recreation sectors that has led to the creation of the Human Activity Recognition (HAR) field. HAR is a process that combines the latest statistical methods of machine learning with electronic sensors and video analysis tools to detect or classify the activity that the subject is performing. However, HAR in sports has been limited to athletes performing a set routine in a laboratory environment, or identifying a high intensity event between periods of generally low work load. This research is the first known study to advance the research into practice by utilising these new technologies and classify the locomotion of athletes within elite sports match play. Specifically, the methodology used and how the output can provide greater insight into the game dynamics.

DANNY O'BRIEN

Title: The social impacts of a disruptive technology: Surf parks, and the importance of getting it right

Abstract: Just as iconic surf breaks can never be "undiscovered," nor can the recent emergence of artificial wave generation technology. The commercialisation of this technology has taken the form of surf parks. Surf parks are purpose-built facilities in which participants pay for time-bound surfing sessions in pools capable of artificially producing up to 1000 perfectly shaped waves per hour. Therefore, surf parks represent an important part of surfing's future and, as such, an opportunity for good in this sport. While Ponting (2017) and Roberts and Ponting (2018) discussed surf parks and sustainability-related issues, empirical work on the social impacts of surf parks in the communities that host them is missing. Earlier work demonstrated how negative impacts from surf tourism can be minimised and lasting community development outcomes can be achieved (Abel & O'Brien, 2015; Martin & O'Brien, 2017; O'Brien & Ponting, 2013; 2018; Ponting & O'Brien, 2014; 2015). These cases were characterised by community involvement in the planning and implementation of surfing infrastructure, governance and policy frameworks, and all were in developing country contexts. Surfing has also been utilised in numerous countries to support the mental health of combat veterans, healthy living behaviours among at-risk youth, and as physical therapy for the elderly and people with physical disabilities. This research is based on interviews with technology owners; surf park developers, owners, employees and customers; and members of local community groups where surf parks are located. The study aims to understand whether and, if so, how positive community development outcomes are achievable in the emerging surf park environment. There now exists a seminal opportunity in this sport to understand how this disruptive technology can be managed to minimise negative social impacts and encourage positive community development outcomes.

SNEHA RAUT and METANSHU PAWAN

Title: Howzat! – The Evolution of Cricket with Technology

Abstract: Cricket is the second most popular sport in the world with an estimated fan following of 2.5 billion people. The game itself came into existence in the beginning of 16th century and has been evolving since becoming England's national sports in the 18th century. The game is governed by the International Cricket Council (ICC), which has systematically led the game to flourish across more than 100 countries. With the passage of time, cricket has grown both on-field as well as off the field. Early use of technology in cricket was seen in the form of the Umpire Decision Review System (UDRS or DRS) and the Duckworth-Lewis-Stern method (DLS). These techniques have contributed to the decision-making powers of the umpires and act as perfect examples of synergy of technology and human. Cricket has become more attractive to a whole new audience with the advent of T20 (Twenty20) format. The format has catered to the demands of the fast-paced generation looking for a quick fun time. Moving further, technology has seeped into every aspect of

cricket with the introduction of stump mikes, helmet cams and Hawkeye to name a few technology enhanced applications. Modern technology is also playing a key role in monitoring the performance of the players. Coaches are using various forms of technology like real time GPS tracking to monitor the agility of the players at any point of time during the game. This allows the coaches with various modes of assessment for understanding the fitness of players in their teams. Thus, we see that technology is playing a vital role in each aspect of the game. Overall, this paper aims to analyze the evolution of Cricket with the use of technology in making it a sport of the masses.

DANIEL BRENNAN

Title: Making Waves: Surfing and Wave-pool Technology.

Abstract: The paper explores the significance of wave pool technology for the sport of surfing. The idea that a 'perfect wave' can be generated in a pool so that surfers compete by riding what is essentially the same wave has drastic implications for the current form of competitive surfing. The paper explores these implications by offering a broad internalist account of surfing which is then applied as an evaluative tool to the very recent competitive events which have run in wave pools. The paper ultimately questions whether the value of wave pool technology matches the internal values of surfing. Considering surfing's inclusion in the 2020 Olympic games, and the rollout of wave pool technology around the world, the paper makes a timely consideration of the role of technology in surfing.

CRAIG DICKSON

Title: The Use of Video Technology in Sports Adjudication

Abstract: The use of technological methods (primarily video technology) to aid in adjudication during sporting events as well as for post-game decision-making is an accepted part of modern sport. However, many of the systems employed by sporting organisations in this regard have only been introduced relatively recently, were often not universally welcomed and remain subject to frequent criticism for inaccuracy, being overly intrusive and too time-consuming.

Research revealed that the drive to incorporate technological advances for rule adjudication on the sports field mirrored the increasing use of technological devices in both law enforcement and legal proceedings. The growing use of technology to permit more accurate and timely decision making was expected to enhance and inform developments in the framework of procedural justice. As Drake J explained in 1994, in Elliott v Saunders, a leading judgment in the development of negligence claims resulting from injury sustained on the sports field:

"Where [a wrong decision of the referee] has led, for example, to a player suffering serious disciplinary action affecting his future, it must surely be right to use the video recording to correct an injustice. If it shows a referee made a mistake ... then it would be wholly wrong not to use the video."

This was a clear encouragement to the English footballing authorities to use video, while at the same time setting guidelines for its use – to help referees to make a definitive ruling and to correct injustices that have affected a professional's future earnings. As a consequence, the English Football Association (FA), closely followed by most other national sporting organisations, now uses video footage to allow a player to appeal against a sending-off or a caution, and it also uses video to charge players with disciplinary offences where the referee has missed them. The proposed presentation will however, concentrate on the use of video technology for in-game decision-making and post-game disciplinary adjudication, for what should be relatively uncomplicated decisions over scoring, game play and rules infractions. However, the acceptance of the use of video technology has been neither straightforward nor uncontentious – both in the legal and the sporting contexts. In fact, the use of technological advancements has been piecemeal as well as subject to numerous constraints and exceptions in the courts; a history that is mirrored by the contribution of technological developments in decision-making on sporting fields.

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