Institution: University of Portsmouth

Unit of Assessment: UoA 26 Sport and Exercise Sciences, Leisure and Tourism

a. Context

Research in this UoA adopts a multidisciplinary approach to understanding, protecting and enhancing human activity in sporting, occupational and survival scenarios. Research, and associated impact activities, are structured around three interrelated groups: *Extreme Environmental Medicine and Science* (EEMS), specialising in preparation for, protection from and performance in extreme environments; *Breast Health*, specialising in the biomechanics of the breast and breast support during activity, and *Human Performance and Health*, specialising in elite performance, occupational physiology, fitness standards and clinical exercise science.

The **types of impact** arising from this research include:

- Influencing and determining the treatment protocols, policies and training of those responsible for the rescue and treatment of immersion casualties at a national and international level.
- Improved business performance of commercial sports apparel and lingerie companies through the development of new products for breast support based on an innovative breast biomechanics method for product design and validation, as well as improved service by bra retailers through bra fitting training.
- Supporting and testing elite GB athletes prior to competition including the thermally challenging Olympics in Athens and Beijing. Developing the first occupational fitness and visual acuity standards for major UK organisations.
- Improved public understanding, health and safety through: an enhanced awareness of the risks associated with extreme environments (e.g. cold immersion) and ways of mitigating these risks (e.g. lifejacket usage); understanding of the factors contributing to breast health and enhancing the ability of women to make evidenced-based decisions on breast support during exercise.

As a result, **significant benefits** have been delivered to:

- International groups involved in the search, rescue and treatment of drowning, hypothermic and hyperthermia casualties, as well as those involved in educating the public on the hazards of environmental extremes. These include: the International Maritime Organisation (IMO) and the International Maritime Rescue Federation, US Coastguard, Royal National Lifeboat Institution (RNLI), Maritime and Coastguard Agency (MCA), Mountain Rescue, Surf Lifesaving GB and New Zealand, Moroccan SAR, Royal Netherlands SAR, US Lifesaving Association, UK and Canadian military SAR; Royal Society for the Prevention of Accidents, Royal Yachting Association (RYA), Yachting Australia; Marine Accident Investigation Branch (MAIB); a wide variety of international media organisations.
- Research and development teams working on product design within the lingerie and sports apparel industry including: Eveden; Sweatshop; Under Armour; Adidas and Shock Absorber.
- Occupational Groups such as the RNLI, MCA, Energy Institute (oil industry) and MoD (non-freezing cold injury)
- Sporting groups and agencies, such as professional and Olympic sports teams, UKSport, the Fuchs Foundation and expeditionary groups.
- The general public

b. Approach to impact

Our research groups adopt an integrated approach to fundamental and applied research; all of our applied output can be traced back to underpinning basic research programmes but, because it is often being driven by questions from end-users, our applied output is usually of immediate relevance to a range of outside agencies. The relevance of our research to end-users has directly informed our approaches to impact, examples include:

- **Direct commissioning of research projects by end-users** to address user-defined challenges on the basis of the unique research expertise within our research groups. Much of the work of our research groups is directly sponsored by outside agencies such as the RNLI, MCA, MoD, UKSport, Bra manufacturers. This work results in specific reports to these organisations (83 reports since 2008), the content of which is usually enshrined in policy or process. Examples include: search and rescue policies of the US Coastguard; fitness and eyesight standards for the RNLI, MCA and Oil Gas industry as well as separate studies in both the thermophysiology and psychology of elite human performance for UKSport, Amateur Swimming Association (ASA), Southampton and Portsmouth football clubs.

- **Working with a network of non-academic organisations to influence working practices.** Following peer review and publication, and with appropriate permissions, we work with relevant organisations that may not have sponsored the work but could benefit from it. Examples include guidelines for the search and rescue of immersion casualties provided to, and incorporated into, the policies of the Fire & Rescue Service and IMO. The Human Performance & Health group have provided workshops and one to one consultancy for the England RFU, Ajax Football Club, Hampshire CCC, British Triathlon, ASA and Welsh Athletics.
- **Building relationships with key sponsors**. From the inception of a project, relevant expert research staff work closely with sponsors to refine questions and agree approaches. All such projects have regular interim reports, both written and via meetings, and a final project report. This relationship often results in further funding and other initiatives, such as: a. Co-funding of Masters projects and PhD studentships to address questions from outside groups (e.g. current Ph.Ds on heat acclimation [UKSport/EIS funded]); ballistic protection and hyperthermia [MoD funded]; b. Staff from sponsors are co-funded to undertake higher degrees on a part-time basis (e.g. current MPhil student *Ramm* is Deputy Director of Ops, RNLI); c. Our staff become members of sponsor's committees (e.g. *Tipton*: Chair of UKSport Research Advisory Group; member of Health committees of RNLI and Energy Institute; Trustee of Surf Lifesaving GB; Patron of SARbot UK Charity).
- **Expert consultancy**. Our researchers have drafted international standards and guidelines for the IMO, International Task Force on Drowning Prevention, Fire & Rescue Service; devised the standard methodology for the evaluation of breast motion and bra function; and acted as a designated thermal laboratory for UKSport (Innovation Partners), as well as provided advice to the MCA, MoD, RNLI and EI on lifejacket use, thermophysiology and occupational health & fitness standards. Work is also undertaken for customers through the University of Portsmouth Enterprise Limited group, this includes provision of a Non-freezing Cold Injury clinic for the MoD Treasury Solicitors and performance-related psychologically-based advice to Middlesex County Cricket Club.
- **Tailored short courses and workshops.** The only exposure many organisations get to areas such as survival in the sea, drowning, climatic illnesses, breast health, acclimatisation strategies is through the research-based teaching provided by our researchers. For example, *Tipton* provides lectures annually on sea survival to the RYA and RNLI, he lectures on the hazardous pathophysiological response to immersion to medical students in London, Leeds and Birmingham. The Breast Health research group has delivered evidence-based Breast Science Workshops to the sports apparel industry (Nike, Adidas, Under Armour, Shock Absorber, Sweatshop, Alexandra Sports). A recent workshop programme with the UK's leading running retailer Sweatshop, resulted in a 40% increase in sports bra sales and a substantial economic benefit for the retailer.
- **Presentations at relevant occupational and professional conferences and publication in technical magazines**. We are regular contributors to the annual conferences of all our non-academic users, including those of the: Royal Society for the Prevention of Accidents; RNLI; Energy Institute; International Lifesaving Federation; Royal Lifesaving Society; Irish Water Safety; Surf Lifesaving GB; UK Mountain Rescue; various trauma care conferences; RYA; World Maritime Rescue Organisation; Belgium Resuscitation Secretariat; Netherlands Oil and Gas Exploration and Production Association, MODO clothing industry conference, UKSport's World Class Coaching Conferences.
- **Involvement of users in research itself.** Our research often involves field studies with occupational groups including those of the RNLI, Oil industry, MCA and elite athletic groups.
- **Public engagement to raise awareness of specific health and safety issues.** We have worked with relevant agencies to produce and deliver campaigns on water safety, for example the campaigns to encourage lifejacket usage such as "Useless unless worn" (UK: RNLI, HM Coastguard); "Stay on top with a lifejacket" (Maritime New Zealand); "Wear one for openers" (Maritime Australia). We have also been involved in water safety campaigns (e.g. RNLI "Respect Water" campaign August 2013) and appeared in, and helped write the script for, the RNLI water safety video "Cold Shock" (2010). Between 2008 and 2012 EEMS staff were involved in over 100 media appearances demonstrating and discussing the risks of immersion and reaching in excess of 150 million listeners and viewers. The Breast Health Group has

engaged media press coverage to over 60 million worldwide, public presentations (Women's Institute, Nuffield Health, MODA, All Woman Show), and television programmes (Channel 4 Sex Education Show, ITV This Morning). The Breast Science workshop has been delivered in general public forums such as The Women's Show and is due to be rolled out to school girls as part of a Breast Health Educational Intervention Study. Our researchers contribute to blogs (e.g. Forums for: the Athlete's Heart; Open Water Swimming; fishing; sea kayaking; mountain rescue; triathlon and others) and Twitter feeds to convey our research output to appropriate outside groups.

c. Strategy and plans

A key strategic aim for this UoA is to build on the approaches outlined above and maximise the impact of research activities. Specific objectives include:

- To capitalise on and strengthen our existing collaborations for the provision of research expertise and research-based evidence that underpins the development of products, policies and practices that improve the health, safety and performance of humans. For example, we are currently working more closely with the Energy Institute and the University of Portsmouth Ageing Network in the area of occupational fitness in older energy industry workers. We are also developing new collaborations with clinical breast health practitioners to promote the co-design of research projects and improve access to a range of external funding streams that promote economic and social impact.
- Prioritising internal support for research projects that address key sponsor challenges, involve key partners and include a range of impact activities. For example, we are working with the local Portsmouth Healthcare Trust to explore the use of inspiratory muscle training for the treatment of asthma. This work is being supported by funding from the University.
- We will continue to engage our research customers in all phases of the research process from the definition of the question to the practical interpretation and implementation of results.
- We are developing standard bra testing consultancy packages which will be marketed to bra manufacturers. These packages use the research methodologies that we have developed to generate a fast turnaround on product testing.
- Constructing a robust framework for the monitoring, assessment and evidencing of impact of research across the UoA and throughout the research lifecycle.
- Hosting events for key stakeholders and the general public that link with our research themes, promote our research and provide an opportunity for user engagement. We are aiming for at least two such events per academic year.
- Increasing participation in regional, national and international knowledge exchange conferences, networks and forums such as the National Water Safety Forum; International Lifesaving Society; Bodyscanning forum; BASES (2014 Student conference at Portsmouth); International Conference on Environmental Ergonomics (2015 Conference at Portsmouth).

Achievement of these objectives will be supported by **actions and processes that create an environment where impact-related activities are explicitly acknowledged, resourced and rewarded.** We will:

- Support staff in identifying the potential impact of their research, and identify appropriate avenues to exploit it.
- Include impact-related activities as part of our annual staff appraisal process and provide training and professional development (enterprise and media training) to support these.
- Increase opportunities for staff mobility and two-way research exchanges with external stakeholders that maximise the impact of research within this UoA.
- Target funding sources for networking workshops, seminar series, exchanges, and engagement activities to maximize the impact of the research across the UoA.

d. Relationship to case studies

ICS *UOP26IMMERSION* demonstrates how researchers worked with a network of non-academic organisations to produce expert advice on the rescue and resuscitation of immersion casualties and subsequently incorporated into SAR policies and working practices. *ICS UOP26BRA* demonstrates how user defined research has been used to improve the design of products, opening new markets and improving the performance of sports apparel companies. Both ICSs exemplify how the engagement of users in the research itself, and public engagement via variety of avenues has raised public awareness of specific and important health and safety-related issues.