**Institution:** University of Abertay Dundee

**Unit of Assessment: 26**

**a. Overview**

The University of Abertay Dundee is a small institution, with approximately 200 academic staff and 5,500 students. This enables the University to work effectively across departmental and discipline boundaries to create an innovative and sustainable environment for research. In particular the provision of a central support service (Research Enterprise and Innovation Services or REIS) facilitates research activity by supporting grant writing, preparing financial estimates, organising contracts etc. The Universities approach to research has been defined by two **Strategic Plans (2007-2011, 2011-2015)**. To this end, the University has developed a strategic focus on four cross-University themes: **Environment, Security, Society and Creative Industries**. Sport research fits into the Universities overarching research theme of **Society**.

The Division of Sport and Exercise Sciences came into being in 2006 and has developed significantly in the ensuing years. Initially it concentrated on developing high quality curricula and is now, in terms of student numbers, one of the largest departments in Scotland. Having laid these firm foundations the Division has, in the last 5 years, placed increasing emphasis on research capability and output. This has been achieved by: a commitment to appoint only research active staff, the introduction of workload modelling to place greater value on research and the release of academic time through a review of both administrative procedures and delivery methods. As a result, approximately 90% of staff members are now research active and Sport is able to make a first submission to the Research Excellence Framework. As part of the continued growth of Sport, and its importance to Abertay, the University bid for, and was awarded £2.7m by the Scottish Funding Council to embark on a new collaborative project (July 2013) with key stakeholders, including Dundee City Council, Dundee College and **sport**scotland, to develop **the Dundee Academy of Sport**. This unique venture seeks to provide sports education from 16-PhD, increase outreach activities and develop world leading research. Key to the success of the Academy is research outreach from Sport staff to end users, such as coaches, elite athletes and clinical populations. End users will be embedded in the research process and will help shape dissemination through targeted CPD provision.

As part of the University's interdisciplinary focus for research, Sport has had a major investment from the University of approximately £100,000 for the development of a biomechanics/human movement facility which allows for collaboration between the Division of Sport and Exercise Science, Division of Psychology and the National Centre for Computer Games Excellence This research laboratory enables high quality video capture and kinematic analysis providing a unique opportunity to develop realistic human movement in games and front facing interface design.

Sport has continued to grow during the current REF period and has built a solid research foundation that we will seek to develop over the next REF period.

**b. Research strategy**

The University's strategic approach to research has been based on two key aims: (1) to encourage, and capitalise on, interconnections across its research base such that expertise from a range of subject areas is integrated and used to support discovery, innovation and translational research; and (2) to increase the pervasiveness of the research culture across the University, developing greater breadth of research activity whilst maintaining and extending areas of research excellence. The Division of Sport and Exercise Sciences developed the following strategic approach to meet the University's aims: (1) to identify a small number of research foci about which multidisciplinary teams could coalesce; (2) to ensure that all staff appointed were research active and could contribute to one or more of the themes; (3) to work with industry partners to solve real world problems; (4) to encourage engagement with end users of research and the wider public; and (5) to increase the number of postgraduate research students.

The major research groups that have evolved as a consequence of strand 1 of this strategy are: health and wellbeing (Babraj, Calmeiro, Cobley and Lorimer), sports performance (Aspe, Babraj, Calmeiro, Cobley, Meggs and Phillips), outdoor activities and coaching (Holland-Smith, Lorimer, Calmeiro, Koehn, Cameron and Olivier). The work of these groups has been directed at

delivery of the strategic aims.

**Health and Wellbeing:** work has focussed on developing innovative strategies to promote greater healthy life expectancy thus limiting the societal cost of ageing. There is an increasingly older population in the UK and Western society in general, with greater numbers having long term conditions associated with lifestyle (e.g. type 2 diabetes). Our research has examined a number of possible approaches to maintaining health including high intensity training, omega 3 supplementation and novel energy drinks. High intensity training studies are challenging received wisdom in relation to both the duration and frequency of training sessions required promote improved health (Babraj, Cobley and Lorimer). Work on Omega 3 supplementation was undertaken in conjunction with Edinburgh Biotech Ltd to improve disease outcomes and both physical and cognitive function (Babraj and Lorimer) whilst work with the Natural Fruit and Beverage Company helped develop novel drinks to improve glycaemic control in people with type 2 diabetes (Babraj). The research being carried out challenges traditional paradigms within health and wellbeing and the researchers are actively engaged in changing the public perception about exercise locally and nationally, e.g. Dundee Science Festival, Café Science, a book on high intensity training, and have been involved in talks with the Scottish Government, Dr Andrew Murray, and Shona Robison MSP Minister for Sport and the Commonwealth Games. The research in health and wellbeing is currently supported by one PhD student and two Masters of Science by Research (MbR) students.

**Sports Performance:** sport participants, whether professional or amateur, seek to improve their performance. Therefore the current sports performance research being conducted into high intensity training (Aspe, Babraj, Cobley and Lorimer) the role of supplementation for endurance and strength gains (Babraj, Cobley, Lorimer and Phillips) , and the role of self-regulation in limiting performance (Meggs and Phillips) is of value to these athletes. For example, research involving physiologists and psychologists (Babraj and Lorimer) on omega 3 supplementation, and in particular the efficacious dose following muscle damaging exercise, has supported the development of a new recovery drink by a local SME (Edinburgh Biotech Ltd). Research conducted by Babraj on skeletal muscle adaptation to nutrition and exercise is informing Gloucester Rugby on supplementation and recovery for players. Further the research on high intensity training is being used to maintain aerobic fitness levels in players with injuries and to enhance performance by both Gloucester Rugby and Sonderjyske Ishockey. The research is also being disseminated to amateur sport such as local running clubs, (e.g. Forfar Road Runners) through talks and high intensity training workshops. Other approaches to performance enhancement are also being investigated, for example Babraj, Lorimer & Aspe received £5000 from Sporting Chance Initiative STAR award 2013 in collaboration with BurnIt Fitness to look at performance improvements following bootcamp style training. One PhD student and four MbR students are helping progress research in the area of sports performance.

**Outdoor Activities and Coaching:** The number of people taking part in outdoor activities in the UK is growing. The research in this domain by Holland-Smith and Olivier, some of which was supported by the Carnegie Trust, examines what makes people participate in these pursuits and how they manage the inherent risks as well as considering issues of self-identity and interpersonal factors associated with this. Research into coaching looks at interpersonal relationships within sport and the psychological factors important in developing these relationships. There is a crossover within these disciplines where coaching research is informing governing bodies involved in outdoor education, e.g. Lorimer has led the development of Mountaineering Council of Scotland coach education (see impact case study). The research being carried out by Holland-Smith and Olivier in outdoor activities is being used in continuing professional development of outdoor leaders, e.g. modules developed for delivery to Ancrum Outdoor Centre staff. Research in this domain is currently supported by four MbR students.

***Future Strategy:***

Guided by its 2011-15 Strategic Plan objectives, the University has established **R-LINCS** (Research-Led Innovation Nodes for Contemporary Society). **R-LINCS** is driven by a University-wide Research Executive that manages internal research funds, interacts directly with the University Executive and the University Research and Knowledge Exchange Committee, and focuses on innovative solutions to societal problems through four cross-University themes: **Environment, Security, Society and Creative Industries**.

R-LINCS provides the following resources to the research community:

- Single, pan-University research leadership to drive our discipline strengths, interdisciplinary research agenda, propose strategic research-focused appointments, and mentor early career researchers.
- Intra- and inter-theme support for doctoral studentships housed in a single Graduate School, which offers a coherent, University-wide integrated training programme; a single centre serves to inculcate interdisciplinary working in our next generation of researchers.
- Proof-of-concept funding for small-scale RKE projects.
- Targeted support for researcher training and for open-access publication.
- Facilitation with public engagement channels including the Dundee Science Centre, our local Café Science organisers and public exhibition spaces.

**R-LINCS** will prioritise its resource allocation to academic staff with a good track record and to support early career researchers, and will seek to foster collaborative ventures including cross-Institution (other universities and research institutes) programmes of research, and RKE projects with major industry partners.

In line with the University's overarching research plan, sport aims to continue to develop the main research areas that have evolved over the current REF2014 period. Sport already links into the R-LINCS concept of the university and will seek to continue to grow research activity. The four main research objectives for sport over the next REF period are:

**1. Further development of the research groups**: Staff recruitment and annual performance review will be used to further strengthen each of the existing research groups. As these groups develop and sustain critical mass of researchers there is an opportunity to develop further. Steps have already been taken to create a research hub related to ageing. This hub will provide knowledge transfer between major end users including charities, NHS, the Scottish Government and researchers. It is our intention to develop similar research hubs around the other 2 research groups to include relevant stakeholders such as professional sports clubs, local councils and national governing bodies. This will be linked to, and facilitated by, the establishment of the Dundee Academy of Sport. Part of the initial £2.7m, c£300k, is identified for knowledge exchange activities over the next three years.

**2. Increasing numbers of postgraduate research (PGR) students:** The current growth in postgraduate student numbers has occurred through the provision of extra PGR opportunities, particularly the provision of MbR as a bridge to PhD and subsequent internal marketing of these research opportunities. To continue to grow the PGR numbers over the next REF period, marketing of postgraduate opportunities in recognised areas of strength will also target students from outwith the University. Furthermore we will develop our existing partnerships, and forge new ones, with external organisations such as industry or national governing bodies, with a view to providing funded PGR opportunities. Sport has already developed one such opportunity during the current REF period via an industry partner (Natural Food and Beverage Company). Currently no researchers from this UoA have been awarded grants that include funding for studentships. A key aim for the coming years will be to target such funding.

**3. Increase research income:** As this is a key aim of the institutional research strategy, researchers in sport will avail themselves of the centrally provided training in relation to grant writing, the established internal peer review process and the significant administrative support available through REIS. Academic allocation of duties allows all researchers to submit grant applications which also signposts appropriate development opportunities. Some staff members have also been supported to attend the Missenden grant writing workshop and will be used to mentor staff during the coming years. Colleagues will also be expected to seek funding for knowledge exchange. We have developed 3 different knowledge exchange projects since 2012 (Natural Fruit and Beverage Company, Edinburgh Biotech Ltd and Burn It Fitness) but will be seeking to achieve much higher value projects, particularly through the formal government funding scheme. Institutionally there has been considerable success in gaining this funding and we will utilise this experience to improve our success in this area whilst continuing to develop our own industry links. This will be partly achieved by the further development of the existing employers' forum within sport to include dialogue between researchers and employers regarding the application of research findings, as well as the development of new projects. This approach has already resulted in one postgraduate student beginning their studies in collaboration with a placement provider (Active Schools).

**4. Increase dissemination and public engagement:** The will be a number of strands to our work

in this area. The Dundee Academy of Sport will provide significant opportunities in this area given the diversity of the partners engaged in developing the project. We will be able to engage directly with, and access the networks of, a number of key partners including: the local councils, FE colleges, Primary and Secondary Schools, regional sports hubs, **sport**scotland, professional sport clubs in Tayside and Fife and the Scottish Institute of Sport. All of these allow us targeted dissemination routes and clear routes to public engagement. In addition we will continue to expand our contribution to local popular science events such as the Dundee Science Festival and Café Science and seek to involve ourselves in similar events at a national and UK level. Abertay's communication department has been proactive in seeking to publicise research and we will continue to engage with the both the traditional media and newer forms of social media to ensure as many people as possible are aware of our research

**c. People, including:**

**i. Staffing strategy and staff development**

The University's staff appraisal system and workload planning model align personal objectives with university research objectives as it enables an appropriate balancing of teaching, research, administration and external engagement activities to develop personal careers and the strategic priorities of the unit. Thus, early career researchers are given more opportunities to develop their research, and probationary lecturers have a lighter teaching and administration load to free up more time for research-intensive staff development. In December 2012 the University's human resources department conducted an audit of the University's recruitment and staff development policies to ensure that these were in line with the recommendations and guidance provided in the Concordat to Support the Career Development of Researchers (2008). To develop and enhance the University's capability to conduct excellent research with impact, appointments to lectureships are required to have a PhD. All promotions are based on research contribution, thus demonstrating the University's policy of rewarding key research staff.

Since 2007 the policy of the Division of Sport and Exercise Sciences has been to only appoint research active staff. Given our state of development this has usually resulted in us appointing early career academics who we believed had significant potential. Inevitably some of these staff members move on as part of their career progression but the overall effect has been that now 90% of all staff members in the Division are research active and we have a mix of experienced researchers and newer academics. Our approach to workload planning ensures that early career academics are given a reduced teaching and administration load in their first year to allow them to generate new research projects and collaborations within the established research groups. Each new appointment is allocated a mentor who offers advice on teaching and research matters. Where appropriate newly appointed staff members are added to existing PGR supervisory teams. This not only helps with their development but actively engages them in the research activities of the relevant research group. Finally, new members of staff are supported with start-up costs for their research, typically in the form of consumables and laboratory space.

The research activities and aspirations of existing staff are also supported and developed. By providing supervision and allocating time in their workload, Sport supports two members of staff currently without a PhD to study for this higher award. Further all members of academic staff have protected time each week for research activities, which is dependent on research goals identified during staff apprisal, grants awarded and the number of research students being supervised. In general the minimum time allocation for research, excluding in time bought out by external funding, is approximately 20% of total time allocation for a research active member of staff. The staff development allocation also supports other training opportunities, both internal and external.

***Future strategy:***

The University is implementing the Concordat to Support the Career Development of Researchers with an enhanced training package and is working towards Athena Swan Bronze. The University has identified a range of development and training opportunities for staff which include a series of training workshops on grant writing, European Framework funding and Knowledge Transfer Partnerships over the next REF period. Some of these will be provided internally, through the R-LINCS structure, but the University also aims to use regional and national development and training opportunities over the next REF period, for example accessing research development courses provided by the other universities as well as VITAE and Leadership Foundation courses. To support R-LINCS the University is increasing its research-academic staffing by 35 (~20%)

in 2013-14.

**ii. Research students**

The number of PGR students associated with the Division of Sport and Exercise Sciences has grown significantly in recent years. Prior to 2011 there were no postgraduate students and numbers have increased from 1 in 2011-12 to 5 in 2012-13 to 12 at the start of the 2013-14 academic intake. The number of staff supervising postgraduate students has increased to 4FTE staff at the start of the 2013-14 academic year. All of the 12 students are self funded with 3 full time PhD students, 8 full time MbR students and 1 part time MbR student. All 3 full time PhD students have upgraded from the MbR path, with one having just entered 3rd year and two having just entered 2nd year of PhD studies. Starting January 2014 there will be a fully funded studentship in collaboration with an SME.

Support for postgraduate research students is extensive. Each student has a supervisory team consisting of at least 2 members of staff one of whom acts as Director of Studies (DoS). In addition to the formal induction organised by the University's central Research Degrees Committee (RDC), the DoS is responsible for conducting a skills audit and identifying the development needs at the start and throughout the programme of study. Regular fortnightly supervision meetings are required and a brief note of these meetings and agreed objectives are logged with the RDC. In addition, a 6 month progress report is agreed between DoS and student and logged with the same committee. Each PhD student is given a dedicated desk and PC in a shared office. Students are required to give at least give one internal conference presentation in their first year, an external conference paper in their second year and to submit at least one paper for publication in a peer reviewed journal in their third year. To facilitate this, there is an annual university-wide postgraduate research conference which all students and supervisors attend. Students, through their supervisor, can apply to School funds and/or the Robert's fund to cover conference costs. All students are offered the option of limited small group teaching by way of skills and career development. The School of Social and Health Sciences hosts a weekly research seminar series during both teaching semesters. Presenters include faculty members, PhD students and external speakers. All postgraduate students are expected to attend these talks, regardless of discipline. The ELIR (2012) reported that Abertay's postgraduate research students were positive about what they described as a friendly, supportive and integrated academic community.

This growth in student numbers has been attained with internal marketing to current undergraduate students as well as recruitment via external marketing of the MbR on the BASES website.

***Future development:***

In the next REF period all postgraduate research students will benefit from the creation of the University Graduate School which will form a central component of the R-LINCS development across the University. All research students will be based in the Graduate School and will benefit from centrally organised generic PhD training. In order to support the long-term vitality of the research culture at Abertay, the University is committed to providing fully funded batches of MbR/MPhil/PhD studentships (at RCUK stipend levels with expenses) for three and a half years (PhD).

The growth in numbers of PGR students in sport offers greater opportunities for developing a sense of community and more development opportunities. An initial research seminar series for PGR students has begun (13-14) to allow students to develop presentation skills and increase the pervasiveness of the research culture. Additional training opportunities will be developed in the current academic year to supplement the centrally provided training and increase employability skills of sport postgraduate students. Finally the PGR students will be encouraged to embed themselves fully in the work of the relevant research groups and to share the different perspectives and approaches that they will be exposed to as a consequence of their membership of the graduate school

A key element of future strategy will be the provision of funded PGR opportunities, with funding sought via industry partners, formal government funded Knowledge Transfer Partnerships, RCUK grants and other grant awarding bodies

**d. Income, infrastructure and facilities**

**Income**

Over the REF period the University has developed strategic relationships with a range of

funders including government and businesses (e.g. Sporting Chance Initiative, Natural Fruit and Beverage Company). This creates a "virtuous circle" where our research is informed by engagement with end users and can therefore be developed to better suit their needs. An example of this "virtuous circle" increasing research funding within sport can be seen with the £4800 STAR grant that was awarded to Babraj in 2012. This has developed into a Natural Fruit and Beverage Company funded Masters by Research studentship (starting January 2014, circa £18000) to continue to develop the positive findings of the initial grant. Since 2012 there has been an increase in the amount of research funding awarded to sport. Over the current REF period sport has brought in £48,887, since 2012 sport has successfully brought in £17,450 in consultancy from **sport**Scotland. Within sport we will continue to increase research revenue over the next REF period. In order to achieve this, staff members engage in the University led professional development for grant writing and submission and attendance at external training such as the Missenden grant writing workshop. This will lead to an improvement in the quality of writing, which should transfer to increased success rates in obtaining external grant funding over the next REF period. Knowledge exchange development is also encouraged within sport and researchers have developed 3 different knowledge exchange projects since 2012 (Natural Fruit and Beverage Company, Edinburgh Biotech Ltd and Burn It Fitness). This type of activity will be continued to be pursued, with larger knowledge exchange grants being sought to continue to build on existing industrial relationships.

**Infrastructure**

The University's **Research Enterprise and Innovation Services (REIS)** office provides advice and support on research related matters. These include: dissemination of relevant funding opportunities and changes in funding practices; finance input into costings; management of the grant application process; management of the research degree students' process from their initial contact with the University to graduation; management of IPR and contractual obligations with funders; and development of commercial contracts. Bringing these services together ensures that a consistent approach is taken across the University in relation to management of research projects and improves efficiency by providing a single point of contact for all research related matters. The net effect is to considerably reduce the administrative burden on researchers

The University Research Repository typically houses staff publications (taking into account the copyright issues). This practice is continually checked by Division Leaders (staff line managers). In addition, all staff research profiles are updated as an on-going practice for all staff. The University also has a fund to meet the cost of publications in open access journals.

In terms of governance, applications for external research funding are reviewed by an ethics committee and for their contribution to full economic costs, with bids where the level of overhead recovery is low requiring a case to be submitted by the Head of School to explain how the bid is strategically important to the University.

The University has clear guidelines and has transparent procedures in place to ensure that it fully complies with the Concordat to Support Research Integrity and these are communicated regularly to all staff.

**Facilities**

Staff members in the unit have access to a wide range of equipment. This equipment base has grown steadily over the last five years and is now at least at a level consistent with that required for the BASES endorsement scheme. It includes, *inter alia*, online gas analysis equipment, blood analysis equipment, a variety of ergometers, EMG, 3-d kinematic analysis system (VICON), various force transducers and accelerometers, ECG equipment and electronic timing systems. In addition to this 'standard' equipment there is ready access to more specialist biochemical and molecular physiology equipment through the School of Science Engineering and Technology.

The on-campus estate available to sport includes an exercise physiology laboratory, a gym and conditioning facility, a studio space and a biomechanics laboratory. In addition there is ready access to facilities owned by Dundee City Council and the University of Dundee

***Future facilities:***

The University is committed to further developing sport and a new research laboratory is planned for completion in January 2014. This will allow improved access to standard research facilities such as breath by breath analysers, ergometers etc and lead to an increase in research capacity by increasing equipment availability and the availability of laboratory time.

The initial funding for the Dundee Academy of Sport project includes c£400k for scientific equipment including portable gas analysis systems, portable force plates, portable blood analysis systems, various ergometers etc. These will also be available for research activity and will have a significant impact on our research capacity. The initial design concept for the physical academy of sport includes a 12 court hall, integrated laboratory spaces and integrated equipment (e.g. force plates, camera systems etc.).

The University is also developing a new Graduate School within a dedicated space in order to accommodate increasing numbers of students undertaking research degrees. Within the unit of assessment we have increased postgraduate student numbers consistently since 2011 and this development will further aid postgraduate recruitment and student experience.

**e. Collaboration and contribution to the discipline or research base**

All research active staff members regularly act as reviewers for journals, e.g. Journal Applied Sport Psychology, Metabolism. Two members of the unit are currently writing academic text books and have contributed chapters previously to academic text books. Collaborations have been developed through attendance at conferences and with continuation of work carried out previously. Staff members are supported to develop these collaborations through time allocations given for meetings and financial support for conference attendance.

**Babraj:** Loughborough University (Prof Timmons) and the University of Bath (Dr Vollaard) focusing on the health benefits of high intensity training. Oxford Brookes University (Dr Jakeman) focusing on the performance benefits of high intensity training. University of Dundee looking at fat response to exercise in type 2 diabetes (Dr Sutherland) and exercise in ageing (Dr Sumukadas).

**Lorimer** Loughborough University (Dr Jowett) on interpersonal perception in coaching. Charles Sturt University in Australia (Dr Hodgins) investigating horse-rider partnerships in equestrian sports supported by a Carnegie travel fellowship.

**Calmeiro** at University of Teeside (Prof Atkinson, Prof Spears, Dr Azevedo), Swansea University (Prof Stratton) and Queen's University, Belfast (Dr Hunter) focusing on reduction of sedentary behaviour in adolescents'. University of Durham (Dr Smith) looking at visual search behaviours under conditions of varying stress. Calmeiro has been involved in a World Health Organisation project examining Health Behaviours in School-age Children (HBSC study), as the Portuguese representative on the physical activity focus group, since 1999.

**Olivier:** Norwegian School of Sport Sciences (Dr Loland) on sport philosophy and ethics. Northumbria University (Dr Partington) and Staffordshire University (Dr Jones) investigating the psychology of flow and psychological skills training.

**Aspe:** Robert Gordon University (Dr Swinton), Leeds Trinity University (Prof Lloyd) on both auto regulation and strength and conditioning strategies.

In addition to academic collaborations, researchers have developed key collaborations with end users. **Babraj** has developed research links with two SMEs, Natural Fruit and Beverage Company, and Edinburgh Biotech Ltd. He has been appointed chief science advisor for Edinburgh Biotech Ltd. He also acts as a consultant providing advice to professional sports clubs (Gloucester Rugby, Sønderjyske Ishockey A/S). **Lorimer** acts as chief scientific officer to the Mountaineering Council of Scotland, ensuring research evidence is embedded into practice and also acts as an advisor to Edinburgh Biotech Ltd. **Cameron** has developed a strong relationship with Active Schools which provides a number of opportunities for undergraduate and postgraduate students. These end user relationships will continue to develop over the next REF period. Through the Dundee Academy of Sport a number of new end user relationships will evolve, e.g. coaches and sports performance. This will directly impact on research opportunities via unique participant pools.