

<b>Institution:</b> University of the West of Scotland
<b>Unit of Assessment:</b> 24: Sport and Exercise and Leisure and Tourism
<p><b>1. Unit context and structure, research and impact strategy</b></p> <p><b>1.1 Structure of research</b></p> <p>This REF cycle has seen UWS expand the research base contributing to UOA24 significantly. Following REF 2014, the University undertook strategic appointments of world leading staff enabling significant subject area diversification and enhanced research capacity. These appointments resulted in (1) the expansion of the staff complement within the existing <b>Institute for Clinical Exercise and Health Science (ICEHS)</b> and (2) the parallel formation of the <b>Centre for Sport Culture and Events (CCSE)</b>, led by Prof Gayle McPherson. Since then, ICEHS and CCSE have together overseen the strategic direction of sport, leisure and tourism research within UWS ensuring effective collaboration across disciplines and supporting the University wide theme of sport and society. The ongoing development of Sport research at UWS means that over the course of this REF cycle the two groups have together overseen <b>more than a million pounds of specialist laboratory redevelopment, a tripling of our research active staff, and a six-fold increase in research income.</b> The expertise available within the two groups is extensive, including sport performance, behaviour change, health, leisure, tourism and culture, and in the case of <b>CCSE, its staff reaches across three Schools</b> within the University.</p> <p>ICEHS is based in the Lanarkshire campus, and is strategically managed by the Institute Chair (Prof. Sculthorpe) and research theme leads. The formal business of the Institute occurs during once-per-trimester meetings to which all staff are invited. However, the role of the Institute includes supporting ECR staff with outputs and funding applications, managing research student applications, organising internal peer review for all funding applications for its staff, and providing training and research meetings to support wider staff development. Since its inception, the focus of the institute has been on three main areas; sport performance, exercise for health, and sport and society. There is substantial overlap in all three areas such that there can be some synergy in the focus of research projects, an approach which has been encouraged to foster greater inter-group collaboration.</p> <p>The CCSE works across three of the University's campuses with a physical base in Paisley. The Centre Director (McPherson) and Deputy Director (McGillivray) are supported by a full-time Research Associate (Dr Mamattah). To enhance its connectedness and influence in its areas of interest, the Centre has established a Steering Group including academics and key partners from industry, NGO's and third sector partners including: <b>Creative Scotland</b> (Scotland's national cultural agency), <b>EventScotland</b> (Scotland's primary event tourism agency), the <b>British Council</b> (the UK's international organisation for cultural relations), the <b>Glasgow Centre for Population Health</b> (who advise the Scottish Government), <b>Carnegie Trust UK</b> (organisation promoting community and societal wellbeing across the UK), and <b>Glasgow Life</b> (responsible for sport, culture and events in Glasgow). Consequently, the CCSE Steering Group has unrivalled knowledge and experience of working within the fields of art, culture, events, tourism and sport within Scotland and the UK. This group combines substantial experience with strategic knowledge of each the sectors and have proven hugely valuable in guiding the direction of CCSE.</p> <p><b>1.2 Research Objectives</b></p> <p>In the 2014 REF submission, the aims of ICEHS were (1) to produce world-leading research that (2) generates new insights and practice in Sport Science, (3) responds to the health challenges of the communities we work with and (4) underpins and informs our taught portfolio. These aims were based on the research of ICEHS specifically, since CCSE would not come into being until 2018. In order to achieve these aims ICEHS undertook several strategic objectives (SO's) following the 2014 exercise. These included (SO1) to streamline and refocus research within the institute, (SO2) to increase research and enterprise income, (SO3) increase the number of staff engaged in research while maintaining high quality research outputs, (SO4) develop the research culture with a focus on excellence and impact.</p>

The CCSE was formed 4-years later with the aim of complementing the research expertise within ICEHS. In contrast to ICEHS in which all staff sit within the same division, CCSE was intended to have broader, interdisciplinary research aims, with staff distributed across different divisions and schools. Correspondingly, CCSE developed its own strategic objectives which included: 1) translating research evidence into outputs that will contribute to academic excellence and influence policy makers and practitioners, working in the sphere of culture, sport and events; 2) producing research evidence to support the importance of culture, sport and events in the creation of economic, social and cultural values for institutional and non-institutional beneficiaries; 3) utilising a range of robust and innovative methodological approaches to undertake research that helps evidence and showcase the benefits of culture, sport and events, working with intended beneficiaries in the production of research outputs; 4) communicating and promoting its activities using proactive communication strategies, informed by the need to translate research outputs into accessible resources for a range of research users.

### 1.2.1 Review of REF2014

The 2014 Research Excellence Framework (REF) saw the first ever UWS submission to unit of assessment 26, Sport and Exercise Science and Leisure and Tourism. The results of that submission were highly encouraging receiving 3 or 4\* ratings on almost 50% of the submitted outputs. Clearly, at that time, Sport research was still in its early stages with the research culture within the Institute still being established. Following REF2014, and in line with ICEHS SO1, a review of research structures resulted in the formation of three research themes to better focus the areas of excellence that REF2014 had identified. (i) Health across the life-span which capitalised on existing expertise in childhood health and successful ageing; (ii) nutrition, environment and sports performance which aimed to expand our research base in nutritional ergogenic aids and evaluation of sport performance; (iii) sport and society with a focus on sport psychology and sport sociology and communities.

Following REF 2014, Profs. McPherson and McGillivray led an expansion of the research focus on Sport, tourism and events, and participation and policy; building on the world leading research they had conducted on the impact of mega-sports events. This meant that the work of the then 'Creative Futures Institute' (returned to UOA34 in 2014) was becoming increasingly aligned with UOA24. A strategic decision that this research would be returned to UOA24 led to the development of the CCSE to conduct research, development, consultancy and knowledge exchange activities aligned to four key themes that fit within UOA24's remit: place-focused cultural regeneration; arts, cultural diplomacy, and soft power; media, communication and digital cultures; sport, sport and cultural events and festivals; building on the track record for outputs and impact of Profs McPherson and McGillivray.

### 1.2.2 Current REF period

Given the investment in ICEHS, this REF cycle has seen a dramatic shift in both the quality and quantity of our research output. UWS is a multi-campus University and in 2018, as part of a larger UWS wide development plan, an investment of approximately GBP120,000,000 was undertaken to relocate the School of Health and Life Sciences to a purpose-built campus located in Lanarkshire, including the redevelopment of teaching and research laboratories. Consequently, since 2014 ICEHS research facilities have been enhanced substantially. This has included large scale investment in two new 'state of the art' teaching labs, as well as bespoke **Consultancy Lab**, **Cardiovascular Imaging Suite**, a **Biochemistry Laboratories**, a **Rehabilitation Suite**, and an **Extreme Environments Lab**, housing one of the largest, purpose built environmental chambers in Scotland. Taken together, and including equipment and refurbishment, this represents a **multi-million pound investment** in Sport and Exercise research which has significantly expanded both our applied and basic research capacity and enhanced our ability to attract high quality staff and research students.

The development of the CCSE was a collaborative partnership between the University of the West of Scotland (UWS) and Renfrewshire Council (RC) including matched investment from both organisations: GBP197,000 from Renfrewshire Council, plus 0.2FTE in-kind support from senior policy staff and GBP180,000 for 3 PhD students from UWS along with in-kind support of 0.2FTE

from Prof McPherson. The CCSE provides an overarching framework, offering organisational support and guidance for staff research. It also provides a physical presence with rooms and spaces to facilitate the collaborative research and development work that has had local, national and international reach.

This REF cycle has also seen expansion of both ICEHS and CCSE, and a focus of both has been to ensure that research active staff maintain their high-level of scholarly outputs (e.g., ICEHS SO3), that new staff are supported to develop into their role as research active academics, and that existing staff new to research are supported and mentored to develop their research profile. This focus has been effective with a substantial increase in research productivity. Together the two groups have produced over 500 scholarly outputs in this REF cycle, including highly cited impactful work, work in highly ranked journals, and work that has contributed to policy changes, and position stands. Consequently, we believe that this is strong evidence of a supportive, and proactive research environment, and establishes UWS as having global significance in Sport and Exercise Sciences, Leisure and Tourism research.

For ICEHS, outputs have risen from 140 from 9.2 FTEs in 2014 to 360 outputs from 21.6 FTEs in the current cycle. The supportive research strategy has also paid wider dividends, raising the profile of Sport research at UWS. The 2019 Shanghai Research Rankings, an assessment of research quality based on outputs, citations, and journal rankings, **placed ICEHS in the top 100 Sport Science Research Institutes Globally**, one of only 2 Scottish and 13 UK Universities to make the top 100. Similarly, CCSE has been equally proactive in ensuring the development of a supportive research environment and in seeking high quality research outputs, resulting in 264 outputs from 12 staff since its inception in 2018.

The current REF cycle has also seen substantial support for, and development of, our internal research culture. Since 2017 external funding has enabled ICEHS to host an annual lecture sponsored by the Physiological Society with presenters including a variety of world-leading researchers both national (Prof Jones – LJMU; Dr Anni Vanhatalo – Exeter; Dr Dan Martin – Lincoln) and international (Prof Allen – Victoria University, Aus; Dr Porcelli – Italian National Research Council) as well as from industry (Dr Randall GSSI, Dr Gomez Diaz, FC Barcelona). More recently, ICEHS was successful in bidding for the rights to host the **2021 Congress for the European College of Sport Science** (now 2024 following delays due to the current pandemic). This is the 2<sup>nd</sup> largest Sports Science conference in the world and UWS was proud to win the extremely competitive bidding process to deliver this world-class event and sees it as recognition for the significant development in our research quality and profile since 2014.

CCSE have also developed substantially since hosting the Leisure Studies Association Conference in 2014, attracting national TV coverage at the time. Their parasport research was shortlisted before **winning the Gold Research Impact Award at the Herald Commonwealth Games Awards 2014**. The CCSE seminar series, which moved online during COVID-19 to become #CCSEConversations and also included internal and external speakers in the field of sport, leisure and tourism has attracted contributions from North America, Australia, Europe and the Global South. CCSE also provides a valuable vehicle for the development of research culture and excellence through the numerous research projects managed by its staff.

Taken together, this REF cycle has seen a step change in our research and our development over the 6 years since 2014 has been substantial and continues to progress. Our two research groups have published cutting edge research across the whole breadth of domains under UOA24. Moreover, the presence of multiple other esteem indicator such as **large-scale investment, hosting top-tier international conferences, world ranking for research, and year-on-year growth in outputs, income, and research student completions** provides compelling evidence that our staff benefit from a strong, research environment. This has been developed strategically over the past decade, building on key appointments and investment, providing a vital and progressive environment that has deep roots and long-term sustainability.

### 1.2.3 Strategy: Next Five Years

UWS' updated 5-year strategy (UWS Strategy 2020-2025) includes institutional goals critical for the future of ICEHS and CCSE including research aligned to the United Nations Sustainable Development Goals (UN SDGs) including ageing, sport, health, and communities and culture. The strategy recognises the power of physical activity and sport, and pledges for UWS to become Scotland's leading Sport university. Consequently, the next 5 years will require both ICEHS and CCSE to refocus their approach on these wider institutional goals. To do this we will build upon the excellent progress within subject specialisms while also proactively seeking out opportunities to exploit the interdisciplinary breadth available across both ICEHS and CCSE. Consequently, the primary **aims** of both groups are to:

- (i) maintain the trajectory in income and world-leading research established over the past decade.
- (ii) improve the lives of those touched by sport, exercise, tourism, culture and events ensuring our research is grounded in the UN SDGs and addresses contemporary and emerging challenges.
- (iii) seek out opportunities to consolidate our strengths both subject specific, and interdisciplinary.
- (iv) capitalise on our international research networks, and location to undertake research that supports our communities but that can be applied globally.

In achieving these aims, both ICEHS and CCSE will focus on sustainable growth allied to **strategic activities** including **promoting, retaining, or recruiting** high quality staff to complement the existing staff expertise. Both groups will also seek to **grow post-graduate numbers**, seeking out national and international opportunities for development in line with expanding supervisory capacity. Meeting the aims will require us to build greater **strategic partnerships** with industry, policy makers, health agencies, service providers and NGOs to strengthen the impact of our research. We will seek to increase the proportion of **funding applications to larger, multi-institution calls** including European, Governmental, and UKRI calls. We will expand our current **COVID-19 research** to include supporting post-pandemic recovery. We will also **further enhance our research environment** and make research excellence a reality for **all staff** by providing high quality support, mentorship, and training. This will include providing **support for staff whose research has been most affected by COVID-19** and social distancing measures, to prevent losing a generation of researchers. Furthermore, this will involve a rapid roll-out of those projects (such as #EventsRights) which are funded but have been on hold during the pandemic. Finally, we will further develop collaborative work between the Institute and the Centre including joint research seminars, workshops, and integration of interdisciplinary teams in the development of funding proposals.

### 1.3 Achievement of impact

Both ICEHS and CCSE undertook specific strategies to ensure that their research was impactful, and to enable impact to be identified. This was achieved in two phases, first by ensuring staff research was aligned to the University's research priorities focussing on the UN SDGs, (prior to 2018 these were Society, Sustainability and Health). While for some staff this required refocussing on the impact of their research, much of the UOA's output was already aligned, for example, key work from CCSE staff aligns with the SDGs and the centre works with Non-Public Development Bodies, Non-Governmental Organisations, and the Chief Scientists Office for Scotland (CSO), in delivering those goals. This first stage focussed staff to consider the areas in which their research would have impact, and to plan for impact early in the research process.

Allied to this was a requirement for research impact to be specifically identified during the internal review of funding applications, requiring researchers to identify the pathway for impact arising from the meeting the research need, and where relevant, a dissemination and impact plan for the findings. By embedding this in the internal peer review, it enabled researchers to consider the impact potential of their work, regardless of whether or not such information was required by the funder. Further support was provided via a comprehensive training and development plan. ICEHS and CCSE leads (Profs McPherson and Sculthorpe) undertook a series of cross-campus impact workshops to help staff better understand what is meant by research 'having impact', including a



detailed examination of high-scoring impact case studies from REF 2014, a detailed discussion of the types of impact (e.g., direct health impact, financial impact, attitudinal impacts, policy impacts), the difference between pathway to impact and impact itself, how to better identify and evidence impact, and the importance of designing impact and impact assessments into project proposals from the start.

### 1.3.1 Impact Case Studies and Impact Approach

Both ICEHS and CCSE have ensured that their research is impactful, with societal benefits, in two main ways. Early in the REF period ICEHS took the strategic decision to focus on research strands that had real world applications in one of the key areas of sport performance, health, and social sciences. In addition, work of the sport performance research strand within ICEHS coalesced around the broader theme of supporting athlete health. This was supported with research time, PGR support and impact workshops to determine how the potential for our research to improve the lives of athletes could best be achieved. Consequently, the **outputs from this ICS have been cited in leading recommendations and position stands**, have been used to inform practice and policy in elite sport, or have influenced the training and development of Sport Scientists undertaking accredited pathways (outlined in impact case studies). We also sought to maximise our relationship with key regional stakeholders, including NHS Lanarkshire with whom Dr Buchan supervised 3 co-funded PhD students evaluating NHS Lanarkshire 'Child Healthy Weight'. Again utilising support via research time, PGR student funding and workshops, this work subsequently informed the development of the policy.

CCSE developed their impact case study (ICS) with national and international policy and practice communities in the area of parasport, major sport events and festivals. Prof McPherson sat on the OECD group that produced recommendations for the global benefits of major sport events for local development. Profs McPherson and McGillivray have presented to a Scottish Government Parliamentary session on the legacies of the 2014 Commonwealth Games. McGillivray has spoken at several public events in 2020 focused on the relationship between festivals, events and public space, drawing on his research project, Festspace. He is also participating in a BBC Scotland commission on land ownership in Scotland focusing on how public spaces are privatised. McPherson has given keynote presentations to the Global Strategy Forum at Whitehall on the role of art and culture in global security and stability (based on British Council funded research) and then presented as an invited key expert to the EUNIC/Ministry for Culture and Education, Cyprus 2-day workshop with Diplomats and Cultural Institute leaders on the contribution of art, culture and sport to conflict prevention and peace. One of our current PhD students has secured the role of the Municipal Secretary of Culture, in Colombia and has just been nominated as one of the most influential young women in politics in Colombia, again showing the impact of our research programmes around the world. Structurally, CCSE supports its members to prioritise impact by ensuring that dissemination or knowledge exchange activities linked to research projects are monitored and documented. Dr Mamattah supports colleagues to capture impact through writing blog posts and collating information generated from seminars, workshop and other events organised by the Centre.

### 1.4 Interdisciplinary Research

The work of both ICEHS and CCSE is influenced by the University's larger strategic plan to address major global challenges using interdisciplinary teams. Studies funded by the Chief Scientist Office for Scotland (CSO) have used interdisciplinary teams to examine the role of exercise in the treatment of people with Multiple Sclerosis and to promote behaviour change in physical activity during social isolation. Other interdisciplinary studies include: supporting athletes and educating coaches about female health in women's rugby, physical and psychological benefits of walking football in older adults and adults with dementia, understanding school-based activity interventions, and stroke patients' perceptions of a biosensing rehabilitation glove. Each of these examples have used cross-school interdisciplinary research teams, with a variety of skills including expertise in physiology, psychology and behaviour change, biomechanics, and social science while also being informed by both qualitative and quantitative research paradigms.

There has been a substantive increase in the interdisciplinary research undertaken between ICEHS and CCSE and within CCSE itself. This has included collaborative projects between CCSE and ICEHS with the Observatory for Sport Scotland. Prof Davidson (ICEHS) was instrumental in establishing the Observatory for Sport in Scotland (OSS). Prof Gayle McPherson (CCSE) has since joined the Research Advisory Group of the OSS. Profs Davidson, McPherson and McGillivray have since submitted evidence to the Scottish Government Health and Sport Committee on 'Social Prescribing of Physical Activity and Sport'. Similarly, a post-doctoral researcher working with both CCSE and ICEHS has now been recruited to a full time, permanent position in ICEHS (Dr Carlin). ICEHS staff have also been able to participate in the EventRights mobilities project led by Prof. McGillivray, undertaking research focused on human rights around major and mega sport events (currently on hold due to COVID-19) and Prof. Sculthorpe has presented a keynote talk to Scottish Tourism regarding health and adventure tourism. Funding collaborations with PIs in ICEHS and CCSE are in development, and May 2021 will see the first joint research seminar between ICEHS and CCSE with a specific theme of seeking out interdisciplinary opportunities.

### 1.5 Open Research Environment

UWS is a member of the *Springer Open Choice*, one of the "Read and Publish" deals the institution has signed with publishers, and ICEHS have used this as one of the main approaches to ensuring open access to as many research papers as possible. In addition, where available, research funding and internal funds have been used to support Gold open access publishing. As a result, approximately a third of our total research output since 2014 is open access, and 80% of our REF submission is open access, partly through the Gold route and the remainder being available via UWS' research repository through the Green open access route. CCSE is equally committed to making its research outputs as accessible as possible, as research is published via regular reports, uploaded to Issuu.com and available free of charge, and where funding is in place, key research outputs are made available Open Access. CCSE also publishes blog posts, #CCSEConversations and online conferences to ensure that our research is accessible to a range of audiences, including policy and practitioner communities.

### 1.6 Research Integrity

UWS (and by extension ICEHS and CCSE) is committed to the Concordat to Support Research Integrity, and the Code of Practice for Research. This ensures that our research approaches are honest, rigorous, and transparent, and with respect for participants and the environment. Moreover, both ICEHS and CCSE undertake research on human participants, and both groups are governed by the University's regulations on the ethical treatment of human subjects. At a local level, this is managed by School based Research Ethics Committees. In line with the Concordat, the University Ethics Committee acts as the arbiter where there are appeals against School level decisions.

## 2. People

### 2.1 Staff Development Strategy

Recruitment in the lead up to 2014 included 3 research active academic staff in ICEHS, with the potential to move into leadership positions. Moreover, our student body has seen year-on-year growth since 2014, enabling an increase in staffing, requiring a coherent staff development policy aimed at satisfying both research and teaching needs. The **establishment of CCSE in 2018**, and the associated appointments preceding that, also meant that there was a substantial increase in staff with world-leading sociocultural reputations. Consequently, both Institutes, with strong support from their respective schools, have employed a sustainable approach to ensure they have a mix of experienced staff undertaking high-level research, and new academics with the potential to become leaders in their fields. This strategy has included recruiting high performing early career researchers to new positions, promoting existing research active staff engaged in world-leading research into new leadership positions, and strategic new appointments at Professorial and Reader level where required. This approach means that staffing base of both ICEHS and CCSE is now more balanced, with experienced leaders in physiology, psychology, and sociocultural domains. This strategy is part of the overarching research and impact strategy to increase the

number, and expertise of staff within ICEHS and CCSE, ensuring the sustainability and viability of both groups.

## 2.2 Staffing and Recruitment

Internal promotions to Senior Lecturer, Reader or Professor are strong indicators that research institutes provide the support and professional development necessary for high-quality research and represents the 'value added' to individual careers. ICEHS has successfully developed in-house staff with the potential to become leaders. **Professor Sculthorpe** joined UWS in 2013, was returned in REF2014 as a Reader and was promoted to Professor in 2018 and has an international reputation in cardiac assessment in older adults with over 60 peer review papers since joining UWS. **Professor Easton** joined UWS in 2014 and was returned in REF 2014 as a lecturer, was promoted to Reader in 2016 and to Professor in 2019 as a world leader in nitrate supplementation with over 50 peer-review papers since joining. In addition, on successful completion of her PhD, **Dr McEwan** was promoted to Senior Lecturer with a growing reputation in the training and development of sport psychologists.

Recruitment has also included specific academic leaders, and 'high potential' ECRs each aligned to a specific theme within each institute. **Professor Davison** was appointed in 2016 with a world-reputation for cycling science and elite performance. **Professor Unnithan** was appointed in 2017 as a recognised leader in paediatric exercise science and youth football science having collaborations with **Celtic FC** and multiple **English Premier League, Championship and European football clubs**. Mid-career appointments include **Dr Dello Iacono** with a strong background in strength and conditioning, and **Dr Mair** with an international reputation in physical activity and behaviour change. At the ECR level we have also appointed research active staff including Drs **Hayes, Valentin, Arthur, Bobrownicki, Cowan** and **Macrae** with expertise in physiology, biomechanics, psychology, and socio-cultural aspects of sport respectively.

As part of CCSE, **Dr Turner** was employed as Senior Lecturer and has since been promoted to Deputy Dean. Similarly, **Dr Carnicelli** was promoted to Senior Lecturer in 2016 and has a world leading reputation in tourism. He is co-chair of the **Royal Society of Edinburgh Youth panel** and has worked in **Brazil** and **Australia**. In addition, two ECRs with potential to become leaders in their fields have also been recruited (Dr **Sharp** and Ms. **Flinn**, who is completing her Prof Doc). Thus, the staff appointments, allied to the leadership of existing **Professors McPherson** and **McGillivray**, mean that the Centre benefits from experienced leaders while also having the potential for continued growth.

## 2.3 Support for Early Career Researchers

Both ICEHS and CCSE have strong support for ECRs including academic staff and post-doctoral researchers. In terms of ECR support, both research groups provide a forum for ECRs to discuss research development and writing support sessions for funding applications and academic articles. Internally, **8 ECRs across both institutes** have attended the **UWS Grant Accelerator Scheme** in which ECRs are mentored by a senior academic through their first grant application. Similarly, **4 staff** have attended the **UWS Crucible**, a leadership and development programme for those ECRs identified as having the potential to be research leaders of the future. In addition, bids for internally funded PhD students must include an ECR with appropriate expertise within the supervisory team.

ICEHS and CCSE are extremely effective at providing a supportive and developmental environment for post-doctoral researchers to develop alongside their main support duties, in line with the updated Concordat to Support Career Development of Researchers. Of the 7 post-doctoral staff employed in the current REF cycle, two are still in post (Dr Guillard, Dr Mamattah) while all of the remaining 5 have successfully secured permanent, full time academic positions (Dr Muggeridge (UHI), Dr Michan (Strathclyde), Dr Campbell (York St John), Dr McCandlish (Glasgow University) and Dr Carlin (Recruited to ICEHS while at a post-doc position with CCSE)). In addition, we have also had a number of research assistant positions, again with a strong emphasis on development, which in one case supported progression to a (now completed) PhD award (Dr Burleigh) and who is currently also employed as Senior Lab Technician at UWS.

## 2.4 Academia – Industry Exchange

Both institutes contribute locally, nationally, and internationally to other groups, and wider research networks in order to support high-level knowledge transfer and impact. Examples of such work includes (1) **FESTSPACE**, contributing to the role of festivals in producing inclusive public space in Europe (McGillivray, GBP541,000) (2) **EventsRights** collaboration with major sport event awarding bodies to enshrine human rights in major and mega sport events (GBP677,000; on hold due to COVID-19), (3) **Collaboration with Renfrewshire Council**, (McPherson, GBP197,000), (4) Creating a framework for the Social Value of Community Events for **Spirit of 2012** and **Local Trust** (McPherson, GBP50,000), (5) Long term collaborative partnerships with **NHS Lanarkshire** to improve health and wellbeing across Lanarkshire (Buchan, GBP66,000), (6) Partnerships with **CENSIS** Scotland's Innovation Centre for sensing, imaging and Internet of Things technologies, and the '**Lenus Digital Health Platform**' (Easton GBP106,000 and GBP57,000 respectively), (7) Key collaborations and knowledge transfer work with **Celtic FC** (Unnithan GBP169,000), and (8) **Scottish Government** funded work to support the health and wellbeing of people with Multiple Sclerosis (Sculthorpe GBP220,000). This groups' agility and expertise means at the end of 2020, they were able to rapidly pivot to provide research support for **COVID-19 and social isolation**, including interventions to support physical activity, and long-COVID-19 using smartphone apps funded by the Scottish Government (GBP124,000, and GBP239,000 Sculthorpe), assessing the efficacy and ergonomics of a new 'Face gator' face covering design with industry partners (Easton, GBP30K), and performing COVID-19 testing for elite Scottish Premier League athletes on behalf of the **Scottish Football Association** and **CignPost** Health (Easton GBP16,000).

## 2.5 Research and Impact Rewards

In partnership with the wider Division of Sport, ICEHS operates a system of time allocation related to research experience and expectations, with a sliding scale of teaching allocation for those with the highest research loads. This ensures a consistent loading across lecturers, senior lecturers and Professors. In addition, in the current REF cycle, staff loading includes a 10% time allocation to pursue developmental research. ICEHS also benefits from strategic investments from the School to support the development of early and mid-career researchers with the potential to become world-leaders. This has included approx. GBP20,000 for accelerometers (Dr Buchan) and GBP18,000 for specialist dual-head musculoskeletal imaging equipment (Dr Ugbohue).

To support the recruitment and promotion strategy outlined above, the staff within ICEHS have also enjoyed significant support from the School in terms of supporting CPD (GBP50,000 since 2014) This has included providing staff with the opportunity to attend national and international conferences. Importantly it has also contributed to the upskilling of long-term staff. This has included nine staff registering for part-time PhDs or Doctor of Professional Studies (Prof. Doc), two of which (McEwan / Graham) have already completed.

## 2.6 Research Students

PGR students' development represents an area of substantial advancement and since 2014 the post-graduate landscape in both ICEHS and CCSE has expanded radically. Students are active members of both research groups and are funded from a range of sources (internally, charity, sport, as well as local and national Government). Consequently, the current post-graduate environment of ICEHS and CCSE is a thriving community of researchers comprising a substantial group of UK and EU students. Moreover, since 2014 **ICEHS has graduated 30 PhD students and CCSE 9** (21 submitted for REF4a).

	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019/20
<b>ICEHS</b>	4	2	7	1	3	2	2
<b>CCSE</b>			1	1	2	5	

The UWS Academy and Doctoral College support students using the Vitae Researcher Development Framework and training to support future career development. Training includes compulsory and optional training modules covering: (i) knowledge and intellectual abilities, (ii)



personal effectiveness, (iii) research governance and organisation, and (iv) engagement, influence and impact. In addition, the Career and Employability team support students' career aspirations with advice on writing, getting published, academic networking and job hunting, academic and research leadership, presentation skills and poster/ presentation workshops, and interview preparation. During the period, the PGR students were encouraged to take part in the Speakers Society and later in the annual Vitae Three Minute Thesis competition, challenging doctoral candidates to present a compelling spoken presentation on their research topic and its significance in just three minutes. In addition, the Doctoral College supports a yearly 3-day festival of research and offers the opportunity to undertake the Post Graduate Certificate in Learning and Teaching in Higher Education. Both ICEHS and CCSE have postgraduate coordinators who liaise directly with students, Faculty, and the Doctoral College to oversee student progression. Both ICEHS and CCSE have seminar series planned, designed and delivered by the doctoral students. In recognition of this, the University received the HR Excellence in Research Award in June 2016 and UWS has recently completed a 4-year progress review including action based on the seven principles of the 'Concordat to Support the Career Development of Researchers'.

### 2.7 Equality and Diversity

Both research institutes are committed to the University's goals regarding Equality and Diversity. ICEHS contributed to the development and submission of the UWS Athena Swan Bronze award in 2017 (Easton). In the current REF period ICEHS (along with the School) has appointed an EDI coordinator to oversee EDI issues including gender, ethnic minority, and LGBTQ issues, both within the Institute as well as broader School level issues. Together both ICEHS and CCSE have supported staff through the prestigious **Aurora Programme** to train women for leadership in Higher Education. We have also supported 8 ECRs through the Universities 'Grant Accelerator' programme (which helps ECRs develop and submit their first funding application). Staff returning from maternity leave have been supported via the University's 'returners' scheme, which offers support and up to GBP10,000 to help restart a new research project after an extended family related leave. More broadly the proportion of females returned has increased from 10% in REF 2014 to 36% in REF 2020. Across the two institutes, appointment and development procedures are robust, with 7 of 13 appointments in this period being females, as were half our post-doctoral researchers and successful PhD students. Staff in both groups are provided with EDI training and unconscious bias training.

## 3. Income, infrastructure and facilities

### 3.1 Research Income and Funding Strategy

Research income has grown substantially since REF2014, where for UOA26 research income was GBP90,000 (from 12 successful applications from 29 submissions). In this cycle **ICEHS and CCSE have a combined research income of GBP1,172,108** including substantial funding from central governmental agencies, charities, and European bodies. In addition to this, the groups also aggressively sought internal support including winning competitive internal bids of over GBP600,000 including support for ECRs, studentships and equipment. To support this increase ICEHS and CCSE have a member of the central research office who acts as a single point of contact for all staff, providing training, advice and support in all aspects related to submission, costings, and approvals. In addition, all members of staff have an internal reviewer to assess applications before submission, and to act as a 'critical friend' in identifying areas of strength and areas for improvement. These approaches have meant that for both institutes this REF cycle has seen a substantial increase in the amount of research activity supported via external funding when compared with REF 2014.

Following 2014, the ICEHS undertook a strategy to increase the number of funding bids with the broader aim of increasing the number of successful applications. This strategic objective resulted in a 3-fold increase in the number of applications, generated by twice as many staff as in 2014. In terms of revenue from all sources (i.e., research, consultancy, and CPD), ICEHS has grown income to over GBP979,000 and of this, **research income comprises GBP555,000**, a 6-fold increase, reflecting the maturing research culture as well as the more strategic approach to research and associated funding applications. Research has included funding from Charities,

industry, consultancy and Government research. Together this has driven a **6-fold increase in research income**, and 10-fold increase in total income including funding from industry (Censis GBP106,000, Lenus Health GBP57,000), from the NHS (NHS Lanarkshire GBP66,000), charity funding (Hannah Foundation GBP80,000), as well as from elite sport (Celtic FC GBP169,000), and from Government (Chief Scientific Office for Scotland GBP220,000 still being drawn).

Similarly, CCSE has been extremely proactive in seeking funding for research and wider activities since its inception. CCSE has attracted total income (including research, consultancy, and CPD) of over GBP1,700,000. As a result, **CCSE has realised GBP686,540 in research funding since 2014** not including large, multi-year grants currently on hold due to COVID-19 and which continue to be drawn down. This includes **European funded** projects such as FESTSPACE, a Humanities in the European Research Area (HERA)-funded project (value GBP541,000) with partners in **London, Dublin, Barcelona, and Gothenburg**, and the **EventRights** mobilities project, an **EU Marie Skłodowska-Curie Research and Innovation Staff Exchange (RISE)** initiative (value GBP677,000) exploring the extent to which major sport events can be improved to ensure a progressive, rights-focused agenda. Other work includes a collaborative research project on the impact of major parasport events on the lives of disabled people in **Canada and Scotland** (GBP220,000) funded by the Social Sciences and Humanities Research Council and Sport Canada, research into cultural diplomacy funding from the **British Council** (GBP100,000), work investigating the social value of community events (GBP50,000), and work assessing the role of leisure and tourism in heritage sites (GBP30,000).

### 3.2 Organisational Investment

As with research and income, this REF cycle has seen a sea change in the infrastructure and equipment following large-scale central investment. In 2018 UWS moved from its Hamilton Campus to a purpose-built state of the art campus in Lanarkshire. The new build cost over GBP110,000,000, and **included upgrading our research capacity via a GBP2,300,000 investment**. This new spend has included over **GBP240,000 on a new cardiovascular imaging suite** including state-of-the art cardiac and vascular ultrasound, **GBP285,000 extreme environments lab**, including one of the largest purpose-built environmental chambers in Scotland, **GBP374,000 for a bespoke athlete consultancy and biochemistry lab** including facilities for exercise testing, and a **GBP586,000 for a new rehabilitation suite**, three bed treatment suite. Also, **GBP747,000 biomechanics suite** and **GBP160,000 for dedicated space for research students on our Paisley campus**.

### 3.3 Support Staffing and Infrastructure

The research environment is supported through two full-time technicians. Their remit includes support for research and teaching. In terms of research, this includes supporting research undertaken across all specialist areas (extreme environments, cardiovascular, rehabilitation, biomechanics, and exercise testing and biochemistry). Technical staff also support research via a variety of roles including equipment maintenance, calibration, and servicing, equipment preparation for data collection and storage, management of the biochemistry equipment and -80°C freezer. Both technicians are also research trained, both having graduated in 2020 with PhDs from ICEHS post-graduate studentships.

### 3.4 Specialist Research Infrastructure for Impact

In addition to the multi-million-pound lab refurbishment noted above, ICEHS has also strategically developed its research infrastructure to maximise the potential for world-leading research and impact. In the current REF period **investment in specialist equipment has exceeded GBP500,000**. Consequently, staff have access to a variety of specialist or state-of-the-art research equipment, such as a **Cardiovascular Imaging Lab**, including a brand new cardiac and vascular ultrasound and an off-line cardiac and vascular analysis software, specialist ultrasound cycle ergometer, functional electric stimulation ergometer for individuals with limited mobility; a **Consultancy Lab** with multiple metabolic carts including a Vyntus Jaeger, Medgraphics, and Metalyzer 3B, HP Cosmos Pulsar with overhead harness, and multiple cycle, ski, and rowing ergometers. This lab includes biochemistry facilities for assessment of blood lipids, C-reactive protein, and cardiac troponin and multiple Biosen-3C blood glucose and lactate analysers, nitrate

and nitrite assays, and microplate reader. The **Rehabilitation Suite** includes treatment space with 3 private treatment areas with plinths, theraband and rehabilitation weights, therapeutic ultrasound, vibration plates, and isokinetic dynamometer. The **biomechanics Lab** has advanced muscle function assessment including an isokinetic dynamometer and dual head musculoskeletal ultrasound imaging system, a Vicon 10 camera Motion Analysis System with the Vicon Nexus software with an integrated 12 channel Delsys Trigno Avanti Platform and **four** Kistler Force plates.

### 3.5 Cross-HEI Infrastructure Collaboration

ICEHS have undertaken a variety of Cross-HEI collaborations in order to maximise the quality, and impact of the resulting outputs. Prof Easton has hosted Dr Bammann from **University of Bremen** to use UWS expertise and infrastructure to assess physical activity in older adults, and Dr Porcelli from **University of Pavia** to utilise our ultrasound expertise, and our environmental chamber to assess changes in cerebral blood flow during hypoxia. ICEHS staff are also part of a large study assessing cardiac, cardiovascular, and cerebrovascular health and cognitive function in post-menopausal women. This includes use of specialist imaging equipment from UWS and **York St John**, beat-by-beat blood pressure assessment using equipment provided by **Federation University, Australia**, with all testing taking place using facilities at **University of Wales Trinity St David**. Work examining the morphology of lower back musculature in chronic lower-back pain also included MRI imaging undertaken by the **University of Edinburgh**. Prof. MacPherson was a visiting Professor at the Institute of Cultural Diplomacy in Berlin, with whom a Masters and PhD programme was also jointly developed.

### 3.6 In-kind Benefits

Both institutes also benefit from less formal agreements. ICEHS has had a long-standing collaboration with colleagues from Ningbo University in China. This has included summer internships for visiting Chinese students from Ningbo University to learn skills in our biomechanics laboratory. Staff from ICEHS (Dr Ugbohue, Prof Sculthorpe) and Ningbo (Dr JaDong) currently co-supervise a PhD student. ICEHS has also hosted an Erasmus Postgraduate Partnership with the University of Jean Monnet, Saint-Etienne, including hosting an internship and MSc in Health Engineering. Post-Graduate students from ICEHS have also visited Dr Porcelli's lab in Italy for skills development. CCSE also have a partnership with the Western University, Canada, on our Parasport research grant. Western pay for research assistants that give time to CCSE staff on the project and pay for staff travel, conference fees and publishing fees.

## 4. Collaboration and contribution to the research base, economy and society

### 4.1 Research Collaborations, Networks and Partnerships

Staff at ICEHS and CCSE have an international research profile, having published work with networks in **Europe** (covering **11 different countries**), **North America** (including **15 different states** across the **US** and **Canada**), **South America**, **India**, **Africa**, **Australia and New Zealand**, **Russia**, **China**, and **Hong Kong**. Collaborations on funded research projects have also been extensive including **Canada**, **Columbia**, **Germany**, **Africa**, **Spain**, **Ireland**, **Japan**, and the **US**. These top-level metrics are the result of proactively seeking and nurturing relationships with research leading groups.

As part of their funded international work (noted above) Profs MacPherson and MacGillivray lead collaboration with groups across Europe, Asia, and North and South America. Prof. Easton is part of an international group examining the role of dietary nitrate on health and performance, including outputs with collaborators in Italy (Dr Porcelli at the Italian National Research Council) and the USA (Prof. Allan at the University of Virginia). Prof. Sculthorpe and Dr Hayes have published extensively on models of healthy ageing with Prof. Grace (Federation University, Australia) and Dr Knox (California Lutheran University, USA). Prof. Sculthorpe and Dr Hayes have also collaborated on funded mobile health technology research with Dr Mair (Future Health Technologies, Singapore). Prof. Baker and Dr Ugbohue have a long-standing collaboration with Ningbo University in China in which Prof. Baker was a visiting Professor at Ningbo, and both Prof Baker and Dr Ugbohue have published extensively with Prof Yaodong regarding the biomechanics

of Gait. Prof. Unnithan has national and international links in professional sport with collaborations including FC Barcelona and Celtic FC. Dr Dello Iacono is part of a strength and conditioning research group with Dr Halperin (Tel Aviv University, Israel).

In addition to these international links, ICEHS and CCSE are also rooted in their communities at regional and national levels. Prof. Davison and Prof. McPherson are both members of the Observatory for Sport Scotland (OSS), and have collaborated with the OSS on previous and current projects. Dr Forrest and Prof. Easton have published seminal work regarding women's health in professional sport, in collaboration with Scottish Rugby influencing both policy and practice within that context. Dr Buchan collaborates with NHS Lanarkshire who have funded multiple projects, including 3 PhD studentships, all of which aim to improve the health and well-being of children in that area. Dr Cowan has collaborated with Jog Scotland and Street Soccer Scotland in his research into the social benefits of community sport, and sport leadership. Dr McEwan has collaborated with BASES, in using her research on the development process of sport psychologists to help develop the new BASES pathway for Applied Sport and Exercise Psychology. Drs Macrae and Carlin have worked on a funded project with Walking Football to assess how it might be adapted for people living with Dementia.

#### 4.2 Engagement with Users, Beneficiaries and Communities

ICEHS has provided a substantial amount of sport science support and consultancy to the communities in which it serves. This has included using the new environmental chamber to provide heat acclimation prior to competition for elite athletes (e.g., Callum Hawkins prior to the **Doha Athletics World Championships**, **Scottish National women's football team** and the **Scottish Men's Rugby team** for various competitions, and former IBO Welterweight champion Hannah Rankin). We have also provided performance support for Scottish elite and junior elite runners, as well as non-elite performance support, such as for Corrine Hutton, who following altitude training became the **first female quadruple amputee to summit Kilimanjaro**. Moreover, CCSE and ICEHS have supported and collaborated with numerous community groups including, **MS Scotland**, **ReviveMS**, **Street Soccer Scotland**, **Jog Scotland**, **England Athletics**, **Walking Football**, and **Age Scotland**.

CCSE staff have utilised their expertise in cultural regeneration to design an evaluation framework for the Council to assess its investment in culture. **UKRI funded work** allowed the CCSE staff to collaborate with close associates from Renfrewshire Council and the STAR Project charity and to reach out to community members to discover their views on the role that art and culture played in their lives. The outputs from this project included a short film of Paisley Art and Soul, a 'zine recording community members' creativity, and an evidence review exploring the role of arts and culture in tackling poverty. These outputs are being used by Renfrewshire Council to inform its strategic priorities and evidences the CCSEs engagement with users, beneficiaries and communities.

#### 4.3 Contribution to Economy and Society

The community and economic benefits described here are in addition to those described in this submission's impact case studies which detail: substantial impacts in athlete health, including cardiac assessment of adult, and adolescent elite athletes, supporting policy change in Women's Rugby, Informing the development of Sport Psychologist training, and research that has led directly to policy changes at **national and international level supported by the OECD (MacPherson, McGillivray, and Turner)**, and work to improve physical activity in primary schools in collaboration with NHS Lanarkshire (**Buchan, Arthur**).

The Exercise Nutrition and Environmental Research Group of ICEHS have worked with industry to develop next-generation **software for notation analysis (Dello Iacono)**, to support coaches by providing better methods of skill development with athletes (**Bobrowniki**), improving our understanding of training and coaching elite youth soccer players (**Unnithan**), supported better assessment and development of football match officials (**Arthur, Unnithan, Easton**), and providing cutting edge work on the role of the oral microbiome in athlete performance and health (**Easton**).



The Exercise Across the Life-span group have provided some of the first work to assess sprint interval training in older adults, and the first meta-analytic assessment of the effect of ageing on cardiac and vascular function (**Easton, Grace, Hayes and Sculthorpe**). This group also has an emerging digital health strand with research projects including the application of 'big data' techniques to physical activity assessment, and to provide more rapid assessment of echocardiographic analyses (**Sculthorpe**), the development of **novel digital health platforms** (**Easton**), developing symptom tracking mobile technologies to link symptom and daily activities in Multiple Sclerosis (**Sculthorpe**).

The sport and society group have worked extensively with external groups providing evidence-based practice and support that helps the communities which we serve while also having broader national and international applications. In this regard staff have worked extensively with underprivileged groups. Work with **Street Soccer Scotland** (**Cowan**) has informed our understanding of the role of Sport in the psychological and physiological health of children from deprived backgrounds. Staff (**Macrae**) have also undertaken ground-breaking work with **RS MacDonald Trust** to evaluate the role of walking football for people with dementia, providing a set of best practices guide future developments. Work with **Jog-Scotland** and **England Athletics** (**Cowan**) is informing the development of, and participation in, social jogging groups via the development of 'jog-leaders'.

CCSE staff have assessed cross-cultural comparisons of leisure and on the morality of leisure in the non-western societies including the diasporic communities with a specific focus on leisure-tourism and sustainability in **Nepal** (**Kaylan**), and on community engagement and the use of leisure time to community projects that aim to ameliorate the environmental impact of tourism without harming local economies (**Carnicelli**). Staff have also contributed to the discourse around lifestyle sports and public policy (**Turner**).

#### 4.4 Discipline and Interdisciplinarity support

Staff have provided important service to their respective disciplines. McPherson is a member of the REF sub-panel for 2021 and an interdisciplinary advisor to the panel. Staff in ICEHS and CCSE collectively serve as editors to 6 journals and have completed over 280 peer reviews including journal articles, books, and grant applications including for **BHF, AHRC, ESRC, and UKRI**. McPherson has completed a term as an elected College panel member for AHRC. Both groups have guest edited special editions including in *Frontiers in Physiology* (Dr Hayes) and *Annals of Leisure Research* (McGillivray, MacPherson and Carnicelli). McPherson is also a member of the British Soft Power Group and has acted as an expert advisor to the FCDO.

Staff have also delivered approximately 80 presentations including keynotes at national and international conferences and have performed external examiner duties for 23 PhD and other post-graduate research awards and have hosted several research students from overseas as part of collaborative arrangements for skills development. In 2014, **McPherson, McGillivray, Carnicelli and Flinn** hosted the **2014 Leisure Studies Association conference** with over 100 attendees, and filmed for **STV news**, with **Prof McPherson** giving an interview on Sport event legacy. The event focused on themes now aligned with the CCSE – major sport events (the event coincided with the **Glasgow 2014 Commonwealth Games**), digital leisure cultures and cultural regeneration and in 2018 ICEHS won the rights to host the 2021 ECSS conference (postponed to 2024 due to COVID-19).

#### 4.5 Wider Influence and Contributions

CCSE continues to be proactive in contributing to academic and societal debates and discussions. In May 2020 CCSE hosted a virtual symposium, Festivals, Events and **COVID-19: Navigating a Global Pandemic**, utilising simultaneous livestream broadcast across Twitter, Facebook, LinkedIn and YouTube to reach the target audience. There were **407 sign ups** to the Eventbrite pre-broadcast: up to **240 simultaneous viewers** on the stream at any one time, with a total of **1171 unique stream views** overall on the day. Post conference, the event reached more than **140,000 people** and **63,730 people** watched the recorded conference on the School Facebook

page. The Centre is also active on web and social media platforms to share its work and foster new relationships with potential partners and audiences. For example, CCSE is present on Twitter (@CCSE\_UWS, currently 624 followers) a platform through which we are able to reach out to our audience, advertising our events and activities and promoting our weekly blog which features posts related to a wide range of culture, arts and policy practitioners who are engaged with CCSE and the CCSE network. The success of our virtual symposium – Festivals, Events and COVID-19 – led to the launch of a series of online discussions titled #CCSEConversations in 2020 and 2021; these conversations provide a platform for continuing to discuss the ideas, themes, challenges and opportunities emerging from the topics debated. The conversations have ranged across a number of topics and themes including tourism, festivals, cultural diplomacy and major sport events. Finally, staff in CCSE are also committed to making their research outputs and outcomes available to the widest possible audiences. We ensure all our knowledge exchange reports are available open access, hosted on the ISSUU platform and embedded on the CCSE website.