

Institution: Heriot-Watt University

Unit of Assessment: 19 Business and Management Studies

a. Overview

Business and Management Studies (BMS) at Heriot-Watt University (HWU) comprises the full range of cognate disciplines: Accountancy, Actuarial Science, Economics, Enterprise, Finance, Human Resource Management, Management, Marketing and Strategy. These are organised into five strategic themes and nine formal research centres (see table 1 below). Since 2008, the 38 individuals submitted to REF have published a total of 326 papers in refereed journals, 22 books, 81 book chapters and 69 government and industry reports, given 63 international keynote addresses and 296 conference papers. In addition, discussion papers are widely distributed, e.g. there were 11,000 full-text downloads of economics discussion papers in the REF period.

All research in BMS is coordinated and managed via Research Centres within Strategic Themes, combining leading-edge theoretical work with practical and policy-oriented insights, in a way which is consistent with HWU's history of industry and business engagement. Since our 2008 submission the range and depth of disciplines has been significantly extended, supported by targeted recruitment of nine new Professors and thirteen Early Career Researchers (ECRs), together with a £1.3M investment in PGR scholarships. Six new Research Centres have also been created to underpin the growth of a collaborative research culture. The table below sets out the relationship between centres and themes within BMS.

Themes	Disciplines	Research Centres (*new since 2008)	Individuals (*new since 2008)
Energy & Sustainability	Management, Economics, Accountancy, Finance	<ul style="list-style-type: none"> Logistics Energy, Resource and Environmental Studies* 	Danson*, Ghadge*, Lu*, McKinnon, Piecyk*, Schaffer, Turner K*
Applied Management & Enterprise	Management, Strategy, Marketing, HRM, Enterprise	<ul style="list-style-type: none"> Research on Work & Wellbeing* 	Chhina*, Danson*, de Gioia-Carabellese*, Kamenou-Aigbekaen, MacIntosh*, MacLaren*, Marks, O'Gorman*, Sang*, Schaffer, Taheri*, Turner C, Tran*
		<ul style="list-style-type: none"> Intercultural Research* [joint with D28] 	
Accounting Profession, Governance & Society	Accountancy	<ul style="list-style-type: none"> Accounting* 	Kamla*, Haniffa*, Paisey, Yonekura*
Finance & Actuarial Science	Finance, Actuarial Science	<ul style="list-style-type: none"> Finance and Investment* Scottish Financial Risk Academy (incl. Actuarial Research Centre) Genetics Insurance Research 	Caglayan*, Cairns, Donnelly*, Johnson, Kleinow, Macdonald, McNeil, Waters, Xu*, Yuen*
Economic Policy	Economics	<ul style="list-style-type: none"> Spatial Economics & Econometrics* 	Bhattacharjee*, Byrne*, Cobham, LeMay-Boucher, Mélitz, Porter*, Schaffer

The BMS submission from HWU derives mostly from the School of Management and Languages (SML). One Research Centre incorporated within the submission (the Intercultural Research Centre) is collaborative between BMS and the Department of Languages and Intercultural Studies which is also located in the School of Management and Languages. Other research staff within the Intercultural Research Centre are being returned separately as part of HWU's submission to D28. Additionally, cross-school strengths in finance at HWU create critical mass with finance researchers and actuarial scientists from HWU's School of Mathematical and Computer Sciences (the actuarial science group was ranked third in the world by the North American Actuarial Journal

in 2013). Staff from BMS also provide supervisory inputs to the Edinburgh Business School (a wholly owned unit of HWU delivering distance learning MBAs globally) on its recently launched professional doctorate (DBA) (sections c and d).

b. Research strategy

Global recognition and professional relevance are prominent themes in the University's 2013-18 Strategic Plan. The research strategy within BMS is, therefore, to develop further those areas where we have achieved global recognition (logistics and energy have been highlighted by successive RAE panels), whilst establishing similar recognition in emerging areas (e.g. cultural heritage and spatial econometrics). Centre directors are charged with expanding the quality and quantity of both outputs and income via three routes. First, continuing an ambitious recruitment strategy, via the institution's Global Platform policy, with the commitment to create at least 20 additional research leadership appointments by 2018; second, further strengthening the research performance of existing staff through enhanced mentoring, training and support; and third hosting visiting appointments from leading international scholars to provide opportunities for global networking and skills development to existing staff. PGR numbers have risen by 50% since 2008. In 2011 BMS created over 20 fully-funded scholarships to provide additional research capacity. The significant investment in doctoral scholarships is being supplemented by the creation of post-doctoral appointments during 2013-14. These post-doctoral appointments form a key part of our research strategy because they will provide both support to academic staff in leadership roles and create a career pathway from PhD through post-doctoral appointment to full member of academic staff. Over the next assessment cycle BMS will benefit from access to a pool of doctoral and post-doctoral candidates as our expansion continues. Our strategy is reviewed regularly by the Research Committee, Centre Directors and the Management Board and all research complies with stringent ethical guidelines set at institutional level.

In RAE 2008 our strategy focused on Energy and Sustainability, Financial Risk, Work-life Balance, and Economic Policy. Evidence confirms that we have improved our research achievements in these core areas. Research awards in the final year of the current period are the highest ever secured in BMS (£1.84M) and this compares favourably to £30k of awards achieved in the final year of the previous assessment period. In addition, proposals submitted during FY2012/13 represented both the highest number of bids and the highest ever total bid value recorded in BMS.

The particular mix of Strategic Themes and Research Centres we have created in BMS (see table 1 above) encourages multidisciplinary research with the opportunity to reach beyond Business and Management. We have benefited from research funding from both the ESRC and EPSRC during this assessment cycle, and the creation of a dedicated research office within BMS supports Research Centre directors and staff in accessing new funding beyond these established sources. In this assessment cycle new funding has been accessed from professional bodies (e.g. Academy of Marketing), representative organizations (e.g. Equality and Human Rights Commission), pan-governmental bodies (e.g. the European Bank for Reconstruction & Development), industry (e.g. BP) and other recognised research funders (e.g. the Gates Foundation and the Norwegian Research Council). The interplay of established researchers of international standing, ECRs and a rapidly expanding PGR population will enhance an already vibrant research culture, consistent with HWU's strategic priority of increased research intensity. Our strategy is to deliver increased numbers of internationally leading research outputs, supported by enhanced grant income, and providing greater impact by building on a set of relationships with industry partners, professional bodies such as The Institute of Chartered Accountants of Scotland, the Institute and Faculty of Actuaries and other intermediary organizations relevant to our Strategic Themes and Research Centres. This external orientation is an important part of our identity given the institution's historical emphasis on impact, end user engagement and relevance.

Energy and Sustainability

Under the theme of Environment and Sustainability, there are two major research centres, the Logistics Research Centre (LRC) and the Centre for Energy, Resource and Environmental Studies

(CERES). The LRC, founded by Professor Alan McKinnon in 1998, pioneered the development of key performance indicators for UK freight transport - a core element of the UK government's sustainable distribution strategy. Over the assessment period we have built on existing strengths in environmental and 'green' logistics, described in RAE 2008. Staff within the centre have also been appointed to UK, European and global policy committees, such as the World Economic Forum, and have won an EPSRC grant of £4.4m jointly with the University of Cambridge to create the Centre for Sustainable Road Freight Transport. The new centre comprises specialists in logistics, road freight vehicle engineering and human factors, as well expertise in energy economics and environmental sustainability. These latter themes of energy and sustainability demonstrate the opportunity for synergy between long-standing and emerging areas of expertise within BMS. The Centre for Sustainable Road Freight Transport will also involve key industry players in setting the research agenda and trialling technical and operational innovations emerging from the research. The impact of research conducted within Logistics Research Centre is outlined in Section 3a/b and staff within BMS have influenced both policy and practice to reduce CO₂ omissions, reduce carbon in the supply chain and promote ethical supply chain developments. As part of a strategic review, the George Davies Centre for Retail Excellence was brought under the Logistics Research Centre umbrella to exploit overlapping interests in supply chains. The combination of the LRC, the new Centre for Sustainable Road Freight Transport and the George Davies Centre for Retail Excellence underlines HWU's expertise in environmental and ethical supply chain issues and the broader area of logistics. The prominence of these issues in environmental and sustainability terms, combined with the expertise in securing external funding, ensures its viability over the next five year period.

The Centre for Energy, Resource and Environmental Studies draws on a multidisciplinary group of researchers, headed by three professors (Turner (K), Schaffer, Danson) working on a broad range of energy issues, from energy efficiency to environmental impact and carbon footprints. Turner,(K) is one of six ESRC Climate Change Leadership Fellows, whilst Schaffer directs the production of HWU's input into the BP Statistical Review of World Energy, the leading publication of its kind, which provides a comprehensive database of world energy trends. The Review, available to the public and widely used by researchers around the world, is described in the press as "an amazing insight to the world's consumption and production of energy" (Guardian 9.6.10). More recently, the Centre has expanded this cooperation to include work for BP's Energy Outlook, the company's annual projection of long-term energy trends. Danson is part of the 'APAtSCHE: Ageing Population Attitudes to Sensor Controlled Home Energy' project with the University of Strathclyde funded by EPSRC; the aim of this project is to assess whether the deployment of energy-saving technology dependent on occupancy and perceived comfort can reliably manage energy demand for an ageing population. CERES has a strong policy focus and is pursuing a strategy which features close collaboration with both industry and government. It is also closely aligned to the Economic Policy theme described below.

Applied Management and Enterprise

Since 2008 this group has expanded with new appointments of established researchers (Danson, de Gioia-Carabellese, MacIntosh, O'Gorman) and early career researchers (Chhina, MacLaren, Sang, Taheri, Tran). These appointments share a focus on delivering industry relevant solutions and strong links with business and government. MacIntosh and Turner(C) undertake strategy-related research from a multi-disciplinary perspective. Both study the impact of technology and globalisation on firms. Turner's work on EU policy has been widely cited in sector specific journals, whilst MacIntosh has co-authored with senior practitioners. Researchers from the Applied Management and Enterprise group have presented at parliamentary committees (UK House of Commons (Business Innovation and Skills, Scottish Affairs); Scottish Government (Economy Energy and Tourism) and Local Government). Schaffer's research on the business environment in developing economies, with academic colleagues at UCL and Toulouse and staff at the World Bank and the European Bank for Reconstruction and Development, enables the identification of priority areas for investment (see also impact case). In RAE 2008 we observed "the growing recognition of the role of health promotion and the creation of a work-life balance also promises to be a funded, policy-oriented research activity." In response we established the Centre for Research on Work and Wellbeing (CRoWW). This centre delivers research which explores issues of mental

health in the workplace, diversity management and work life balance. The centre informs practice in these areas by adopting a broad view of wellbeing. Research has covered issues of ethnicity, gender, social class, age and disability since these are seen to impact on people's relationship with work (Marks, Kamenou- Aigbekaen and Sang) and build on existing funded projects by the ESRC, working with trade unions, the third sector and industry. Further new appointments to this group will come on stream in early 2014 reinforcing our ability to connect with senior practitioners in a range of sectors.

Accounting Profession, Governance and Society

At RAE 2008, our accounting researchers targeted improved publication outcomes and closer engagement with professional bodies, government, business and other key constituencies. There are overlaps with finance and actuarial science and those studying energy and sustainability. Evidence reinforces the importance of these links e.g. the Accounting for Society and the Environment Research Symposium held at HWU in December 2012. Further, HWU now has campuses in Dubai and Malaysia and recent appointments have added research expertise on Islamic finance and accountancy (Kamla and Haniffa) and Islamic marketing (Taheri, ECR), as well as exploiting links with Languages and Intercultural Studies at HWU. This area of research is embryonic, but will grow in importance over the next assessment cycle. Kamla has contributed to the Scottish Parliament's consultation on "Islamic Finance and its contribution to Scotland", whilst Haniffa's research on religious charity organisations in the UK led to engagement with Islamic charity organisations on accountability and governance issues. Yonekura (ECR) has interests in another international context and has published on corporate governance in Japan, contributing to the wider methodological debate in accounting and management. Paisey's research builds on his work from RAE 2008 on educational and professional practices in accounting and explores the relationship between professional body disciplinary processes and human rights, along with issues relating to social mobility and the accounting profession.

Finance and Actuarial Science

HWU benefits from strong relationships with major financial institutions in Scotland and worldwide. The three research centres in Finance and Actuarial Science bring together academics and senior practitioners to shape research projects and ensure the practical relevance of our research. The principal concern of this theme is the development of innovative new mathematical models that address practical problems in insurance, banking, finance and other areas such as energy prices. In the next assessment cycle, this will create opportunities for collaboration with those researching under the university-wide energy and sustainability theme.

The Centre for Finance and Investment (CFI); the Scottish Financial Risk Academy (SFRA, further details in section d); and the Genetics and Insurance Research Centre (GIRC) conduct research and knowledge exchange in the fields of insurance, pensions, banking, asset management, financial markets and corporate finance. Additionally, 2012 saw the formation of the Actuarial Research Centre (ARC) as the research arm of the SFRA. Consistent with HWU's ethos, the group places strong emphasis on engagement with industry and much of the research output tackles real-world financial and insurance problems (two impact cases from this group, with underpinning mathematical research, have been returned to the Mathematics panel, B10). Each of the research centres relating to this theme has its own industrial advisory committee, panel or board to maintain focus on the impact agenda. The CFI, GIRC and ARC are primarily research centres, while the core objective of the SFRA is knowledge exchange. Industry links will be strengthened in the coming years to ensure the continuing relevance and impact of the group's research.

Research in the assessment period has included work on econometric modelling of financial markets and economic indices (McNeil, Cairns, Caglayan, Xu); capital structure and corporate finance (Caglayan); energy markets (Johnson, Xu); modelling and management of longevity risk (Cairns, Kleinow); asset-liability modelling and asset allocation (Cairns, Donnelly, Kleinow, Yuen); asset and funding liquidity (Cairns, McNeil, Donnelly); genetics and insurance (Macdonald, Waters); mortality and morbidity (Macdonald, Waters); anti-selection in insurance (Macdonald,

Environment template (REF5)

Donnelly); international solvency regulations (Cairns, McNeil, Macdonald, Donnelly); derivative pricing and optimal control (Johnson, Yuen).

Staff within the Finance and Actuarial Science theme have strong relations with the UK and international actuarial professions (i.e. the Institute and Faculty of Actuaries, and the International Actuarial Association), and are prominent players nationally and internationally in knowledge exchange activities. In 2013, Johnson organised the highly successful IMA Mathematics in Finance Conference and has been invited by the IMA to chair a future conference in the series. Caglayan (European Economic Review, 2008) makes a unique empirical contribution to the literature by testing several theoretical predictions on the linkages between inflation and price dispersion, an issue which has important implications on efficient allocation of scarce resources and firms' capital structure adjustment problem. Cairns' research has had a significant impact on how the pensions and life insurance industry measures and manages longevity risk, and he is a much sought after invited speaker at conferences (21 invited talks since 2008 including the OECD and the International Longevity Risk Conference). McNeil's research monograph on Quantitative Risk Management has had a very significant impact on the development and use of quantitative methods in banking and insurance. Banking and other quantitative finance professionals often cite McNeil's monograph as one that they must have to hand in their offices, and it is very heavily cited by both academics and practitioners (over 1900 citations on Google Scholar). Both Cairns' and McNeil's research has had direct impact on transactions in insurance and banking amounting to billions of pounds (e.g. Prudential Retirement, USA, and Moody's Analytics respectively). Research into the impact of genetics on insurance is led by Macdonald and has moved from single to multi-gene disorders with significant progress made towards modelling and understanding the financial impact of such diseases on insurance business. The group aims to develop further its reputation as a world leader in quantitative risk management, building not just on existing strengths such as actuarial science, but, also, through new appointments and through actively seeking out new and challenging quantitative problems arising in industry.

Economic Policy

Economics at HWU has a strong policy focus, both in its contribution to the Energy and Sustainability Theme (above) and in its own right. Two new centres have been introduced: The Spatial Economics and Econometrics Centre (SEEC, led by Bhattacharjee) and the Centre for Energy, Resource and Environmental Studies (see above) to address emerging areas of research. These centres build on the legacy of The Centre for Economic Reform and Transformation, identified in RAE 2001 panel feedback as a particular strength and in RAE 2008 highlighted as being of international excellence. The new focus of the Economic Policy theme incorporates work on household behaviour (LeMay-Boucher and Porter, ECR) using survey-based data and the application of microeconomic techniques which are at the forefront of modern development economics. In addition, macroeconomics has been significantly strengthened with five additional recruits since the last assessment. Byrne provides an overlap with research in Finance through his work on open economy relationships, and issues ranging from exchange rate-prices pass-through to the international determinants of bond yields and exchange risk premia. Cobham's research on monetary policy frameworks, techniques and strategies is part of an important trend initiated by George Evans (Oregon) and Seppo Honkapohja (formerly Cambridge, now Bank of Finland). Bhattacharjee works on the contribution of individuals in monetary policy decision-making committees. BMS hosted a monetary policy conference in 2011 (papers published in Oxford Economic Papers) and will host a further conference in 2014 (papers to be published in a special issue of the Manchester School). Mélitz's work on stabilisation in fiscal policy and the role of language in foreign trade complete a distinctive combination of micro and macro level researchers working within BMS. Further, the policy dimensions of this work continue to provide clear pathways to impact from our research.

c. People, including staffing strategy and staff development.**i Staff**

The HWU 5-year Strategic Plan states that by 2018 all academic staff will be active at

internationally competitive levels in research and/or scholarship. This is supported by a strategic investment fund, Global Platform for Research Leaders, enabling the University to appoint 20 additional research leaders p.a. over and above routine vacancies. We have attracted eight professors via this initiative since 2011, and we are committed to continuing to grow both the quality and capacity of our research base via this and other routes. The organisation of research through Themes and Centres, see table 1, has broadened the base of research since 2008 and has informed targeted recruitment decisions to fit within this structure. New and existing senior staff work closely with our cohort of high potential, ECRs. Over 20% of staff submitted have been appointed to their first academic role since the last assessment. Our professorial appointments have been awarded two fully-funded research studentships to further expand our research capacity and deepen our research culture.

We offer a highly supportive research environment and an attractive career path, with a special emphasis on supporting ECRs. We have a clear policy that all research active staff are on open ended contracts and none of the Category A staff submitted here is employed on a fixed term contract. Particular attention is paid to maximising research opportunities for ECR staff by, for example, prioritising early opportunities to participate in PhD supervision with experienced colleagues. Staff have access to three specific budgets (in excess of £150k p.a.) to facilitate pump-priming research, conference travel and development support.

HWU also has an active Performance and Development Review (PDR) policy where all staff prepare forward job plans, which are reviewed every six months, and a mentoring scheme is used to enhance the skills of ECRs (see below). This ensures that researchers have the necessary support for their research, are contributing actively to the research culture within the various research centres and themes and are performing against clear expectations in terms of publication, PGR supervision, external funding and impact. This is particularly important in assisting staff who have had a break in research for whatever reason. PDR meetings are used to ensure staff have time to return to research, e.g. a phased return to full teaching and administrative commitments.

Research career development at all levels (staff and PGR students) in the University is coordinated by the 'Research Futures' section within our award-winning "Centre for Academic Leadership and Development" (Times Higher Education awards for 'Outstanding Support for Early Career Researchers', 2010 and 'Leadership & Management' 2013). Research Futures offers a full programme of staff and PGR student training courses designed to increase research capability and research success across the University. HWU was amongst the first in the UK to receive the "HR Excellence in Research" recognition from the European Commission in 2010 (renewed 2012). This award recognizes the positive actions that HWU has taken to support the career development of researchers and the actions in place to implement the principles of the "Concordat to Support the Development of Researchers" and all aspects of the Vitae Researcher Development Framework. Further evidence of the strength of this support came in the Times Higher Education 2013 awards, where HWU's HR Team won the outstanding category.

HWU created and runs the "Scottish Crucible" as a pan-Scotland professional and personal leadership programme (developed initially by NESTA for the UK). This is funded by SFC and the Scottish Government (www.hw.ac.uk/scottishcrucible) for future research leaders. The scheme enables talented early career researchers, developing independent research from any discipline, to explore innovation, policy, and interdisciplinary collaboration, and expand their creative capacity and problem-solving potential in new directions. Heriot-Watt was the first HEI to also develop an institutional version, HWU Crucible, and launched the first European Crucible in 2012. Three of our submitted ECRs have won places on HW Crucible to date and all future ECR recruits will be entered for Crucible training. As well as promoting research and supporting knowledge exchange activities, there are individual career consultations and an advanced communications surgery.

PGCap (Postgraduate Certificate in Academic Practice), which includes research training modules, is offered to all incoming ECR staff as part of a three year probationary period. ECRs are supported by a mentoring system matching them with experienced staff from their research area and ensuring reduced teaching commitments post appointment. Further, individuals at all levels

are encouraged to use internal peer review before submitting journal publications and external funding applications. In the next assessment cycle conversion rates for both will be closely monitored to gauge the effectiveness of this support.

Staff are encouraged to work closely with professional bodies both in their research communities, where individuals have held executive roles within organizations such as BAM and the Academy of Social Sciences, and within relevant practitioner communities such as the Society of Actuaries and the Institute for Chartered Accountants of Scotland.

We have regular research seminars, with a programme of external speakers complementing internal contributions from both staff and research students. In addition, a Reading Group encourages all staff to share innovative methodologies and a comprehensive range of epistemologies. The School Ethics Committee is responsible for reviewing and approving all data collection involving human subjects ensuring adherence to the university's Ethics Code. The Research Committee regularly reviews the work of this sub-committee and the University Ethics Committee audits the work of School Ethics committees across the university.

'Valuing and Respecting Everyone' as one of HWU's five agreed 'Values', upholds support for equal opportunities at all levels. Three of the nine professorial appointments and five of the thirteen ECR appointments made in the last two years are female. HWU was certified at Institutional Bronze level under the Athena Swan Charter's May 2013 round and is committed to extending these principles throughout all disciplines (although this initiative has not yet been extended to the Arts, Humanities and Social Sciences). We have embarked on the self-assessment process using the guidance provided by the Athena Swann pilot project. This is a specific commitment in HWU's 2013 Outcome Agreement with the Scottish Funding Council. All research meetings and seminars are held within the working day and, if evening events are held, child care is provided. There is an on-campus nursery available for staff.

ii Research students

PhD numbers have increased by 50% over the REF period with 39 registrations in August 2008 and 59 in July 2013. Strategic investments in scholarship funding have seen the rate of growth in PGR registrations increase substantially in the latter part of the assessment cycle. The majority of these registrations have been for PhD degrees with smaller numbers registering for the recently launched professional doctorate offered by the Edinburgh Business School.

HWU is part of the ESRC Scottish Social Science Doctoral Training Centre and provided its founding director. The success of our PhD programme is highlighted by the destinations of our graduates including the IMF, the Hong Kong Monetary Authority, Standard Life, DIW-Berlin (the German Institute for Economic Research, the BP chief economist's office and the National Institute for Economic and Social Research. To complement an established pattern of ESRC scholarships, there have been 51 university-wide and Business and Management funded Scholarships paid at the same rate as the ESRC scholarships. These funded studentships form an important part of our research strategy and will build capacity over the next assessment cycle. Some scholarships have additional funding from industry partners including Proctor and Gamble, BP and Mercedes-Benz UK. All economics and some finance PhD students (in total 25 started their PhDs over the period) are qualified to participate in the Scottish Graduate Programme in Economics activities including advanced MSc options, a range of short training courses and the annual conference, at which they are each required to present. At the last such conference over 20% of the PhD presentations were from HWU. Students from the Scottish Financial Risk Academy also have the option of industrial placements of which there have been 57 since 2010, involving 18 companies and 5 universities.

Established staff contribute to doctoral supervision and ECRs are encouraged to take second supervisory roles as part of their development. Consideration of the impact agenda is central to the supervisory process, featuring as a standing item during regular meetings between students and their supervisory team. All students are offered appropriate ICT, accommodation and access to HWU's postgraduate centre. They are treated as full members of the academic community and

our PhD community participates in the seminar series run by Research Centres, as well as dedicated skills days and poster competitions run within BMS. The University offers a number of educational and development courses dedicated to PhD students at different stages of their studies (including business and enterprise skills, career development and Viva preparation) and the resources provided by the Centre for Academic Leadership and Development (see Section c). Funding is provided to enable research students to undertake specialist training where appropriate, such as recent cases where financial support was provided to facilitate individual students attending summer schools in Advanced Quantitative Methods and ethnography.

d. Income, infrastructure and facilities

Over the assessment period grant funding from RCUK, industry and charitable sources has risen from an average of £139k p.a. in the last RAE, to £324k p.a. Total income (by spend) during this assessment period is £1.62m, an increase of 66% on the RAE2008 period. In 2008 we set out to increase both the volume of research income and the proportion of income received from RCUK; this has now reached 49% of total research income (£798k). Further, the range of funding sources has expanded suggesting that our strategy is delivering results. The final year of this assessment period has featured the highest ever total value of research grants awarded as well as the highest ever value of research proposals submitted. The distribution of awards, as can be seen from form REF4b, has been enabled by the strategic investments made by both HWU and BMS which have enhanced our ability to win external funding.

During the period, we have received a number of notable awards. The Centre for Sustainable Road Freight Transport was established with £4.4M of funding from the EPSRC (£1.7m of which is based at HWU). Significant industry support (£1.4m) was secured from a consortium of partners including key freight operators such as John Lewis, Tesco, DHL and Wincanton, along with vehicle industry partners including Volvo, Goodyear and Firestone. In addition, we have continued to attract direct funding from leading industrial firms such as BP (£111k to support Schaffer's work on energy). The Scottish Funding Council award of £335k in 2010 to establish the Scottish Financial Risk Academy (SFRA) enhanced HWU's reputation in financial research. It featured significant in-kind industry support, in total estimated at £354k from a range of partners including, Aberdeen Asset Management, Moody's Analytics, Lloyds Banking Group, Scottish Financial Enterprise and the Institute and Faculty of Actuaries. Further investment came from The Maxwell Institute for Mathematical Sciences, a joint venture of the University of Edinburgh and HWU. In 2013, SFRA transitioned to being entirely funded by industry with contributing partners currently including firms such as Lloyds Banking Group, Standard Life and PwC.

The University's Research and Enterprise Services (RES) provides comprehensive support for grant and contract applications together with support for industry engagement and enterprise. In further support of research income generation, BMS maintains a dedicated, School research office that works closely with RES to handle both the local costing of proposals and the efficient management of awards. The presence of local support staff provides vital assistance with grant applications, information regarding specific funding initiatives, management of the PhD programme, organisation of research meetings and seminars and the production of a monthly research newsletter to disseminate achievements and celebrate success and increasingly to enable pathways to impact. Staff members within BMS are encouraged to provide details of all research achievements to the Research Office who, in turn, work closely with the university's corporate communications team to disseminate outcomes. All research outputs are recorded and made publicly available in the University's Open Access repository, "HWU Research Gateway".

HWU is a multi-campus University with modern infrastructure. Business and Management occupies five buildings in close proximity, three of which are exclusively occupied and one of which comprises the Edinburgh Business School (see overview), forming a major hub of expertise. The University strategy encompasses continuous upgrading and development of all facilities and within this assessment period £1.2m has been invested in Business and Management infrastructure. Full-time academic staff have individual offices and are supported by centrally managed IT services. Staff have the option of a desktop computer or laptop with docking station as well as access to

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analytical and research resources such as Nvivo, Stata, Eviews and SPSS. Specialist software and databases are available, for example Datastream; Markit; CLASS by Cirrus Logistics: a warehouse management simulation model used for warehouse design as well as the principles of stochastic simulation; Paragon and Optrak, transport planning tools; and Dragon Translation software. Business and Management also invests over £950k per annum to maintain access to databases and online resources via HWU's library.

In 2010 a new £9M Postgraduate Centre was opened on campus providing excellent lecture theatres, meeting rooms, study and social space. More recently, in 2013, a new Business and Management open plan PhD office was opened at the heart of the University to accommodate 24 students, allowing the PhD community within Business and Management to expand. All full-time PhD students have their own workstation and access to appropriate software. Further office space was created for the start of session 2013-14 to accommodate 20 additional PGR studentships as part of the expansion in PGR numbers within BMS.

e. Collaboration or contribution to the discipline or research base

All Staff within Business and Management at HWU regularly engage with fellow academics, relevant professional bodies and policy makers in the course of their daily work. These relationships help build a network of influence within and beyond individual disciplines and, within this assessment cycle, collaborations between staff in the School of Management and Languages and actuarial scientists working within the School of Mathematical and Computing Sciences have been formalised, resulting in this, the first joint submission of staff to C19.

The examples below indicate some of the ways in which staff have contributed to their disciplinary areas during the assessment period.

In logistics, McKinnon chaired the World Economic Forum Council on Green Logistics between 2009 and 2012 (he continues as Vice Chair). He is also a member of the European Commission High Level Group on Logistics set up to advise the EU Transport Commissioner on logistics issues and he advises the European Council for the Chemical Industry and the Freight Transport Association on green logistics. Piecyk (ECR) won the prestigious James Cooper Memorial Cup for the Best PhD on a Logistics Topic and DB Schenker PhD Award for the Best PhD on a Logistics Topic in Europe, awarded by the Stinnes Foundation. Piecyk has since contributed to the United Nations Economic Commission for Europe Transport Division's expert meeting on Development and Implementation of a Monitoring and Assessment Tool for CO₂ Emissions in Inland Transport to Facilitate Climate Change Mitigation in 2012. The LRC advised the European Council for the Chemical Industry on how to measure CO₂ emissions from their transport operations and set the targets for the Freight Transport Association (FTA) for reducing the carbon intensity of freight transport between 2010 and 2015 for FTA's Logistics Carbon Reduction Scheme, which was subsequently endorsed by the UK government. In 2012 the LRC (PI Piecyk) was successful in a bid to EPSRC to launch a Centre for Sustainable Road Freight Transport (CSRFT), jointly with University of Cambridge. As a result, a team of six full-time research staff and six PhD students are working with eleven academic investigators currently based at HWU and Cambridge Universities ensuring that HWU retains a prominent position in this sub-discipline. Further, in 2012, significant industrial support from ASDA, Schuh and Johnstons of Elgin helped secure a £120k ESRC project to examine ethical fashion supply chains.

The Genetics and Insurance Research Centre is led by Macdonald who is acknowledged as 'the world leader' in this field (British Actuarial Journal Vol. 18: pp1-2 2013). He was co-opted as a member of the Monitoring Group on Genetics and Insurance of the Human Genetics Commission, and he was commissioned to write a report on genetics and insurance for the Office of the Canadian Privacy Commissioner. In 2011, Macdonald was awarded a Finlaison Medal by the Institute and Faculty of Actuaries. Similarly, Cairns was awarded the Halmstad prize in 2008 and the Society of Actuaries Prize in 2010 for his research on the modelling and management of longevity risk. He was an invited panellist on three government commissions (Audit Scotland Public Sector Pensions Audit; Lord Hutton Independent Public Service Pensions Commission; HM

Environment template (REF5)

Treasury Discount Rate Consultation). The recently formed Intercultural Research Centre has helped foster a range of collaborative activities including an analysis of the origins of capitalism within classical antiquity (MacLaren and O’Gorman (HWU), Wallace-Hadrill (Cambridge), Baxter (Sussex)) and more contemporary business history such as ‘Conrad Hilton and the Creation of the Global Hotels Industry,’ MacLaren and O’Gorman (HWU), Harvey (Newcastle) and Maclean (Exeter)). The IRC has also created a means of collaborating with established scholars in Languages and Intercultural Studies (D28) at HWU.

Staff have engaged with key learned societies and have held executive representative positions in the Institute for Small Business and Entrepreneurship, Regional Studies Association (Galloway and Danson), the Academy of Social Sciences (Danson) and the British Academy of Management (MacIntosh). Other expert fora where staff have been invited to hold office include the Reid Foundation and the Sino-RSA RDAs. In terms of academic contributions, Business and Management is engaged in a number of emerging research areas. The new Spatial Economics and Econometrics Centre is the only one of its kind in the UK and will develop and expand the application of the spatial econometric techniques on which Bhattacharjee is working. Schaffer’s work on econometric estimators for the Stata statistical software package has involved collaborations with colleagues at Boston College, Otago (New Zealand), and Brown University, Tulane University (USA) and the University of Western Australia. The software developed by Schaffer et al is used by thousands of researchers in academia, the private sector, governmental and quasi-governmental organisations with over 400,000 downloads in the assessment period.

In energy studies and economic policy, CERES is part of the ‘The Climate Crunch’ project funded by the ESRC Strategic Investment fund. This project is being led by Oxford University and the CERES Director (Turner, K) is one of six ESRC Climate Change Leadership Fellows. Turner is a member of the Scottish Government’s Input-Output Expert Users Group and an adviser to the European Commission DG Joint Research Centre Institute for Energy and Transport, Renewable Energy Unit on conducting analyses of rebound effects from energy efficiency increases. During the assessment period, Schaffer contributed to the production of BP’s Statistical Review of World Energy and its Energy Outlook. Bhattacharjee was the expert on econometric evidence for the Supreme Court of New South Wales (Australia), 2010-12: Chief Commissioner of State Revenue vs. Southern Cross Airports Corporation Pty Limited (Supreme Court proceedings no. 2008/277254) and is member of the European Monetary Forum, a high-profile body of economic policy makers and academicians advising on issues of monetary and fiscal policy within the European states and beyond. Cobham has developed a reputation as an informed critic of much of what is done in current monetary policy (see his contribution to Oxford Economic Papers on central banks and house prices in the run-up to the crisis).

Finally, staff within Business and Management hold visiting appointments at 24 universities, act as editors/associate editors to 20 peer reviewed journals, have edited special issues of 14 journals, hold editorial board memberships with 39 journals and have been involved in the organisation or hosting of 47 conferences.