

<b>Institution: University of Strathclyde</b>
<b>Unit of Assessment: C17</b>
<b>1. Unit context and structure, research and impact strategy</b>

Strathclyde Business School (SBS) fully embraces the University's founding mission as a 'place of useful learning'. SBS strategy is to enhance our academic research strengths and combine these with increased engagement with policy-makers and business to deliver impact. Our organisation and strategies reflect this commitment. As noted in the 2014 REF submission, SBS aims to "advance and invest in research that strengthens links between theory, practice and policy" and this remains our overarching objective. This is supported by the University's technological environment and partnerships with businesses and public policy making institutions. SBS has intensified engagement with companies and the public sector through the University's industry-focussed research centres (e.g. Advanced Nuclear Research Centre). SBS has contributed to cross-disciplinary academic engagement with modern complex challenges through leadership and participation in strategic University research themes (e.g. Innovation, Energy). The recently formed Glasgow City Innovation District (GCID) - a partnership between Glasgow City Council, the University of Strathclyde, Scottish Enterprise, Glasgow Chamber of Commerce and Entrepreneurial Scotland - brings academics and industry professionals together helping us to identify their needs, generate ideas for improvement, and implement and evaluate solutions emerging from our research. SBS is represented in the GCID governance structure and contributes to leadership of associated cluster activities (e.g. in Health Technology, Industrial Informatics, and FinTech) (Please refer to institutional environment statement for further details on GCID). To achieve a significant impact on policy, we leverage our strong research profile (evidenced by the outcome of REF 2014 and reflected in the quality of the research environment and impact cases submitted) and our strong stakeholder partnerships (particularly through the Fraser of Allander Institute and the Scottish Centre for Employment Research) to allow us to achieve a meaningful impact on policy.

The School's research and impact strategy has four pillars:

- (1) to provide a supportive and coherent research environment that facilitates theoretical, empirical, applied and policy-oriented research;
- (2) to enhance visibility and dissemination of research findings through academic channels and networks of businesses and policy making bodies;
- (3) to develop and use proactive strategies to win external research grants; and
- (4) to provide a vibrant and successful PhD programme.

The intellectual rigour and development of SBS domain knowledge is rooted in six academic departments: Accounting and Finance; Economics; Hunter Centre for Entrepreneurship; Marketing; Management Science; and Work, Employment and Organisation. Four main specialist research centres complement the departments: (i) Fraser of Allander Institute (FAI), (ii) the Scottish Centre for Employment Research (SCER), (iii) Informed Decision Analytics (IDeA), and (iv) the Centre for Financial Regulation and Innovation (CeFRI). These centres enable a growing number of interdisciplinary, applied studies and engage in sponsored research for business and public institutions.

The research objectives and strategies of SBS are the result of a collaborative effort across the School, implemented under the leadership of the Vice Dean (Research), supported by an Associate Dean. Since 2011, a dedicated Vice-Dean (Knowledge Exchange) has led the development of our engagement with the research needs of multiple stakeholders. Research and Knowledge Exchange (KE) in each department are co-ordinated by departmental Directors of Research and KE. This

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structure promotes both strong departmental, subject-specific research groups and interdisciplinary cross-fertilisation research activities across SBS, as well as effective conversion of research findings into public policies and business practice. Both the VD(R) and VD(KE) act as links between the University's research support units/committees and the School's academic departments, research centres and individual staff. They report research and impact related activities of the School to the University's Research and Knowledge Exchange Committee and other committees. They also disseminate information on the University's initiatives and support to departments as well as to individual staff via Faculty Research Committee, Faculty Knowledge Exchange Group (F-KEG) and departmental research and knowledge exchange committees.

### Academic Departments

SBS strength derives from our research integrity in domain-based departments, engaged specialist centres, and interdisciplinary projects, facilitated by the maturing University models for impactful research, to create useful new knowledge, theories and novel methodologies. During this REF period, the number of academic staff at SBS has increased by 58%, from 73.35 FTE of 2014 to 116.1 FTE. The composition and broad research areas of the six academic departments are as follows:

Academics in the Department of **Accounting and Finance** (20 FTE) have been undertaking theoretical and empirical research in the fields of Accounting, Corporate finance, and Financial Markets. Research in the fields of Banking, FinTech, and Sustainability is also growing rapidly. Staff in this department have published in world class journals including Review of Financial Studies (Acheson), Accounting Review (Hass), Accounting, Organizations and Society (Cooper and Grisard), Economics History Review (Acheson), European Journal of Operations Research (Tang and Paudyal), and Journal of Corporate Finance (Hillier, Marshall, Paudyal and Thapa).

Staff based in the Department of **Economics** (15.4 FTE) specialises in applied research focused on providing practical solutions to real world problems. Staff expertise is broad-based with research clusters in Applied Micro- and Macro-economics, Applied Econometrics (with particular specialism in Bayesian Econometrics), Energy and Environmental Economics, and Economic Policy. Staff from this department have published in world class journals including Journal of Econometrics (Koop), Journal of Environmental Economics and Management (Dickson and Gehrsitz), Journal of Money, Credit and Banking (Koop), Journal of Law and Economics (Gehrsitz), Journal of Public Economics (Dickson), and Journal of Applied Econometrics (Koop and McIntyre).

The research in the **Hunter Centre for Entrepreneurship** (20.5 FTE) covers three main areas: entrepreneurship (entrepreneurial ecosystems, enterprise policy, and inclusive entrepreneurship), innovation (government innovation policy, technology innovation systems, business model innovation and open innovation), and strategy (organization performance measurement and management, strategy process and practice, scenario planning). A growing number of studies within these areas also contribute to sustainability related issues. Staff from this Centre have an excellent record of publishing in high-impact journals including Journal of World Business (Sahasranamam), Research Policy (Hannon), Technological Forecasting and Social Change (Abdullah, Efsthathios, Lockett, McKiernan, Shaw and Stoyanova), International Small Business Journal (Dodd, Mawson, Mwaura and Shaw), Entrepreneurship Theory and Practice (Russell, Shaw), and Journal of Business Venturing (Russell and Shaw).

The key areas of research in the department of **Management Science** (18.2 FTE) include Risk and Uncertainty, Health Systems, Knowledge modelling, Optimisation and Analytics, and Operations and Supply Chain. Several studies in this department also contribute to research on sustainability. Staff from this department have published in world class journals including European Journal of

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Operational Research (Akartunali, Arulselvan, Bedford, Belton, Doostmohammadi, Howick, Liu, Morton, Quigley, Revie, Walls and Wright). Similarly, they have also published in Operations Research (Morton), Risk Analysis (Bedford, Quigley and Walls), Reliability Engineering and System Safety (Bedford, Colson, Liu, Revie and Walls), Technological Forecasting and Social Change (Belton, Howick and Wright), and Journal of Health Economics (Arulselvan and Morton).

The Department of **Marketing** (20 FTE) holds a strong heritage in research coalescing around four research clusters: Consumption, Marketing and Society; Organisations, Markets, Networks and Innovation; Service Marketing; and Strategic Marketing & Analytics. Within these clusters, a rapidly growing number of research outputs are related to sustainability. Academics from this department have published in the field's major journals, including Journal of Consumer Research (Hamilton), Journal of Service Research (Alexander and Nazifi), Annals of Tourism Research (Alexander, Bryce, Hamilton and Murday), Work Employment and Society (Doherty), Journal of Travel Research (Alexander, Bryce and Murdy), and Social Science and Medicine (Davies).

Finally, research within the Department of **Work, Employment and Organisation** (22 FTE) brings leadership and disciplinary diversity to studies of organisations, human resource management, and employment and are organised around the themes such as labour markets, skills and employability, organising for digital and social innovation, regulation and restructuring of employment relations in a global context. Academics based in this department have an excellent record of publishing in world class journals including British Journal of Management (Johnstone), Human Relations (Baum), Human Resource Management (USA) (Nickson and Scholarios), and Journal of Business Venturing (Johnstone). Similarly, staff have published in other top journals, including Public Administration Review (Lindsay and Findlay), Work, Employment & Society (Cunningham, Garvey, Lindsay, Scholarios and Taylor), British Journal of Industrial Relations (Gilbert), Organization Studies (Simpson), Personnel Psychology (Scholarios), and Public Administration (Cunningham and Lindsay).

### Developments in Research Strategy

A key promise of the 2014 REF submission was to build on the success of the then seven academic departments, with additional emphasis on ensuring sustainable capacity in the strategy and innovation areas. A subsequent internal review of the departmental structure and research enhancement strategies suggested that the School's aim of high-quality research would be better served if 'strategy' were integrated and contextualised with other academic disciplines in the School. Consequently, in 2018, the then department of Strategy & Organisation was closed and the research integrated into Entrepreneurship, Management Science, and Work, Employment & Organisation. To promote interdisciplinary research in workplace innovations, performance management and organisation in the Department of Human Resource Management was reorganised to include this wider view of research and renamed Work, Employment and Organisation (WEO). This is strengthening research on workplace innovation (especially in the Scottish Centre for Employment Research) and allowed the development of a new strategic theme within WEO (e.g. organising for social and digital innovation) reflecting a stronger interdisciplinary approach. To enhance research in innovation management (social, economic, and business technology) six new staff were appointed with the Hunter Centre for Entrepreneurship (HCE) and further recruitment is continuing. Staff have published about 50 research outputs in innovation management. The University-wide strategic research sub-theme on Socially Progressive Innovation and Entrepreneurship is led by SBS staff (Nicolopoulou).

The 2014 submission noted our aim to extend our "emphasis on research that builds on engagement with business and government". Research centres such as FAI, CeFRI, IDeA, and SCER (listed

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above) actively engage with business and government and produce applied research to inform policy and practice. The Fraser of Allander Institute (FAI), established in 1975, specialises in providing independent analysis, briefing, and expert economic and fiscal commentary to help organisations make sense of key international, national and local economic trends through a Scottish lens. It also undertakes commissioned research with a policy focus, publishes a quarterly economic commentary, regular blogs, and facilitates interaction between SBS academics and policy-makers. All senior staff within the FAI are members of various government and parliamentary advisory boards (see section 4 for a selection). The quarterly commentary on economic policy published by FAI and their 'blog' attract extensive attention (the blog has attracted over 400,000 views since its introduction in July 2016, and 190,000 views in 2020 alone) among policymaking communities and professionals. Two impact cases ('Improving policy-relevant analysis through novel macroeconomic modelling methods' and 'Enhancing analytical capacity and knowledge through economic modelling to strengthen regional policy-making in Scotland, Northern Ireland and Europe') originated primarily from research at FAI. The Scottish Centre for Employment Research (SCER) engages with multiple organisational stakeholders and has been highly successful in attracting external research funding for policy-related research (see section 4 for some examples). Its outputs include academic publications, commissioned reports, stakeholder dissemination presentations and multimedia outputs. Two of the impact cases submitted ('Driving workplace innovation to transform work and workplaces in Scotland' and 'Advancing fair work policy and practice in Scotland to benefit workers, businesses and society') originate from SCER's research activities.

The Centre for Financial Regulation and Innovation (CeFRI), established in 2016, is growing in prominence in FinTech at national and international levels. Examples of external recognition of CeFRI include the Inspiring Cities Award in 2018 (People make Glasgow); an invited presentation to key government ministers and advisors in Westminster (2019); a keynote speech at HM Treasury on International Fintech; City UK-funded participation in the 2017 UK-Russia Fintech taskforce; and the invited delegation to the Future of Fintech festival in Kolkata in 2019. The Centre for Informed Decision Analytics (IDeA), launched in 2019, aims to stimulate further SBS methodological research on modelling real-world management problems and to enable useful research outcomes. IDeA has consolidated much of the research, consultancy and CPD in SBS management science research, including its established Risk Consortium. International organisations benefitting include Bruce Power, Iberdrola, and the European Food Safety Agency, together with UK organisations such as the Department for Business, Energy and Industrial Strategy, NHS and Scottish Water. In addition, two impact cases ('Improved patient outcomes through evidence-based decisions by Scottish and global health organisations' and 'Enhancing decision-making through new modelling methods of dependent risks to improve engineered systems and complex projects') are associated with IDeA. The active participation of SBS in the Glasgow City Innovation District will further extend the impact of our research findings on corporate and public policymaking sectors.

Consistent with the ethos of 'place of useful learning', research on sustainability influencing policies and practices have been growing rapidly in SBS, covering most of the 17 goals of the United Nations for sustainable development. All six academic departments are actively involved in this area of research. Examples include research on climate finance, green finance, water and sanitation, and living wage (funded by Barclays) within the Department of Accounting & Finance. Staff in Economics Department have been researching on energy and environment (funded by Scottish Government and UK Energy research centre) and have joint research projects on environmental measurement and monitoring with academics from Stanford University and the University of California (Berkeley). Staff in the Hunter Centre for Entrepreneurship (HCE) are examining how innovation can help manufacturing companies to address Net Zero targets (an ESRC funded project). An academic from HCE is also a member of the UKRI funded Energy Revolution Research Consortium. Academics



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from the Department of Management Science have researched multi-criteria decision analysis models for water resource management, environmental and energy challenges with partners including the Finnish Environment Institute and the Universitat Polytechnica de Valencia. The United Nations Water Resource Management Programme was designed using multi-criteria decision analysis methods resulting in the MCA4Climate decision support tool that provides a formal analytical framework that can be used by governments to develop their climate change policy plans. Academics from this department have also contributed to research reports for organisations including the World Health Organisation, Global Fund for AIDS TB and Malaria, Center for Global Development and Global HITAP (Health Intervention and Technology Assessment Programme). IDeA researchers have created novel modelling solutions for multiple energy projects funded by industry partners through University centres (e.g. Low Carbon Power & Energy programme).

Similarly, research in the Marketing department covers sustainable goals like No Poverty, Zero Hunger, Good health and Well-being. Their research includes transformative servicescapes and consumer vulnerability (funded by Leverhulme Trust), sustainable supply chain, sustainable business models, circular economy, sustainable marketing sites of cultural heritage, and subsistence marketplaces and institutional voids. Finally, research projects pertinent to sustainable development within the Department of Work, Employment and Organisation include building sustainable employment, workplaces, and communities; health and wellbeing; Fair, Innovative and Transformative work programme examining the job quality across sectors. Academics based in this department have completed a stream of research projects on work, land and globalisation that impact good health and wellbeing in challenging hazardous chemicals, pesticides, labour and public health. Within the One Ocean Hub programme (NERC, 2019-24) staff from this department are addressing the issues of sustainable employment. Completed and on-going research projects of this department are also highly relevant to Just Transition policy (endorsed by the ILO, EU, and UN Climate Change framework) especially as a key driver is social dialogue with partners (trade unions and employers) and other stakeholders (such as communities).

Agility in research support systems and the ability of academics to respond to contemporary problems are among the key strengths of SBS. This is evident from swift action of many staff in developing research projects on various aspects of ongoing COVID-19 pandemic. For example, SBS staff have already submitted 32 research proposals to local authorities, the government, and other funding bodies. So far, 15 of them have been successful and 10 are waiting for the outcomes. Examples of successful grant applications include Impact of pandemic response upon public mental health and disparities (CSO, NHS Scotland), A capabilities assessment of Covid-19 changes to the Workers (UKRI-ESRC), Social impacts, exposure and resilience to the pandemic COVID19 between Munduruku indigenous and traditional communities in the Brazilian Amazon (Pará) (SFC GCRF), External advice and analysis - COVID19 (Scottish Government), and The impact of Covid-19 on the Renfrewshire economy (Renfrewshire Council). In addition to externally funded research, staff are researching on many other aspects of COVID-19 pandemic.

Continuing with the implementation of the plan set out in the 2014 submission, SBS has made significant investment in its PhD programme. To attract and support high calibre PhD students SBS offers six types of scholarships every year. Three of them are funded jointly with the University and the others are funded by the School. The three jointly funded schemes (Student Excellence Awards, Research Excellence Awards and John Anderson Research Awards) provide full funding for up to 18 SBS students each year. Additional faculty level awards include (a) international studentships that cover the difference between home/EU and Overseas fees (up to 10 each year), (b) departmental partial fee waivers (up to the number of full fee paying students recruited in previous year), and (c) matched funding (as many as sponsored by external institutions). In 2019, the

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University introduced scholarships for interdisciplinary PhD research supervised by Chancellor's Fellows (CFs). Since 2014, 190 students have benefited from these scholarships (see section 2 for further details) compared to 87 students over the 2014 REF period. These measures have helped improve the quality of our PhD graduates and this is reflected in the quality of the institutions they have joined at home and abroad after graduation (see section 4).

During this assessment period, SBS continued to make significant progress in grant wins maintaining its position within the top 10 UK business schools and being fifth in 2017/18 (CABS 2019 report). Since August 2013, staff have submitted 598 research grant and fellowship applications and were successful in 168 cases (with 28% success rate). This generated £48.8m from sources such as the UK government, European Commission, and RCUK/UKRI. Research funding applications are aligned to the research themes of six academic departments noted earlier including economic policy, energy, innovation and entrepreneurship, workplace and employment relations, and sustainable development.

Over the next five years (consistent with Strathclyde's *Vision 2025*), SBS aims to further enhance the quality of research output and its impact on businesses and public policy by utilizing the existing strong research leadership and infrastructure of the School, and the University (see institutional environment statement). To strengthen our partnership research model to deliver timely impact, two new Associate Dean (User Engagement and Impact) posts have been created to work with the Vice-Deans Research and Knowledge Exchange. To enhance the corporate, public policy and societal impact of our research we intend to strengthen our research centres and academic units by drawing on the expertise in other faculties of the University (Engineering, Science, Humanities and Social Sciences) as well as both existing and new networks of businesses and public policy partners developed through the Glasgow City Innovation District. Finally, building on the existing foundation of research on sustainability, we aim to expand theoretical and policy-oriented research to cover all 17 goals of the United Nations for sustainable development through discipline specific and interdisciplinary research projects. To achieve this objective, especially for interdisciplinary research and user impact, the School will utilise the resources and networks of the newly established Centre for Sustainable Development (2020) that operates across all faculties of the University.

To understand the needs of business and policymaking bodies SBS draws on established networks of external users of research and engages in networking events to facilitate dialogue and dissemination. The locus of nodes in our user networks are at business school, academic department and research centre levels. At University events such as the annual 'Engage with Strathclyde' events (which bring academics and industry professionals together) held between 2015 and 2019, SBS organised 61 activities with the participation of over 1,300 individuals. Engagement with partners through University-led projects has allowed us to broaden and deepen our strategic partnerships and raise the profile of our research. For example, staff in the Department of Work, Employment & Organisation have proposed a new pedagogical model for delivering advanced manufacturing skills in Scotland through a Manufacturing Skills Academy within the auspices of the National Manufacturing Institute (NMIS) bringing impact from business and management research beyond Strathclyde's manufacturing-specific expertise. Across SBS, invited panel discussions and guest speakers as well as the appointment of industry professionals as Visiting Professors (32, honorary), and Business Fellows (15, honorary) further facilitate interaction between academics and users. Special lecture series jointly hosted with major industry partners (e.g. 'Leading Forward Engagement' series with the Royal Bank of Scotland), and co-location with Scottish Chambers of Commerce and Entrepreneurial Scotland and practice-oriented seminars (e.g. the annual 'Futures of FinTech' seminar series) and meetings (e.g. RegTech) align with particular stakeholders. Collaborative communication platforms such as the Productivity of Outcomes of Workplace Practice,

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Engagement & Learning (PrOPEL) Hub enables us to bring together leading academics from seven institutions across the UK and the Chartered Institute of Personnel & Development (CIPD) to explore workplace practices that deliver high-quality, engaging work and enhance business performance and productivity. As individuals, academics engage with corporate and public sector bodies through board membership (29 positions) and advisory positions (58 positions) on corporate and public sector bodies (see section 4 for further details).

Projects (e.g. with SME using Innovation vouchers, Knowledge Transfer Partnerships (KTP)) as well as our portfolio of executive education and work based educational programmes led by a dedicated SBS unit (Strathclyde Education and Executive Development (SEED)) we have deepened relations and transferred knowledge from our research. Similarly, SBS staff completed at least 97 research reports commissioned by businesses and public sector organisations that have been instrumental in transforming research into businesses practice and public policies.

### Interactions with Industry and Commerce

Interaction of SBS staff with industry and commerce is a two way process. The Vice-Dean (KE) leads the interaction of SBS with external organisations through several pathways. These include Knowledge Transfer Partnerships, 'innovation vouchers', consultancy contracts, collaborative communication platforms such as the PrOPEL Hub, and commissioned research reports to businesses and public sector organisations. To understand the needs of businesses and policymaking bodies, SBS has established a set of networks and networking events that facilitates exchange of ideas and dissemination of research findings to address real-world problems (see section 4). Interactions are also facilitated by invited panel discussions and guest lectures, and appointment of industry professionals as Visiting Professors and Business Fellows. As summarised in section 4 (**Contributions to industry**) SBS staff also interact with the corporate and public sector institutions through their board memberships.

The networks of the newly established GCID have been instrumental in broadening engagement of SBS academics with policy makers. Similarly, staff in WEO have proposed a new pedagogical model for delivering advanced manufacturing skills in Scotland through a Manufacturing Skills Academy. This project, in collaboration with the National Manufacturing Institute for Scotland (NMIS), deepens our strategic partnerships and raises the profile of our research/KE beyond Strathclyde's manufacturing-specific expertise. SBS also offers a portfolio of executive education programmes which establish sustained relations with individual organisations.

Executive development programmes led by SEED play their part in enabling academics to engage with groups of companies and business leaders on topical challenges, to share research and to foster networks. For example, the Growth Advantage Programme (GAP) launched in 2015 aims to support businesses seeking to scale-up, while the Productivity through People (PtP) programme aims to support leaders of SMEs to create high-performing workplaces. Corporate MBA programmes, such as the MBA25, the Iberdrola MBA in the Global Energy Industry and the Babcock Senior Leaders MBA, provide a further platform for embedding research in the executive education curricula. A newly introduced programme in Health and Care Leadership (Management Science researchers with colleagues from Faculty of Science) also demonstrates our commitment to knowledge sharing from research, and creating collaborative learning communities with key stakeholders.

### Interdisciplinary research

SBS staff engage with colleagues from other faculties in both discipline specific and interdisciplinary research that delivers on the University's strategic research themes of Energy; Health and Wellbeing;

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Innovation and Entrepreneurship (led by SBS staff); Ocean, Air & Space and Measurement Science; Society and Policy; and Enabling Technologies. SBS staff have received awards for many major (£500K+) externally funded interdisciplinary projects from a variety of funders. The ESRC funded PROPEL Hub (Findlay, Lindsay, Roy and Shaw in collaboration with six other UK universities and the Chartered Institute of Personnel and Development CIPD) is a collaboration between Business School academics and social scientists. Three major interdisciplinary EPSRC funded projects include collaborations with academics from engineering and mathematics. The Predictive Computer Aided Design (CAD) project (Quigley) is a collaboration with the Department of Design, Manufacturing and Engineering Management as well as industrial partners Shapespace Ltd and the Weir Group. The Energy Revolution Research Consortium (Hannon) is a collaboration with the Department of Electronic and Electrical Engineering, and 21 other universities. The iNEED - Nondestructive Evaluation in Engineered Design project (Illes) is a collaboration with the departments of Mathematics & Statistics, Electronic & Electrical Engineering and Design, Manufacture & Engineering Management. Three major EU Horizon 2020 funded projects are in collaborations with engineers and computer scientists. Game-Changer Vessels for Servicing Offshore Windfarm (Walls, Quigley and Revie) is collaboration with the Department of Naval, Ocean and Marine Engineering and European industry partners Kongsberg, Gondan and GMSL. The health project ADLIFE (Morton) is a collaboration with the Department of Computer & Information Science as well as 10 other partner institutes. Uncertainty Treatment and Optimisation in Aerospace Engineering (Akartunali and Revie) is a collaboration with Department of Mechanical & Aerospace Engineering and ten other universities. The NERC funded One Ocean Hub (Baum and Revie) is a collaboration across a variety of disciplines such as the Departments of Law, History and Mathematics & Statistics as well as 23 other research partner institutions and 35 project partner organisations.

To promote interdisciplinary research with international partners, SBS has provided financial and logistical support to staff. Staff in Economics (Allan and McGrane) collaborated with researchers in the Department of Physics and Stanford University on the economics of environmental measurement and the use of photonics. A workshop on Energy was run at the University of Waterloo's Institute of Sustainable Energy (WISE) bringing together SBS academics from the Departments of Economics and Management Science with WISE engineers, economists and social scientists. A result has been PhD exchanges with Waterloo on Energy as well as joint publications and grant applications with academics from science, engineering and social science in areas of energy, risk and FinTech. Other growing interdisciplinary collaborations in the School include research on the environment in Economics; water and financial technology in Accounting and Finance and Management Science; Operational research, health, space, and artificial intelligence in Management Science; health and safety and renewable energy in Work, Employment and Organisation. Garvey's ESRC and GCRF/Newton Fund funding, along with the Federal University of Para, Amazonia Brazil and other partners in the Amazon region, has direct impact on the critical situation in the Amazon in relation to work and livelihoods, law and the environment, often linked to the green economy. This has involved extensive interdisciplinary research over the last 5 years.

SBS promotes Interdisciplinary research at PhD level research too. Eighty-four PhD students registered in SBS have supervisors from different departments, of which 30 are jointly supervised with colleagues from other faculties. Continued success in generating external income and internal investment in promoting interdisciplinary research ensures viability and sustainability of interdisciplinary research at SBS. The Strathclyde Centre for Doctoral Training, established in 2019, also facilitates interdisciplinary PhD research.



**Open Access, Data Sharing and Ethics**

SBS fully supports open access to research and complies with REF Open Access Policy. In addition to open access compliance, SBS staff research outputs are disseminated widely through two online platforms, StrathPrints and PURE. Currently 496 outputs are available on StrathPrints, while PURE records a total of 1946 research and scholarly outputs in the form of refereed journal articles (1153), monographs, books, and book chapters (287), commissioned and other research reports (185) and 176 other publications. SBS, supported by the University's Research Data Management unit, also facilitates research data management that allows researchers to store and access data. Staff are encouraged and supported to publicise their findings on web-based platforms such as ResearchGate, Google Scholar, SSRN, and Research Papers in Economics (RePEc). Evidence of citations (e.g. H-Index and I-10 Index) feeds into their annual Accountability and Development Review and the promotion process.

SBS is committed to a high standard of ethics and integrity in research and follows the principles of the UUK Concordat. To promote research integrity the Organisational and Staff Development Unit provides appropriate training, support and recognition to all staff and doctoral students. Our research ethics policies include the Research Code of Practice, Policy and Code of Practice for Postgraduate Research Study and Code of Practice on Investigations Involving Human Beings. All academic departments in SBS have Ethics Committees to support and monitor research projects. The University Ethics committee has representatives from all faculties, and staff in research offices support departmental Ethics committees. The University committee formulates policies and procedures to ensure ethical issues are addressed in all research activities.

<b>2. People</b>
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Since REF 2014, the number of research active academic staff of SBS has increased by 58% from 73.35 FTE to 116.1 FTE. Of these, 31% are professors, 13% readers, 20% senior lecturers and 36% lecturers. In addition, there are 22 FTE research-only staff (of which 6.4 FTE are on open-ended contracts, and the others on fixed-term contracts for specific research projects) supporting academics in research projects. A further 16.5 FTE staff (KE Fellows and Professors of Practice) are employed on a Knowledge Exchange pathway with primary responsibility to engage with business and policymaking bodies to shape, develop and communicate mutually beneficial research.

**Recruitment of Staff**

While recruitment of high calibre staff with research interests compatible with an SBS academic unit remains a core principle of recruitment, we also recruit talent in areas of strategic importance. Opportunities to recruit staff emerge in the usual manner from vacancies arising through departures, expansion of academic activity in particular areas and strategic priorities such as Innovation, and in support of focused areas and interdisciplinary research. Additional strategic appointments are made under the University's the Global Talent (Reader and Professor) and Chancellor's Fellowship (lecturer and senior lecturer) programmes (please see institutional environment statement for further details). Under these programmes, SBS has appointed 18 staff (5 professors, 1 Reader, 1 senior lecturer and 11 lecturers).

During this REF period, although some staff retired or moved to other institutions due to personal reasons, for promotion, and to take up greater responsibilities (such as University Vice-Principal, Faculty Dean, and Head of Department) we recruited 55 new staff increasing our academic staff base by 58%. Among the new recruits, six are professors, one is a reader, 13 are senior lecturers,

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and 35 are lecturers. The new recruits have PhDs from eleven different countries and of these 50 have been previously employed at other institutions across five continents and twelve different countries. The early career academics (lecturers) joined SBS with PhDs from a wide range of institutions around the world including: KAIST (Kwon), Université Dauphine (Grisard), Emory University (Lenhart), The University of North Carolina at Greensboro (Norris), Tor Vergata University (Romiti), and the University of Johannesburg (Booyne). Similarly, Doostmohammadi holds a PhD from the University of Aveiro, Liu from the City University of Hong Kong, Baylon from ESSEC Business School. Several others have PhD from universities within the UK such as Edinburgh, Glasgow, Loughborough, Strathclyde, and Warwick, among others. Prior to moving to SBS senior academics (professors, readers and senior lecturers) were affiliated with some of the highly respected institutions around the world such as University of Iowa (Hass), World Health Organization (Lauer), SKEMA Business School (Basu), Brooklyn College (Gehrsitz), Technische Universität Berlin (Arulselvan), Center for Disease Dynamics, Economics & Policy, USA (Megiddo) and Bremen University (Briekn). Several other senior staff moved to SBS from universities within the UK such as Bath, Birmingham, Glasgow, Imperial College, Liverpool, Manchester, Newcastle, and Stirling, among others. Collectively, the newly recruited staff hold an extensive range of experience of working at national and international universities and professional institutions.

New staff were recruited to cater for the academic needs of the departments as well as to support the strategic research directions of the School. Depending on their expertise, these staff are based in six academic departments of the School. Of the 55 new academic staff, 10 (including Acheson, Grisard, Hass, and Zhang) joined the Department of Accounting and Finance, nine (including Comerford, Gehrsitz, McGrane, and Norris) joined the Department of Economics, and 14 (including Dodd, Gok, Hannon, Lockett, Matthews, Sahasranamam) were recruited into the Hunter Centre for Entrepreneurship. Similarly, six new staff (including Arulselvan, Lauer, Megiddo) joined the Department of Management Science, seven (including Davies, McLean, Nazifi, and Tsougkou) joined the Department of Marketing and nine of them (including Briekn, Johnstone, and Loeffler) were recruited into the Department of Work, Employment and Organisation.

To enable external engagement and co-creation of research, SBS has increased its complement of senior staff recruited from business and government. Recent appointments include the Director (Roy, from Scottish Government) and Deputy Director (Spowage, from Scottish Government) of Fraser of Allander Institute, the Head of SME Engagement (Anderson, former Chief Executive of The Entrepreneurial Exchange), Director of Centre for Financial Regulation and Innovation (Broby from fund management industry), and Director of the new Institute of Digital Transformation (Page, with extensive experience in strategy and transformation). These staff, classed as Knowledge Exchange (KE), play a key role in developing long-term collaborations with external partners and contributing to achieving impact of our academic research. KE staff play leading roles in industry consortia, such as the Risk Consortium now part of the IDeA centre, and in leading the activities supported by the FAI, SCER and CeFRI (See Section 1), working collaboratively to co-create useful research with academic staff and external stakeholders. Additionally, SBS has engaged business personnel on a part-time basis in core research activities with the aim of structuring research challenges and supporting fieldwork for EC funded ITNs (e.g. Changing Employment's partners from industry were EDF, Volvo, The Edrington Group and several small consultancies. Other partners included the International Labour Organisation and the European Trade Union Institute). Business representatives sit on the Advisory Boards for SBS and its research centres (including: Chair, Capital Markets Board; HR Director, Heineken UK; Managing Director, Babcock Marine Division, Head of Employment Policy, Confederation of British Industry; Senior Risk Director, C. Hoare and Co bank; Regulation Analyst, Department of Business, Energy and Industrial Strategy; Chair, Al Otaiba

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Enterprises). SBS academics sit on the boards and advisory boards of various economic and professional institutions (see section 4 for a selection).

### Staff Development and support

The need for development and training of all staff is assessed and agreed during annual Accountability and Development Review (ADR) meetings with line managers. All academic staff, including ECRs, are required to undertake annual ADR meetings with their Head of Department (HoD). In the process, they discuss their research achievements, key targets for the next academic year and training needs. The HoD commits to providing appropriate support (including funding to attend conferences, subscriptions to specialist databases, hiring research assistants, and teaching) and advice during review meetings. Senior staff (Professors, Vice-Deans and Heads of Department) are also reviewed at the University level under the 'Senior Academic Review and Development' programme.

Two main criteria in the University's Accountability and Development Review (ADR) process are research, and knowledge exchange. Academics are recognised in their annual reviews for their accomplishments in these areas, and supported in their development by senior colleagues. One-off financial rewards for exceptional performance (e.g. contribution pay) are awarded, and the promotion process is associated with the ADR. Applications for promotions are invited every six months. Research achievements are significant in the University's promotion system at all levels. Excellence in research is judged by the quality and quantity of publications, external research grant wins, national, and international esteem (e.g. keynote speeches, journal editorships, visiting positions etc.), and engagement with businesses and academic societies. Promotion is a three-stage internal process involving: the line manager (usually the head of the department), a faculty level panel (the Executive Dean and Vice-Deans), and the University's Academic Professional Appointments Panel. Candidates who are not successful are given feedback and guidance for improvement by the line manager or the reviewing panel. All Professors are annually reviewed by the University's Senior Academic Review and Development panel and given feedback. The University also operates a Professorial-zoning system (zones 1 to 4), in which individuals are assigned to a zone based on the quality of their contributions to the University as well as to the academic profession at large. A recognised high-level research performance is mandatory for Professorial zone movement.

SBS actively plans for succession in key leadership roles, such as Vice-Dean and Head of Department. To minimise dependency on a single major post-holder, potential successors have opportunities to work alongside the leaders. Most potential successors have a designated role/title (e.g. Associate Dean, Deputy Head etc.), while others work with the post-holder on an informal basis. Similarly, experienced Principal Investigators work with junior colleagues in preparing grant applications, and senior academics supervise PhD students jointly with junior colleagues.

SBS uses a defined workload model in which at least 40% of an academic's time is protected for research and knowledge exchange. Additional time for academic research is provided in the form of sabbaticals, as explained above. SBS encourages and provides full financial support (conference fees, travel, accommodation and subsistence expenses) to enable participation in events, workshops, academic conferences and research visits to all academic staff and PhD students to present their research papers at national and international conferences. Staff are fully funded to present papers at two international conferences in an academic year (more is possible) and as many domestic conferences as they wish. Similarly, PhD students are funded to present their research findings at one international conference a year and attend domestic conferences. Since 2014, staff have participated (keynote speeches delivered and papers presented) in over 800 domestic and international conferences supported by funding of over £640K. Similarly, targeted and essential

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support is given to staff who produce research that can demonstrably influence business, society and policy, including funds to engage with companies, government and charities, organise seminars for professionals, teaching time buyouts, workshop participation and information collection. The Interns@strathclyde programme, aimed at providing undergraduates with hands-on experience of research, offers opportunities for staff to hire our own UG students during the summer months. Policies are also in place to stimulate ongoing research with business enterprises, such as reinvesting KTP overheads into PhD scholarships.

Further support for research is provided in the form of research leaves such as mini-sabbatical of less than a semester and sabbatical of one semester or longer. SBS academics can apply for one semester of study leave every seven semesters. Staff with major leadership responsibilities (Dean, Vice-Dean, Head of Department) are automatically granted one semester sabbatical at the end of each leadership term. Sabbaticals may be accumulated for up to a year. During the current REF period, sabbatical requests of 31 staff (36 semesters in total) were approved. The Head of Department makes decisions on requests for mini-sabbaticals (ranging from a couple of weeks to less than a semester) and many staff have benefited from this policy. In addition to sabbaticals, provided there is no detriment to students, staff can choose to have all their teaching responsibilities in one semester and keep a semester free from teaching in order to pursue research. Many staff take this opportunity on a regular basis.

All staff receive the same level of support for conference funding, journal article submission fees, research assistance, access to databases, IT support, training, sabbatical, and promotion opportunities. In addition, each newly appointed professor is supported with seed capital for his or her research activities through the New Professors' Fund (up to £25,000 each). As stated earlier, staff appointed under the Chancellor's Fellow and Global Talent Attraction programmes get additional time and funding to support their enhanced research targets.

SBS fully supports the principles of the UUK Concordat to promote the career development of researchers. The University's Organisational and Staff Development Unit and Strathclyde Programme in Research and Leadership (SPIRAL) offer research and leadership training such as Researcher Development, Research and Leadership, Research Staff Development, Leadership Development Programme, Building and Increasing Impact on Society and the Economy. They also offer PhD supervision training to all new staff including ECRs. In the last four years, SBS staff participated in 332 such training programmes with 30 individuals attending 'leading research' training courses.

**Development of ECRs**

Early career academic staff are appointed on probation for a year with a further development phase of two years. For the first three years (probation and the developmental phase), early career staff have a reduced teaching load to allow time for research, participate in relevant training, and gather teaching and research experience. All probationary staff are allocated a mentor to guide them in research, knowledge exchange and teaching. The mentors are their first port of call for support and advice. Forty percent of academic staff time (up to 70% for staff in probation and developmental phase) is ring-fenced for research and knowledge exchange. As the key role of the staff recruited under the University's strategic appointment programmes (noted above) is to develop and contribute to strategic research in their area of expertise, they are given additional time (up to 10%) and funding for research during the first five years of appointment.

On appointment, all early career researchers (ECRs) are informed of what is expected of them in their first three years. This includes their contribution to the research, KE and teaching portfolio of



### Unit-level environment template (REF5b)

the School and completion of a mandatory PGCert on learning and teaching. Every ECR is guided by their mentor(s) on research, KE and teaching related matters. This guidance includes help with preparing research plans, feedback on research manuscripts, selection of journals for publication and responding to reviewers' comments. ECRs are also supported by their department's Director of Research and mentors on research related tasks, such as arranging for feedback on their grant proposals, advice on possible funders, research strategies, how to proceed with what is in the pipeline, advice on improving the visibility of research outputs, and presentations within the department. Where appropriate, ECRs are introduced to colleagues in other parts of the School/University for collaborative research. If any ECR fails to meet the minimum expected target, depending on their level of performance and potential to achieve, their probation/developmental phase may be extended (with precise target, support mechanism, and review plans) or asked to leave the institutions. During this REF period, only a handful of ECRs needed such extensions. Early career researchers (and any other academic staff) who prefer to concentrate primarily on teaching or external stakeholder interaction (Knowledge Exchange), rather than to develop as researchers, have options to transfer to these career pathways and three individuals did so during this REF period.

### Equality & Diversity

SBS puts considerable effort into enhancing the demographic profile of staff, especially with regard to gender balance and race equality by ensuring equal treatment. Female academic staff account for 34% of our faculty. With due consideration for quality, we aim to shortlist at least 50% female applicants for interview. Since 2018, SBS has held the Athena Swan award (Bronze) for gender balance. The University recognises the importance of race equality and has recently established a Race Equality Working Group, a University level working Group, chaired by the current Vice-Dean (Research) of SBS. The School also values the international experience of staff and recruits globally. Among the academic staff, 59% are UK nationals, 26% are from other EU nations, and 15% are non-EU nationals. Forty-four percent of them have had graduate level job experience (at least one year full-time) in another country (academia or professional).

### Post Graduate Research Students

SBS has been actively recruiting high quality PhD students in line with wider university targets, availability of supervisors and ensuring the highest academic standards. A dedicated Associate Dean for Postgraduate Research (AD(PGR)) is supported by a senior faculty administrator (Postgraduate Research) based in the faculty office. They lead a wider, departmentally based team of Directors of Postgraduate Research. There is a dedicated Postgraduate Research administrator in each academic department. The AD(PGR) sits on the faculty research committee and the University's Doctoral School Management Board. The AD(PGR) takes responsibility for all student lifecycle decisions through the University's central lifecycle team and manages the PGR budget in consultation with the VD(R).

In addition to a dedicated SBS Postgraduate Research Portal, each department maintains its own Postgraduate Research pages, with links to research themes and supervisory expertise. This key information improves the matching between applicants and supervisors. During this REF period, 396 new students entered our research degree programmes. Since the beginning of this REF cycle, 190 students have completed their doctoral studies (1.64 FTE student per current staff FTE) over the seven-year REF period (i.e. 0.24 FTE student per staff FTE/year). Currently, there are 259 students registered for PhD programmes. The PGR student to academic staff ratio stands at 2.23:1.

As outlined in section 1 we offer both fully and partially funded scholarships. Of the six types of studentships three, Research Excellence Awards (REA), Student Excellence Awards (SEA), and John Anderson Research Awards (JARA) offer full funding (fee and stipend for UK/EU students); the

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rest provide partial funding. For the REA, academics prepare research proposals and bid for funding. Successful staff recruit doctoral students through a competitive process. SEA are for outstanding PhD applicants nominated by academic staff, and JARA have part of their funding provided by external organisation(s). Since the introduction of these scholarships in 2015/16, 108 scholarships have been awarded to SBS students. In recent years, recognising the significant growth in high-quality overseas applications, SBS has offered full-fee waiver and partial fee-discounts to overseas students on a competitive basis. SBS also offers matched-funding scholarships. Academic departments also have discretion to use their own funds to offer partial scholarships to outstanding candidates. Under these funding provisions, since 2014, 66 additional students have benefited from full/partial scholarships awarded from the School's internal resources. In 2019, the University started PhD scholarships dedicated to interdisciplinary research. Currently, nine SBS staff, in collaboration with 13 colleagues from Engineering, Humanities & Social Sciences, and Science faculties, have received full funding for 50 PhD students, (25 based in SBS in 10 interdisciplinary doctoral centres) at a cost of £3.3million. In addition, 100 doctoral students receive financial support (full/partial) from external sponsors. Recently, SBS has launched an MRes scholarship to provide fees for a home student to study a full time MRes. This is designed to create a pipeline of academically strong home students for the PGR programme.

SBS PhD students receive full/partial scholarships from external institutions as well. During this REF period, 31 doctoral students received sponsorships from industry & employers and 48 students received funding from overseas institutions. In-kind supports have also been received (e.g. Valuechain, Resolver, Autostrade per l'italia).

SBS plays an active role in the ESRC Doctoral Training Partnership, the Scottish Graduate School of Social Sciences, through two pathways – Economics and, Accounting & Finance and Business & Management. SBS has designated pathway coordinators who provide support to colleagues and students applying for the Scottish Graduate School of Social Sciences scholarships. Pathway coordinators also provide feedback on draft applications and support applicants through the process. During this REF cycle, SBS secured 29 studentships from the ESRC and one from the AHRC Doctoral Training Partnerships.

Each doctoral student has two supervisors - first and second. All supervisors must have completed the Universities mandatory PhD supervisor training or have prior experience of successful supervision. New first supervisors are always partnered with a more experienced second supervisor. SBS uses a local intranet (Neptune) to support and record the student's progress. Each student maintains a profile on this site to record minutes of supervision meetings and upload evidence of progress. Neptune is also used to manage and record the outcomes of reviews. Students are reviewed twice a year. The review process commences with a report written by the students (Part 1), and the supervisor reports on the student's progress (Part 2). Finally, post-review and final reports are completed, highlighting progress, recommendations and objectives for the next six months. An interim review is attended by the supervisory team only, and the significant annual review panel has a member of staff from outside the supervisory team. Students must present their progress at these meetings and, for students finishing year one, a 6,000-word report on progress is required and assessed by a panel. Review outcomes include proceeding with the degree, students being required to attend supplementary reviews or, in extreme cases, being withdrawn from the programme. The departmental PGR Director has to sign off each student review and can make recommendations and/or support supervisory teams as required.

At the School level, the Associate Dean (PGR), in association with the Vice-Dean (Academic), leads the management of the PhD programme, is a member of the Faculty Research Committee. They are

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supported by a Senior Faculty Administrator who provides administrative oversight and support for administrative staff. Each department has their own Postgraduate Research Director (who act as academic counsellor for students in their departments) and dedicated administrator who support the student lifecycle and can signpost the student to University support mechanisms. The School supports student representatives from each department who also act as points of contact for students experiencing difficulties.

Supervisors are a key resource for directing students to training opportunities. In addition, all students must complete 60 credits of training encompassing a Postgraduate Certificate (PGCert) in Research Methodology for Business and Management before their Viva examination. Students can engage in external development opportunities for credit accumulation to achieve the required 60 credits through, for example, professional societies such as NATCOR (UK-based doctoral training programme in Operational Research) and Economics Network training for Graduate Teaching Assistants. Students have the option of obtaining a further 60 credits for a 120-credit Postgraduate Diploma. In addition to the mandatory PGCert, students can also access training elsewhere in the University through the University's PGCert in Researcher Professional Development. In this, students explore issues associated with Knowledge and Intellectual Abilities, Personal Effectiveness, Governance and Organisation, and Engagement, Influence and Impact. Recently, the School has launched an Applied Economics Centre for Doctoral Training that utilizes the expertise of the Fraser of Allander Institute to help students realise the full impact of their research beyond the confines of academia. SBS also provides dedicated academic skills support via the University library. Every year a set of six workshops is offered to deepen their knowledge of library skills, referencing, critical thinking, open scholarship and copyright.

Students participate in regular departmental and school-wide research seminars and workshops that are often given by world-leading academics. Each student can access funds to participate in external training opportunities and academic conferences. Since 2016/17, the School has invested in excess of £239K on additional support to PhD students including more than £115K on their conference participation. The University provides additional funds to support students' international travel for data collection and onsite interviews. To enhance PhD graduates' research and teaching skills, students are encouraged and supported to publish their research findings in academic journals and offered tutoring opportunities. Prior to engaging in a tutoring role, all students receive rigorous training on teaching provided by the University.

### 3. Income, infrastructure and facilities

As noted in section 1, one of the aims of SBS is to develop and use proactive strategies to win external research grants. Our staff recruitment & development and research support strategies (discussed in section 2) as well as the infrastructure at both School and the University levels facilitate in achieving this goal.

#### Grant Funding

Staff are expected to apply for and win external research grants. The University's Organisational and Staff Development Unit (OSDU) provides training in grant application preparation and runs periodic workshops led by internal and external experts. Aimed at strengthening the quality of applications, SBS operates mandatory internal review of research grant applications to Research Councils. The VD(R), in association with the departmental DoR, identifies appropriate reviewers for draft applications. The Research and Knowledge Exchange Services (RKES) unit of the University supports in costing of the projects.

Since August 2013, SBS academics have been investigators on 168 successful external research grant applications, generating £48.8m in total, which is more than double the amount from the previous REF period of £19.9m from 124 successful awards. Funding has been primarily from the UK government, Horizon 2020 (EU research and Innovation programme) and the UK Research Councils. 131 grants had an SBS academic as Principal Investigator (PI) (combined value of £11.8m). Major grants include £1.58m for The PROPEL Hub-Productivity Outcomes of workplace Practice, Engagement and Learning (ESRC to Shaw, Lindsay, Findlay, Roy), £923K for Bayesian Argumentation via Delphi (US Office of the Director of National Intelligence including IARPA for Wright), £858K for Improving Management Practices (ESRC to Findlay), £660k for Regional nowcasting and improving regional economic indicators (ONS Economics and Statistics Centre for Excellence to McIntyre, Koop, Roy and Spowage), and £533k for Building sustainable development (ESRC to Garvey). 37 projects involved PI's outside SBS resulting in £5.1m accruing to SBS. These included Towards Game-changer Service Operation Vessels for Offshore Windfarms from H2020 (SBS £549K) and One Ocean Hub from NERC (SBS£1.7m). The external research income of SBS grew rapidly in this REF period, exceeding £2.25m in 2017/18 and reaching £12.8 Million during the whole period (£16K per current staff FTE per year). Research activities are also supported by funds generated from our highly successful postgraduate and SEED executive education programmes, the latter of which generated £6.62 million between 2015/16 and 2019/20. Since August 2013, our research income from KTP has been in excess of £1.40m.

### Physical and Operational Infrastructure

To provide a unified working environment for SBS, three existing buildings were redesigned and refurbished at a cost of £23.2m in 2016. The unified building houses all six academic departments, four research centres, PGR facilities, and Administrative & Professional services. Academic staff are provided with a single occupancy academic office, computing facilities, project-specific and full-time research assistance. Support for research grant applications is provided by the University's Research and Knowledge Exchange Services office. In the last five years, SBS has invested more than £2m on research databases subscriptions, such as Datastream, CRSP, Compustat, SDS platinum, Bloomberg, WRDS, etc. In addition, the University library subscribes to further databases, such as FAME, Osiris, and Capital IQ. Staff can also request purchase of specialist database(s) and hire of research assistant(s) for specific projects.

The VD(R) and the VD(KE) together lead SBS policies for both academic and applied research. These Vice-Deans work with SBS teams of Departmental Directors of Research and Knowledge Exchange (KE) to support the development of our themed research activities. They are also supported by a dedicated Research Excellence Officer (Impact)/Senior Faculty Administrator (Research & Knowledge Exchange). Relevant administrative staff at departments & research centres provide administrative support to all researchers. Departmental staff also work closely with the Research Excellence Officer /Senior Faculty Administrator.

The Vice-Deans represent SBS in the University's research and KE working groups (e.g. Knowledge Exchange Group, Open Research); committees (e.g. Research and Knowledge Exchange Committee, Researcher Development sub-committee). They are also the lead contacts for the University's research support units such as the Research and Knowledge Exchange Services, who provide corporate support for engaging and contracting, and Innovation and Industry Engagement, who support development of strategic relationships with business and industry. Examples of information sharing include: support from RKES in identifying suitable research grant application opportunities and preparing grant applications; the West of Scotland Knowledge Transfer Partnership (KTP) centre provides information and support to bid for KTP projects; StrathPrints and



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PURE (web based platforms) provide a mechanism to disseminate research findings to external audiences. VD(KE)'s ex-officio membership of the School's Research Committee (chaired by VD(R), the University's Research and Knowledge Exchange Committee (RKEC) and the Knowledge Exchange Group facilitates the flow of information between F-KEG and other research and KE units across the University. Quarterly meetings of Faculty Research Committee and F-KEG are held to review and improve the quality and impact of research.

As outlined in the previous paragraphs, SBS has well-structured physical, academic and operational infrastructure to support world-class academic and impactful discipline-specific and interdisciplinary research. In addition to protecting at least 40% of total time for research and knowledge exchange and periodic sabbaticals, staff who have their own external research grants are provided with additional time (e.g. teaching-time buy out), administrative support and research assistants to manage and complete the project. Quality and velocity of research publications and developing impact cases are the key components of promotion criteria. As part of training for developing impactful research, staff are encouraged to learn from the impact cases submitted in 2014.

All staff and PhD students are provided with state-of-the-art computing (hardware and software) facilities suitable for their needs and access to ARCHIE-WeSt supercomputer. The latter being important especially for computational evaluations of some new modelling methods developed by researchers (for example, in Management Science). Archie-West is a cross-HEI, regional supercomputing centre for the West of Scotland set up in 2012 through initial funding of a £1.6M award from the EPSRC and is dedicated to research excellence and economic growth. The facility was upgraded in 2018 through a £2.4M investment by Strathclyde.

Academics are also supported by research assistants (open-ended contract, fixed-term full-time and part-time) and administrative staff, as appropriate. Staff receive full reimbursement of journal article submission fees and funding to present papers at up to two international conferences in a year and as many domestic conferences as they wish. To encourage high quality academic research, staff are awarded £2,000 for each article published in FT50 journals and so far 15 awards have been made. Staff with externally funded research projects can apply to buy out their teaching responsibilities enabling them to focus on research and project administration. SBS provides full financial support and the necessary logistics to invite national and international scholars to exchange ideas and present their research findings in our regular departmental seminars/workshops.

### Industry and Other Organisation

SBS works with key enabling actors to generate opportunities for interaction with business users through University centres, research themes and GCID clusters. Through collaborations developed during 2014-2020 between SBS researchers and University research centres' sector facing initiatives (e.g. Health Cares and Futures institute, Advanced Nuclear Research Centre, and the Low Carbon Power and Energy programme) SBS has enhanced both organisational capabilities and conducted value-adding research projects, defined and delivered by academic teams in collaboration with relevant users.

Funded initiatives, facilitating exchange between academia and business entities include the following: Scottish Funding Council's Innovation Vouchers have brokered and underwritten new partnership projects defined by SMEs enabling Marketing academics to work with L&S Fluids Ltd. on customer service provision, and High Life Highland on developing a Scottish ancestral tourism industry. Management Science staff have worked with Datalytics on decision-driven forecasting methodology. Targeted funding in Data Science from the SFC-funded Datalab has led to projects with Scottish Water on a water quality risk predictions and with Glasgow City Council on optimal

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scheduling and routing home carers. University EPSRC Impact Accelerator funds have led to Professorial secondments to Selex and initiated projects with Scottish Power Renewables. KTPs have embedded SBS academics in projects with partner organisations, including Virgin Money, Fishers, Scottish Hydro, William Grants, BiP Solutions, to deliver research impact and grow a sustained relationship.

SBS engages with external agencies such as the West of Scotland KTP Centre (e.g. SBS won 13 KTPs between 2014 and 2020), Knowledge Transfer Networks (e.g. research dissemination from EPSRC supply chain resilience project), and Interface to engage with SME on short-term mission led research (e.g. innovation vouchers). Engagement with enterprise agencies (e.g. innovation workshops led by SBS in partnership with Scottish Enterprise) give access to a network of organisations for whom our research is relevant and with whom ideas can be co-created. To underwrite longer-term relationship development around particular projects, such as 3.5 year business doctorates that are part-funded by agencies and businesses SBS has engaged in co-funding activities with, amongst others, Scottish Enterprise funding (PhD projects for low income families in HCE) and Arnold Clark (funding a PhD cluster in Marketing with PhD student internships as part of the package).

The support received from industry and public institutions include collaborative scholarships, access to data, access to interviewees, advice of key personnel in the form of external supervisor roles, travel and accommodation expenses, internships etc. PhD scholarships have been co-funded by Arnold Clark, Scottish Government, Joseph Rowntree Foundation, VisitScotland, Scottish Power, Irvin GQ and the Competition and Markets Authority. Institutions providing in-kind research support include NHS Greater Glasgow and Clyde (internships), Rolls Royce Marine Norway and Rolls Royce Aerospace UK (data, access to expertise), Brilliance Auto China (access to data and interviews), Co-operative Atlantic Canada (access to data and interviews), and Wascoenergy Malaysia (access to data and interviews). SBS has had sponsorship, financial and in-kind, from business for leading international conferences hosted by us including Edrington Group for EMAC2018 and Scottish Power for ESREL2016.

Participation by external business and policy-makers in our advisory boards is a major in-kind benefit to SBS. These include participants in major research projects funded by the European Council and UKRI with companies including Siemens Gamesa, Rolls Royce and Equinor, leading international academics (e.g. Beijing, Tsinghua, Poltechnico di Milano, Aalto, Waterloo universities.); research centres such IDeA (e.g. DSTL and Amazon), CeFRI (C. Hoare & Co), the Strathclyde Doctoral Training Centres (Castlight, BlackArrow, NHS, Scottish Enterprise, National Physical Laboratory). Similarly, external partners contribute by presenting in workshops and events such as Engage with Strathclyde and other Glasgow City Innovation District cluster events, including Glasgow City Council, Fishers, NHS Scotland etc.

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

SBS interacts with users through a combination of structured managed processes and bi-directional processes, both managed and serendipitous, which lets us build our profile, enhance our reputation and sustain our relationships.

### Conference, Events and Speaking Engagements

External recognition of the quality of SBS researchers is evident in invited keynote speeches at top conferences, symposiums and public lectures delivered around the world. Since January 2014, 40

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staff have delivered 240 such speeches. Examples include OR60 Operational Research Society Annual Conference (2018, Belton), Global Conference on Accounting and Finance (2016, Cooper), HTAsialink (2016, Morton), EURAM (2017, McKiernan), British Standards Institution The Digital World: AI (2020, Dorfler), International Conference on Natural Resources, Tourism and Service Management (2015, Baum), Scotland's Economic Future (2017, Roy), Advances in Econometrics Conference (2020, Koop), Society for Risk Analysis Europe (2020, Bedford), European Safety and Reliability Conference (2016, Quigley) and UK MOD Reliability and Maintainability Specialist Conference (2016, Walls). Staff delivered 97 commissioned reports of national and international significance. Examples of institutions commissioning such reports include World Energy Council (Hannon), OECD (Anderson), International Labour Organisation (Taylor), Union Network International (Taylor), Department for Education (Luchinskaya), Federation of Small Business Scotland (Mwaura et al.), Scottish EDGE (Casulli), Joseph Rowntree Foundation (Findlay et al.), Scottish Government (including several reports by Samuel & Lassalle, Findlay et al, Roy et al.).

Since 2014, SBS has hosted more than 125 international speakers from 29 countries including 18 from Brazil, 11 each from Australia and USA, 10 from France, 8 each from Finland and Philippines and 6 each from Belgium, Hungary and Italy. Outward research visits are supported by the School whilst the University's Global Engagement fund aims at developing and enhancing strategic, sustainable and mutually beneficial collaborations with world-leading academic institutions and organisations outside the UK. This has led to collaborative research between SBS and Harvard University, National Cheng Kung University, University of Adelaide, The Hong Kong University of Science and Technology and the University of Washington, amongst others. In addition, the University provides funds to develop sustainable research with its International Strategic Partners. Under this programme, SBS staff have developed collaborative research projects with academics at Stanford, New York University, City University of New York, MIT, Waterloo, Politecnico di Milano, Tsinghua, and Aalto.

SBS underwrites expenses to host international conferences and interaction events. 57 staff have had conference organising roles in 147 major international conferences (at home and abroad). Major conferences chaired/led by SBS staff include European Safety and Reliability Conference (2016, Bedford, Walls, Revie); European Conference on Operational Research (2015, Belton, Bedford, Akartunali); Innovation and Product Development Management Conference (2016, Ates). Sminia/McKiernan led EURAM (2017), Cooper led European Accounting Association Annual Conference (2015) and Gounaris led the European Marketing Academy Conference (2018). SBS also hosted the International Conference of the Financial Engineering and Banking Society (2017, Andriosopoulos) and the Financial Management European Conference (2019, Marshall). Wooton organises the European Trade Study Group in collaboration with Johannes Kepler University of Linz.

Within the framework of UKRI's Global Challenges Research Fund, staff are awarded, on a competitive basis, pump priming and accelerator funds to work with researchers around the world. Using these funds research has occurred with partners in Argentina, Brazil, Egypt, Germany, Philippines, South Africa, Namibia, Indonesia, USA etc.

Academic achievements of SBS staff have been recognised by a number of awards. Many staff (including Alexander, Ates, Belton, Doherty, Dorfler, Howick, Koop, Sreevas, Thapa, and Wilson) have won best paper awards at international conferences and journals. McKiernan received the BAM Life Time Achievement Award in 2016. Koop is a Fellow of the Journal of Econometrics, and Distinguished Author of the Journal of Applied Econometrics. Similarly, Howick received Standards + Innovation Award, and Walls received an IEC 1906 Award for Significant Contribution to international standards (2014). The impact of SBS research on external beneficiaries was

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recognised through awards for its long standing and sustained contribution to the Scottish Human Resources profession at the HR Network Awards in 2018.

**Editorial Work**

Many SBS academics are on editorial boards of several journals of international standing. A selection of journals in which SBS staff hold senior editorial positions is summarised below.

Journal title	Member	Journal title	Board member
European Journal of Finance	Andriosopoulos (Associate Editor)	European Management Review	Nicolopoulou (Associate Editor)
New Technology, Work and Employment	Taylor (Co-Editor-in-Chief)	IIE Transactions	Morton (editor)
Qualitative Research in Organization and Management	Simpson (Associate Editor)	EURO Journal on Decision Processes	Morton (editor)
Human Resource Management Journal	Scholarios (Co-editor in Chief)	Journal of Behavioral Decision Making	Wright (Editor-in-chief)
Employee Relations (Journal)	Nickson (Editor-in-Chief)	Supply Chain Management: An International Journal	Wagner (Editor)
Technological Forecasting and Social Change	Gok (Associate Editor)	Journal of Marketing Management	Doherty (Editor)
Journal of Applied Econometrics	Koop (Associate Editor)	Journal of Business and Economic Statistics	Koop (Associate Editor)
Journal of Econometrics	Koop (Associate Editor)	Organisational Studies	Simpson (Senior Editor)

**International collaborations**

52 staff hold 116 visiting professorship and research scholar positions in 95 academic institutions around the world. Examples include visiting positions at Montpellier Business School (Shaw), University of Malta (McKiernan), University of Bergamo (Casulli), ESCP Europe Business School (Andriosopoulos), and Jinan University (Paudyal). Further examples of such positions include Morton at China University of Science and Technology, Sminia at Mackenzie University, Simpson at HEC Montreal, Scholarios at the University of Gothenburg, Baum at William Angliss Institute, McGrane at Stanford University, Wooten at ETH Zurich, De Feo at Massachusetts Institute of Technology, and Gehrsitz at the University of California Davis.

At least 77 SBS academics have worked with co-authors based in 51 countries (including USA, Germany, Australia, China, New Zealand, Spain, Canada, and Italy) and published over 300 research outputs with them. The world-leading standing of SBS staff is evident from their successes in winning research grants from international funding bodies and foreign countries through collaborative work with international co-authors. Since 2014, 38 SBS staff have been awarded 59 international research grants from funders based in other countries. Successes include Wright and Akartunali (from USA), Morton, Quigley, Walls, Howick and Baum (from EU, H2020), Morton (from WHO), Revie (from Singapore), Wilson (from Japan), Nicolopoulou, Jafari (from Turkey), Basu (from France), Hsu (from Taiwan), Walls, Revie, Barlow, Wooton, and Eiser (from Canada), and Cunningham (from Australia).

Since 2014, SBS have been involved in 48 successful grant applications in collaboration with 103 other universities, 58 of which are outside the UK. Two thirds of these applications involve only one



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other university (average value £440K) while a few are large consortium awards such as the £8m EPSRC funded Energy Revolution involving 23 universities, or the £18m GCRF funded One Ocean Hub of 12 universities. The Global Challenges Research Fund has also been instrumental in extending the international research networks of SBS staff. For example, Garvey, supported by two GCRF awards on the theme of Pesticides, Work and Public Policy have developed networks with University of Sao Paulo, UNESP-Presidente Prudente (Geography, health and hydrology) and Federal University of Mato Grosso (Nucleus of Studies of Work and Social Health) and Pesticide Action Network (Germany and Europe). Similarly, Baum works with the University of the Philippines Diliman to engage with tourism from a social and economic inclusion perspective in the context of the contemporary city.

## Contributions to society and the economy

User engagement events are designed to define real life challenges and build relationships to support solution creation. Problem themes are aligned with our research capabilities. For example, the Hunter Centre for Entrepreneurship holds social entrepreneurship days, and the Risk Consortium has held thrice-yearly events to bring together stakeholders and academics. Media, blogs, vlogs and white papers are used, particularly by Scottish Centre for Employment Research and the Fraser of Allander Institute. Networking events such as the annual 'Engage with Strathclyde' week where SBS research is displayed using a range of events involving stakeholders from industry, public and non-profit sectors, professional associations, and government. Examples include customer service by Marketing, the award-winning Chartered Institute of Personal Development Skills Development Scotland, and the Future of FinTech events led by the Centre for Financial Regulation and Innovation. Similarly, the department of Work, Employment & Organisation held a range of local stakeholder engagement events as well as international events through Engage with speakers from Brazil, Germany, Sweden, Belgium and organisations such as the International Labour Organisation.

SBS research has societal impact through work with individuals and organisations in the UK and globally. For example, individuals and communities in the Brazilian Amazon have benefited socio-economically by interventions arising from UKRI-GCRF Covid-19 funded research (Garvey). The charity, Children's Hospices Association Scotland (CHAS) significantly increased referrals and the number of families they support, thanks to the inclusive strategy-making research conducted in the Hunter Centre (Smith).

## Contributions to policy making

Governments' economic policies have been affected by FAI's research in macroeconomic modelling (e.g. Northern Ireland Department for the Economy to model scenarios for the Northern Ireland protocol, and Scottish Government to model trade scenarios in the light of Brexit). Research led by Morton on the consequences of antimicrobial resistance (conducted as part of the EC FP7 DRIVE-AB project) has led to work with and advisory roles for UK Chief Medical Officer on unblocking R&D for new antibiotics. Energy policy-makers including the Scottish Government Sectoral Marine Plan for Offshore Wind Energy (2019) and the UK Parliamentary Office for Science and Technology POSTnote on Wind Energy can access research in Hunter Centre for Entrepreneurship. Similarly, research on 'Enhancing entrepreneurial policy, ecosystems and firm growth' by HCE staff has informed entrepreneurial policy, improved Scotland's entrepreneurial ecosystem and supported the scaling up of entrepreneurial ventures. Through collaboration with UK and devolved governments, regional enterprise support organisations and membership organisations, this research has provided an annual profile of Scotland's position in the Global Entrepreneurship Monitor.

Recognising that the UK Social Care sector has the lowest paid workers, and these essential workers have some of the poorest terms and conditions of employment, Cunningham conducted several

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research projects that initiated change in employment policy, practice and conditions. The research included benchmarking research on pay and conditions and research on personalisation at UNISON (one the UK's largest unions, with 1.3 million members). Cunningham also investigated the management of change at Cornerstone, a leading provider of care and support services for adults, children and young people with disabilities and other support needs, supporting approximately 3,000 individuals and their families and employing 1,700 staff. In collaboration with key bodies in the sector, Cunningham produced longitudinal data that was recognised as driving system-wide changes to recruitment and retention. Working with UNISON and four Voluntary Sector (VS) providers the research raised the profile of the VS workforce in the union and led to improvements in recruitment. At the organisational level Cunningham's research led to increased pay and improved conditions for front-line care staff, and more open and inclusive dialogue in the change management process. This research was also evidenced to have influenced sector-wide policy in Scotland and improved terms and conditions for essential workers, specifically 600 workers at ARK Housing, a not-for-profit charity and registered social landlord employing over 900 staff across Scotland.

SBS staff interact with businesses and policy makers through participation in economic forums and platforms, such as the Glasgow Economic Forum, Research Panels of professional bodies and Parliamentary and government advisory boards. Staff are active in professional societies with chartered status. Examples include Chair of the Scottish Low Carbon Energy Investment Impact Hub Expert Group (Coulson), member of the Strategy and Research Advisory Group of the Institute of Chartered Accountants of Scotland (Smith), Member of the ACCA Global Forums on Sustainability (Coulson). Similarly, Howick, Belton and Akartunali hold leadership roles in the Operational Research Society, and Nickson, Scholarios, Stewart are Steering Group members for the Chartered Institute for Personnel and Development Applied Research Conference while Coulson is a Member of Global Living Wage Steering Group Hosted by UK Living Wage Foundation and Citizens UK. Others have expert advisory roles for organisations such as the Office of National Statistics (staff in Economics), BSI and IEC/ISO standards (Dorfler and Walls) and sit on company boards and public policy bodies (e.g. Scottish Government, Glasgow Economic Recovery Group, Northern Ireland Executive, and Scottish Policy Foundation).

SBS works with key enabling actors to generate opportunities for interaction with business users through University centres, research themes and GCID clusters. Through collaborations developed during 2014-2020 between SBS researchers and University research centres' sector facing initiatives (e.g. Health Cares and Futures institute, Advanced Nuclear Research Centre, and the Low Carbon Power and Energy programme) SBS has enhanced both organisational capabilities and conducted value-adding research projects, defined and delivered by academic teams in collaboration with relevant users.

## Contributions to industry

SBS research has informed both public and private sectors. For instance, SBS study on 'Tackling in-work poverty in the UK by demonstrating the business case for a real Living Wage' underpinned the Living Wage Foundation campaign from 2015, persuading over 6,000 companies to become accredited real Living Wage employers between 2015 and 2019 to the benefit of more than 240,000 low-paid workers. Similarly, study on 'Equipping trade unions to improve employment relations through achieving performance management reform', led by Coulson and Cunningham, provided evidence of the nature and implications of poor performance management practice in the public and private sectors which equipped UK trade unions to campaign effectively for Human Resources Management reform to improve employment relations.

SBS has also evidenced impact to industry and beneficiaries since 2013 based on a range of research. For example, research led by Wagner informed the creation of the Strathclyde Open

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Innovation programme. Delivered in collaboration with funding from Scottish Enterprise, Wagner's research contributed to increasing Scotland's innovative capacity. Organisations gained economic and social benefits. For example, technological innovation was accelerated for Scottish Power Energy Networks, Subsea7 and the Doosan Service Group. The innovation strategy was enhanced and a cooperative culture created in organisations ranging from Stena Line to Glasgow City Council. The influence of the Strathclyde Open Innovation programme was recognised internationally, including by the Deputy Director at NASA's Center of Excellence for Collaborative Innovation who believed it was unique in achieving a high level of innovation at scale.

DHL Freight's Customer Experience Management (CEM) model, was based on work by Wilson in collaboration with Gallup and Ovum, and assessed the company's readiness for customer experience transformation and pinpointed areas of strength and weakness. This CEM model was used during the country-wide roll-out of the CEM program at DHL Freight with the Vice President Customer Experience recognising that the collaboration with SBS led to an irreversible change in the way the leadership team manages the business.

Research on structured expert judgement (Colson, Quigley) contributed to the European Food Standards agency scientific training programme. Scottish Water has worked with staff in Management Science department on modelling research to inform planning decisions for both strategic investment and water quality operations. Energy companies including SSE, Scottish Power, EDF, and Bruce Power have drawn upon SBS research. For example, a decision support model developed in IDeA is used by Bruce Power to support CANDU reactor maintenance operations and enable power station life extension targets to be met. Foresighting research at SBS (McKiernan, Wright) brought benefits to organisational strategy making for companies including the Wood Group and SSE (both on issues to do with anticipation of the form of the energy transition) and Glasgow city region (on issues to do with post-COVID urban activities). A major reorganization and overhaul of management processes/procedures at the Turner Group followed engagement with strategic management research (Sminia). A white paper produced by CeFRI (Fintech in Scotland: building a digital future for the financial sector) informs financial services (e.g. Nasdaq), and Virgin Money are drawing upon Hunter Centre research to embed a structured programme of digital and service innovation within their Small Business Strategy division. Benefits in the hospitality sector include reductions to a £4m per year inventory spend due at Fishers aided by the KTP with operations management researchers on new digital laundry tracking processes.

26 SBS staff hold or have held 83 board membership and advisory positions and 32 staff hold 57 Non-Executive Boards and Trustees positions on corporate, professional, and policy-making bodies at home and abroad. Examples of external engagement include the Dean of BAM Fellows (McKiernan), Vice-President of Operational Research Society (Howick), Commonwealth Scholarship commission (Thapa), UNICEF/Chinese Ministry of Health (Morton), British Institute of Energy Economics (Hannon), European Investment Bank (Thapa) etc. Similarly, Findlay, Wilson, and Roy are advising the Scottish Government on economy, employment and finance, Roy and Eiser are advising the Scottish Parliament on economy and finance while Hannon is associated with Scottish Power Energy Networks and Gounaris advises the European Marketing Confederation. Baum chairs the panel of the Estonian HE Quality Agency, Findlay co-chairs the Fair Work Convention and Doherty Chairs the Academy of Marketing and Marshall is a member of Glasgow Economic Leadership Finance and Business Services. Staff also hold membership of various external research committees and funding bodies including the Carnegie Trust (Doherty, Wilson, Wagner, Smith, Findlay), ICAS (Smith), NHS Scotland (Findlay), European Business History Association (Spadavecchia), Swedish University of Agricultural Sciences (Baum), Operational Research Society (Morton), and ESRC (Findlay). Staff also hold positions of influence on parliamentary and government advisory boards with advisers to parliamentary committees (Roy, Eiser, Findlay, Taylor),

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Scottish Business Taskforce (Roy), Carnegie Trust for the Universities of Scotland (Findlay), the Newham Democracy and Civic Participation Commission (Loeffler), members of Minority Ethnic and Migrant Enterprise Working Group, Scottish Government (Mwaura and Lassalle), etc.

**Media appearances**

SBS staff regularly receive invitations from public media (Radio, TV, spotlight articles for specialist magazines etc.) to share their expert views on contemporary issues. In recent years, SBS staff have been invited on more than 115 occasions by public media to comment. Topics include entrepreneurship (Mwaura, Nicolopoulou), leadership (Nicolopoulou), importance of Early Diagnosis of Pancreatic Cancer (Van der Meer), tourism (Baum), work place innovation, fair work (Findlay), NHS funding (Eiser), UK budget (Eiser), the Scottish Economy (Eiser, Roy), the Greek economic crisis (Andriosopoulos), power technology (Hannon), call centre workers' health and safety (Taylor), and weight discrimination (Nickson) among others.

**Destination of PhDs**

For many years, the excellent academic and research activities of SBS staff have been supporting Business education, public policies, and corporate practices. In addition to direct involvement of academic staff with businesses and policymaking bodies, SBS has been contributing to the sustainability of Business education in the UK and beyond by developing high calibre PhD graduates and excellent academic and business leaders. Our PhD graduates have joined academic institutions within the UK including Dundee, Leicester, Glasgow, London, and Lancaster and outside the UK including UCLA (USA), Université du Québec à Montréal (Canada), Business School, Lausanne (Switzerland), King Faisal University (Saudi Arabia), Universitas Prasetiya Mulya (Indonesia), National Defence University of Malaysia, and the Indian Institute of Management. Many of our PhD graduates have joined national and international organisations including the Scottish Government, Unite the Union's Political, Research & Campaigns Unit, European Commission, the International Trade Center, and Malta Financial Services Authority.