



University
of Glasgow

KNOWLEDGE EXCHANGE AND INNOVATION STRATEGY 2017-2021

Changing the world through Engagement – Innovation – Impact

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Executive Summary

The University of Glasgow is one of the world's leading research-intensive academic institutions. The economic impact of our University, its students and the international visitors that we attract is already evident. We sustain £1.5bn of output, £800m in GVA and nearly 15,000 jobs across Scotland. For every £1 invested in our University, £8.30 of economic activity is generated.

Although we have been delivering world-changing impact for over 565 years, we are firmly focused on the future. Our new Knowledge Exchange and Innovation Strategy aims to build upon this to enhance the global impact of our research, meet government aspirations for entrepreneurship, business growth and economic prosperity. In doing so, it supports our University mission:

‘To bring inspiring people together and create a world-class environment for learning and research, empowering staff and students to discover and share knowledge that can change the world.’

Through this new strategy we aim to provide the framework through which we will further the University's ambition, creating impact for society and the economy through *innovative engagement*. The priorities set out here are underpinned by our determination to grow the number and depth of our partnerships, building strong and fruitful relationships with established businesses, with the entrepreneurial community, with policy-makers and practitioners, with third sector organisations, and directly with communities and public audiences, locally, nationally and internationally. Our priorities are:

PRIORITY 1

The University, Open for Business

We will deepen our existing collaborations, and develop new relationships with businesses and industry, locally, nationally and globally.

PRIORITY 2

Economic Impact through Entrepreneurship & Innovation

We will enhance support for students and staff to increase the number of new high-growth ventures formed from within the University.

PRIORITY 3

High-Quality Policy & Practice in a Changing Landscape

We will extend our influence on policy and practice, maintaining our position as an innovator and advocate in the creation and translation of research based evidence.

PRIORITY 4

Inclusive Public & Community Engagement

We will promote a culture of public and community engagement with our research, with a focus on socioeconomically disadvantaged communities.

The political context in which we operate may change over the coming period, but given our portfolio of world-leading research and the significant investments that we are making in the expansion and development of our campus, the next four years present exciting opportunities for the University of Glasgow. Our passionate, professional and progressive staff and students drive our success, and we welcome your support in turning the ambitions outlined in this strategy into reality.

Context

Knowledge exchange encompasses the multiple interactions between Higher Education Institutions and businesses, public services, charities and communities to create societal and economic benefit.¹

Significant progress has been made since the launch of our first Knowledge Exchange and Innovation Strategy (2013–2016). Over this period, the Higher Education landscape has changed considerably. Increasingly, universities are being asked to develop and support an entrepreneurial culture and provide new mechanisms to help drive the economy, the skills agenda and global connectivity. Our new strategy aims to enable us to be agile in our responses to these opportunities, especially given the potential that the campus development will unlock.

There are many external challenges, not least the political environment and on-going discussions over Scotland's relationships with the United Kingdom and the rest of Europe. But these should not diminish our ambitions nor our place as a major institution in the Scottish, UK and international economies.

Impact

The drive of governments at all levels for accountability of public funds, to demonstrate the impact of research outcomes on society and the economy, has never been greater. The REF2021 Research Excellence Framework exercise, which will take place at the end of the strategic planning period, will again formally assess the quantity and quality of the University's research excellence and impact, with opportunities for revenue growth associated with a strong performance. The importance of generating impact through our research is therefore an imperative in the many aspects of knowledge exchange and innovation that we undertake.

Anchoring Scotland's Knowledge Economy

The inclusion of impact in REF2021 is just one indicator of the growing importance placed on our delivery of benefits to communities beyond the academy. The University of Glasgow is committed through its Outcome Agreements with the Scottish Government to support their ambitions in maximising the opportunities afforded to the economy through the exploitation of research undertaken by our world-renowned academics and scientists. We anticipate that there will be increasing scrutiny of our performance in business engagement through the promotion of innovation in products, processes and services and the delivery of social impact with inclusive growth. These activities will be complemented by the development of entrepreneurship and associated skills amongst the University's students and staff.

Competition

The global Higher Education sector is growing, with significant international competition to attract investment in research, development and innovation. Set against this backdrop, constraints in public spending over the next strategic planning period will limit the availability of central government funding. Despite this, the Research Councils and charities continue to show a willingness to increase funding for the translation of research and the acceleration of its impact, for example through the £4.7bn investment in the Industrial Strategy Challenge Fund. Exciting new opportunities are also emerging to grow our revenue elsewhere, including through the development of innovative strategic partnerships with external organisations.

International Opportunity

The University of Glasgow is global in its outlook and is well connected internationally. Knowledge exchange and innovation already play a vital part in helping to link our researchers with our partners worldwide - including, but not limited to, our strategic international partnerships in China, Singapore, Hong Kong, North America and Australia. We are now positioned to link our local partners into global economies, markets and communities. At a time of significant political change, it is important that we remain outwardly focused in order to ensure our global influence and relevance.

The University has the talent, commitment and research capability to respond to these challenges and to ensure that we continue to grow as a destination for research, development and innovation excellence and investment.

¹ HEFCE (August 2016). Higher Education Innovation Funding: Institutional five-year knowledge exchange strategies (Policy and request for institutional strategies).



The Nano & Quantum World

QuantIC is the UK centre of excellence for research, development and innovation in quantum enhanced imaging. Led by the University of Glasgow, it brings together more than 120 full time researchers with over 40 industry partners. QuantIC's vision, shaped in collaboration with their industry partners, is to create a new industrial landscape using quantum technologies to improve products and processes in the imaging sector. The vision is being realised through a large scale programme of industry engagement, through co-investment with business partners in research and development work, and through the industrial sponsorship of a significant cohort of skilled postgraduate researchers, who will be the next generation of quantum technology innovators.

Making the Invisible Visible

Complementing QuantIC's strategy of accelerating technology uptake with industry, it has been active in engaging other stakeholders such as the public, government and educational bodies. A key highlight of this has been the development of a permanent exhibition in collaboration with the Glasgow Science Centre to raise awareness and educate the public about quantum physics - making complex science understandable and relevant to everyday lives.

'We are very excited to be amongst the first to be able to bring this technology to the public and hope the exhibition will inspire a new wave of quantum physicists to help take forward this cutting edge work to discover the field's full potential for the benefit of mankind.'

Stephen Breslin, Chief Executive of the
Glasgow Science Centre



An Inspiring and Transformative Campus

The acquisition of a 14-acre site immediately adjacent to the University of Glasgow's main campus at Gilmorehill has enabled the University to embark upon one of the UK's largest current campus development projects. Knowledge exchange will play a key role in both shaping and realising the huge potential afforded by this expansion. The immediate opportunities now include:

- Developing a test-bed for the University's staff and for industry to accelerate and translate academic research into the development programme in areas including Internet of Things, energy, materials, communications, SMART City technologies and health & wellbeing;
- Creating dedicated flexible space to translate research into start-ups and spin-outs;
- Providing opportunities for corporate co-location with appropriate interaction areas to facilitate collaborations between staff, students and companies;
- Creating open, creative and inviting spaces to facilitate public engagement with our research;
- Providing dedicated space associated with student entrepreneurship to encourage innovators to realise their potential.

The University can also influence the economic development of Glasgow through the development of three core activities, providing staff with new routes for engagement:

- A cultural quarter comprising the Kelvingrove Museum, the Hunterian and Kelvin Hall and pointing towards the Riverside, the SECC and the Hydro creates a unique opportunity to engage with audiences in cultural heritage, performing arts and the tourism sectors;
- As one element of the proposed new Innovation District, an Innovation Zone close to Church Street to enable business engagement, as well as skills development and student entrepreneurship;
- As another key element, a translational Clinical Innovation Zone to attract external partners to the Queen Elizabeth University Hospital, building upon our internationally renowned research in precision medicine and imaging.



Cultural & Creative Economies

Access to our world-class collections for teaching and research has greatly improved through our collaborations, both internationally with the Smithsonian in Washington and locally with the National Library of Scotland, Glasgow City Council and Glasgow Life. Together these partnerships have helped us to transform one of Glasgow's landmark buildings, the Kelvin Hall, into a centre of excellence for research, heritage, public engagement, sport and commercial activities.

Kelvin Hall is a much-loved and iconic building in Glasgow's West End. The move of 1.5 million items from the University's museum, The Hunterian, to the Kelvin Hall, and the co-location with other expertise across the museum and heritage sector, has created significant opportunity for innovation. The collections have converged on their new home from storage places across the city – as they previously converged on Glasgow, over the centuries, from locations across the world. Our researchers and their partners are bringing objects from storage to illuminate their stories.

Our collaborations with prestigious arts institutions have also helped to build stronger links for knowledge exchange and greater learning opportunities for all of our communities.

'Kelvin Hall is the perfect venue. It's about community and about the animation of cultural life. I can't think of another city that could have a building that brings all that together so creatively. It has this unique combination of worldwide ambition with a friendly, local feel. It's that idea that we have the history; we have the heritage; we have the experience. We're Glasgow.'

Professor Karen Lury, Professor of
Film & Television Studies

PRIORITY 1

The University, Open for Business

We will deepen our existing collaborations and develop new collaborations with businesses, locally, nationally and globally.

There is a growing demand for innovative approaches to product, process and services development to address market opportunities across all industry sectors, from multinational companies to small and medium-sized enterprises (SMEs). The University meets these needs in several ways, such as collaboration in research and development; licensing of technology; the supply of graduate and postgraduate students into the skilled labour force; and access to sector-specific expertise through consultancy. To grow this activity over the next four years, we will:

- Promote interactions with businesses and increase the volume of our funding that comes directly from industry sources and from public funders of business collaboration;
- Build effective partnerships that understand corporate needs;
- Ensure that our processes are efficient, making it easier for industry to engage with our staff;
- Foster close working relationships with regional enterprise agencies, Interface, the Knowledge Transfer Partnerships programme and Innovate UK;
- Develop a University-wide approach to industry engagement to build our portfolio of collaborative projects, including by working closely through the Scottish Funding Council Innovation Centres;
- Increase students' exposure to industry, helping to develop their skills and employment prospects through increased opportunities for work-based placements and experiences within the curriculum.

Precision Medicine & Chronic Diseases

The University's world-leading development of precision medicine enables co-operation between researchers, clinicians, and the private sector in identifying and implementing treatments that are effective for specific groups of patients. Precision medicine (also known as 'stratified medicine') will be transformative on future healthcare, with significant

implications for the NHS, the pharmaceutical industry and the medical technologies supply chain. Healthcare providers across the world have recognised the disruptive potential that innovation associated with precision medicine will have, by improving diagnosis and treatment success for many conditions.



The University leads a Scotland-wide consortium comprising four Scottish universities, NHS Scotland, global biotechnology company Thermo Fisher Scientific, and biomedical informatics company Aridhia Informatics, who together have established a biomedical innovation cluster at the Queen Elizabeth University Hospital. The Stratified Medicine Scotland Innovation Centre (SMS-IC) has attracted companies at the leading edge of developments in biomedical innovation from Europe, Asia and the USA.

The partnership, spearheaded by Professor Dame Anna Dominiczak (pictured above), between the University and the Queen Elizabeth University Hospital has also established a number of key innovation facilities, including the 22,000sq ft Clinical Innovation Zone – a dedicated space for companies to engage with the academic community. The Zone is supported by dedicated business innovation managers, who seek out academic and NHS partners to engage with companies.

The University's Imaging Centre of Excellence, which incorporates an ultra-high resolution 7T MRI scanner, is connected to the Zone and places the University at the forefront of imaging technology, a key pillar of precision medicine. The Imaging Centre of Excellence brings together world-leading research, cutting edge technology and industry under one roof to translate science into economic and patient benefit for Glasgow, Scotland and the UK.

PRIORITY 2

Economic Impact through Entrepreneurship & Innovation

We will enhance support to increase the number of new and potentially high-growth ventures formed by the University's community of students and staff.

Advancement of the UK's knowledge-based economy requires the up-skilling of our workforce and the creation of an ecosystem of support for individuals and organisations in order to help realise the economic impact of new innovation arising from our research. This ecosystem is already evolving and our partnerships have delivered exciting new enterprises over the last planning period. For example, we have strengthened our links with the investment community by deepening our partnership with both IP Group plc and the Epidarex Capital venture fund. We are building a strong relationship with Santander, one of the world's major enterprises, which continues to give active and sustained support to our student entrepreneurs.

However, there is more to do and more to achieve. The Scottish Government recently published its Phase 1 Report on the Enterprise and Skills Review which clearly articulates the need for a skilled workforce at all levels. As a University we have a responsibility not only to maximise graduate employability but also to help continuous improvement in staff skills through the development of new partnerships and external engagement.

Our campus development offers a once-in-a-generation opportunity to re-define the University and its surrounding district, as a major centre for innovation, skills and high-growth business in Scotland. To fulfil the promise of this historic opportunity, we will:

- Support staff in securing translational grants to de-risk innovations to investor or licensing/co-development readiness;
- Ensure that all students have the opportunity to experience entrepreneurship training as part of their educational programme;
- Expand our dedicated support for students and staff to establish new ventures, providing training, events, mentorship and access to space and finance;
- Provide our academic staff with access to professional development training in nurturing and supporting student entrepreneurship;
- Deepen our network of mentors (e.g. alumni, industrialists and entrepreneurs) to assist staff and students develop investor-ready propositions;
- Further develop our engagement with venture groups in Scotland, the UK and the rest of the world;
- Establish dedicated innovation spaces within the campus development programme for entrepreneurs and companies to co-locate, co-produce, network and access support.



Image courtesy of Furhat robotics

Future Life

Our researchers at Glasgow's Institute of Neuroscience & Psychology have developed ground-breaking methods to reverse-engineer human cognitive processes – where, when, and how specific information is processed – from complex brain activity.

The aim is to implant these models into neuro-circuits within robots, giving them human-like flexible cognitive abilities. Research, led by Dr Rachel Jack, is pioneering our understanding of the language of facial expressions in partnership with commercial partners.

Social robots – digital avatars that interact socially with human beings – must be able to communicate effectively by using a host of different languages, including the language of human facial expression. Whilst humans can effortlessly understand and produce the non-verbal language of facial signals, social robots, which are already being commercially deployed in educational and care settings, do not. Dr Jack and her team are now formally characterising the language of facial expressions – understanding its structure, syntax, and semantics – to develop mathematical models that will equip social robots with this most human of abilities.

Glasgow's researchers are already developing their technology in partnership with commercial partners, enhancing their social robot system's repertoire of facial expressions; the technology is applicable to projections onto static masks, or for use on semi-static plastic models, and hyper-realistic moving bases. The technology also has potential for development for the next generation of social media, which will rely upon the blending of live video and virtual reality environments. Rachael Jack's partnerships with leading providers are important steps in making the virtual reality experience both psychologically meaningful, and commercially successful.

PRIORITY 3

High Quality Policy & Practice in a Changing Landscape

We will extend our influence on policy and practice, maintaining our position as a leading innovator and advocate in the creation and translation of research based evidence.

The University has a rich heritage of research that has informed, influenced and evaluated public policy and practice, a tradition that our researchers continue today. We work to break down barriers by using innovative methods to affect real change not only in how policies are formulated but, crucially, in how their outcomes manifest into the practice of public, private and third sector organisations.

The next four years may be a time of great change in the political landscape in Scotland and the UK. We will curate relationships with policy makers and practitioners that endure, at all times seeking new inclusive methods to develop both existing and new partnerships. We will also develop new mechanisms by research-based evidence that can be translated into real change. We will:

- Support our researchers to access appropriate partner networks to improve the quality, and increase the uptake of policy- and practice-focused research;
- Lead in the creation of consortia, including policy and practitioner partners, which build on our position and reputation as an innovator in evidence co-creation and translation;
- Utilise our existing knowledge and expertise to develop novel networks of researchers, legislators and practitioners around emerging areas of importance.



Addressing Inequalities

The UK Collaborative Centre for Housing Evidence is an example of the innovative way in which our researchers are making an impact on policy and practice. The issues facing the UK's housing system are varied and complex, and cannot be tackled in isolation. A consortium of experts, led by Glasgow's Professor Ken Gibb (pictured below), and including ten academic institutions, is working in true partnership with non-academic organisations, including the Chartered Institute of Housing, the Royal Institution of Chartered Surveyors, and the Royal Town Planning Institute. The project's key priority is the co-development of evidence by

researchers and practitioners, and the development of mechanisms to influence policy and practice at all scales, from neighbourhood to national.

Evidencing different dimensions of housing, such as poverty, inequality and the efficiency of the housing system will create a strong base for better policy and practice. The Centre's headquarters is in the Olympia Social Research Hub in Glasgow's East End – a location which gives it access to both collaborative working opportunities with experts from the Glasgow Centre for Population Health and creates

a unique laboratory for investigating housing concerns facing underserved local communities.

Building upon the renowned work of Glasgow researchers into the links between housing and well-being, including for example through the ground-breaking GoWell initiative, the Centre's vision is to build a robust understanding of how housing interacts with the wider economy and society; its legacy will seek both to engender changes in policy and practice that will deliver impact and aim to embed a culture of evidence across the housing system.



PRIORITY 4

Inclusive Community & Public Engagement

We will promote a culture of public and community engagement with our research, with a focus on socioeconomically disadvantaged communities, locally, nationally and globally.

The University of Glasgow was founded for the benefit of the city and its people. Today, we remain committed to helping Glasgow to flourish – but we are also looking beyond the local area to engage a broader global community in our work.

By engaging the public with our research we provide unique insight to our work, highlight the human story behind research endeavour and build public trust in the value of what we do.

The University's staff and students are well placed to enable communities to participate in, and derive value from research. Locally, we have worked for many years with some of Glasgow's most socioeconomically disadvantaged communities, and globally, we have significant strengths in knowledge exchange and co-creation with some of the most fragile communities in the world.

Continuing to promote a culture of public and societal engagement with our research, with a focus on socioeconomically disadvantaged communities, we will:

- Ensure that our staff and students have access to training and development opportunities related to community and public engagement in research;
- Identify innovative and effective models of community engagement and co-creation from within the institution and provide mechanisms through which these models can be shared, adapted and adopted;
- Support and enable staff to focus their public engagement activities appropriately, with additional support, on socioeconomically disadvantaged communities, locally, nationally and globally;
- Improve access to our campus, creating open, inviting spaces, and the means to access them, to optimise opportunities for community and public engagement.



One Health

Our health and wellbeing is tightly interwoven with the health of animals and the environment around us. Through an integrated 'One Health' approach, our researchers bring together experts in veterinary and human medicine, ecology and social sciences to devise solutions to reduce the spread of diseases such as rabies, zika and malaria. The approach enables effective resolution of health questions through an understanding of the complex biological and social, economic, political and environmental contexts in which those questions are embedded.

Community level engagement is central to the approach and our teams work in successful partnership with communities in Africa to control the spread of livestock diseases. For example, Tanzania has the third largest livestock population in Africa, vital to the economic and food security of the rural poor. Our researchers are currently involved in visits to approximately 120 agro-pastoralist and pastoralist villages, organising workshops involving key village-level representatives to map and understand livestock resources and main livestock routes, and to evaluate strategies for community-based participatory disease surveillance (case detection and diagnosis).

Our work in One Health exemplifies the Glasgow approach; starting with the needs of the most vulnerable, and bringing together expertise from across our University to co-develop solutions in direct partnership with the communities affected.

APPENDIX - OUTCOME AGREEMENT AND FUNDER COMMITMENTS

SFC University of Glasgow Outcome Commitments

- Increase portfolio of Easy Access IP Technologies
- Manage a portfolio of 2-3 potential high growth companies per year
- Grow Knowledge Exchange Activity

University Innovation Fund Outcome Commitments

OUTCOME 1 (demand stimulation):

Working with Scotland's enterprise agencies, Scottish Government, business networks, Interface, and others, Scottish HEIs will have helped to increase the demand and quality of engagement from businesses and the public sector for university services.

OUTCOME 2 (simplification/commercialisation):

In partnership with the Enterprise Agencies (EAs) and Interface, Scottish HEIs as a sector will have demonstrably simplified business access to the knowledge and expertise in Scottish universities.

OUTCOME 3 (simplification/greater innovation):

In partnership with the EAs and Interface, Scottish HEIs will, at a national level, have made strategic use of their sectoral knowledge to promote greater innovation in the economy (including beyond non-STEM).

OUTCOME 4 (entrepreneurialism):

Scottish HEIs as a sector will have made a significant and positive change in the way entrepreneurial opportunities are promoted and delivered to students, HEI staff, and businesses.

OUTCOME 5 (international):

In partnership with Scottish Development International, Connected Scotland and others, Scottish HEIs will have pooled their knowledge and networks, and shared good practice to promote and engage Scotland internationally (operating under Scotland's International Framework).

OUTCOME 6 (inclusive growth and social impact):

Building on current and good practice Scottish HEIs will have scaled up their support of the Scottish Government's ambitions for inclusive growth.

OUTCOME 7 (equality and diversity):

Building on current and good practice HEIs will have ensured positive promotion of equality and diversity in staff and all who are affected by the use of UIF.

RCUK Concordat for Engaging the Public with Research Commitments

- Have a strategic commitment to public engagement;
- Recognise and value our researchers for their involvement with public engagement activities;
- Enable our researchers to participate in public engagement activities through appropriate training, support and opportunities;
- Regularly review our progress in fostering public engagement.

Glasgow City Region, City Deal Deliverables – The Imaging Centre of Excellence

- Innovation Engagement (events, conferences, visitors)
- Industry Support & Collaborations (collaborations, SMEs supported)
- Clinical Innovation Zone Occupancy (companies, drop-in, floor space)
- Research & Innovation Impact (projects, papers, students, patents)
- Patient Engagement (scans, trials)
- Income Generation (scanner, rental, grants, trials)
- Employment Generated (jobs on-site, off-site = 400).