

HEIF case studies 2021: Cluster M

The Research England-funded Higher Education Innovation Funding (HEIF) supports higher education providers to exchange knowledge with business, public and third sector organisations, community bodies and the wider public, increasing economic and societal benefits from their work.

The case studies below demonstrate the ways that English higher education providers have used HEIF to support knowledge exchange activities, and the impact they have achieved. Cluster M includes smaller universities with more research activity funded by government bodies or hospitals.

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Buckinghamshire New University: MedTech SuperConnector

MedTech SuperConnector is an open experiment in acceleration of research commercialisation in MedTech. It brings together talented early career researchers (ECRs), academic discoveries and pooled know-how from BNU.

Through the consortium partnership of the MTSC, staff and students from BNU had the opportunity to develop a medical technology from idea phase to commercialisation through the accelerator programme.

MTCS support of three projects. Their technologies, which included digital solutions for mental health & wellbeing and a new design for caps which reduced joint pain for those with arthritis, solved pressing health problems.

Ms Pepita Stonor in the BNU Applied Positive Psychology department refined her idea and began developing Coggi, an application which uses augmented reality and positive psychology to promote positive mental health & wellbeing in children.

Ms Stonor has benefited from specialist support for digital and healthcare businesses provided by the BUCKS HCS Ventures.

The health and social care start-up programme for innovators in Buckinghamshire is accelerating business innovations to market. It works directly with health and social care providers to ensure new business ideas meet their needs and propel them to market through a combination of expertise, networks, and facilities.

Richard Harlow, a final-year PhD student in Product Design, has developed a child resistant bottle cap which also reduces pain for those with joint or muscular chronic pain. The project is at patent phase and ready for testing & mass production.

BNU has grown its entrepreneurship offering by launching and developing the Digital and Health Tech Hubs and Bucks HSC Ventures in conjunction with its role in MTSC. This has allowed BNU staff and research students to develop their entrepreneurial capacity and exchange best practice with a network across London, including the journeys of its participants and support it has given to others.

University of Winchester: The HELP Hampshire Stroke Clinic

The [HELP Hampshire Stroke Clinic](#) was launched in January 2019 as a collaborative initiative between the University, Hampshire Hospitals NHS Foundation Trust (HHFT) and Hobbs Rehabilitation (an independent neuro-physiotherapy service). Its aim was to achieve societal benefit by providing community-based, low-cost, accessible exercise for individuals living with the debilitating effects of stroke. The work was aligned with the Government's priority of the Ideas chapter of the Industrial Strategy, specifically the focus on healthy ageing.

HEIF supported the Clinic through academic staff buy out, facilitate meetings between the partners to exchange knowledge, and deliver sessions.

Patient assessments incorporated physical and psycho-social assessments and community-based exercise classes followed. In the first year, the Clinic received 57 referrals from HHFT or GP practices. Four GP practices agreed to regularly refer patients to the scheme. All clients undertake a screening and a 12-week follow-up assessment, following participation in the exercise classes. Three exercise classes were delivered each week in either the Stanmore or Oliver's Battery areas of Winchester.

The main outcomes of the first year of operation were:

- A referral rate to clinic (57 patients in 8 months).
- Excellent adherence to exercise classes (>900 individual attendees in 8 months).
- Good retention to the 12 week follow-up assessment.
- Clinically relevant reductions in primary outcomes (systolic [-10mmHg] and diastolic [-5mmHg] blood pressure) following participation in the programme.

In 2019-20, the Clinic partnered with the Stroke Association and community venues to host social support groups focused around additional exercise classes outside of Winchester in accessible community locations. A total of 1443 people attended exercise classes which were held three times a week across the year.

As the Covid-19 pandemic emerged, the Clinic moved their exercise classes online, offering two virtual classes per week. Classes are real-time and allow the tutors to interact with the patients, offering advice, teaching points, adaptations and corrections. This has enabled continuity in both rehabilitation and providing a sense of community for the patients. 31 people have attended 485 online sessions over a 28-week period. Between March 2019 and May 2021, there were more than 120 referrals to the programme (including a 6 month hiatus in recruitment due to the pandemic).

The project has provided societal benefits, enabling positive health outcomes combined with community benefits for those who have suffered a stroke.

University of Winchester: Broadly Engaging with Tranquillity Easy and Refined (BETER)

The foundations for the Broadly Engaging with Tranquillity Easy and Refined (BETER) project lay in an earlier ESRC bid, which funded automated tranquillity modelling in a Geographical Information System. HEIF supported a collaborative research and knowledge exchange project to design, test and validate a spatial planning tool in QGIS (open access software).

The project addressed the Ideas chapter of the Industrial Strategy, developing artificial intelligence and data to contribute to regional development – notably tourism – and support wellbeing. HEIF was used to facilitate the meetings of a wide range of partners and develop the software.

BETER was initially used by local authority planners and managers of protected landscapes to produce tranquillity maps for their areas. It now has a network of 65 academic and professional members, e.g.: landscape planners and environmental managers including the World Commission on Protected Areas; community workers and charitable agencies including Stepping into Nature; public health officials including Public Health England; and community representatives. The team has progressed 24 projects, and refined a programme focused on landscape qualities, including tranquillity, and their effects on people's health and wellbeing. Outcomes include:

Enhancing implementation of national planning and land management policies

- **providing evidence** for locating tourism management activities in protected landscapes i.e. Howardian Hills AONB, activities in combatting littering, noise and light pollution; South Devon AONB(SDAONB) increased capacity in designing practical interventions to identify and maintain tranquillity and manage visitor pressure in sensitive areas, especially coastal; Dorset AONB's(DAONB) design of leisure management activities, enhancing public access to nature, and informing decisions taken on options assessments for new off-road cycling routes;
- **providing data** needed to inform tranquillity as a key indicator of environmental strategies (Dorset's State of the Environment Report 2018);
- **informing authorities' implementation of national planning policy** e.g. SDAONB and DAONB's Management Plans 2019-2024; SDAONB's, Landscape and Seascape Character Assessments, their implementation and monitoring of targets set in Defra's Environmental Land Management scheme, 'Test & Trials' (2020).

Enhancing professional practice, increasing capacity

- DAONB: findings have enhanced staff induction, performance reviews and personal development processes, by embedding public value of tranquillity, and informing advisory responses on development control applications i.e. solar renewables.
- Dorset-wide: the focus on experiential and perceptual landscape qualities to enhance public wellbeing, contributing to 'healthy aging', has created a network of representatives from public and charitable sectors, resulting in:
 - the award-winning Stepping into Nature (SiN) project, facilitating older people's contact with nature, particularly those with dementia and their carers. It has:
 - attracted £706,144 from National Lottery Community Funds, providing 2,646 nature-based activities for 827 people;
 - identified and enhanced 18 greenspaces for older people's access, through access improvements;

- o resulted in over 9,000 people engaging in 60 events, and in 'Picnic in the Parks', promoting people's access to nature in urban greenspaces, (attracting ca.1,200 people each year);
- o provided training to 214 front-line staff and volunteers, increasing understanding/awareness of dementia.

The project offered societal benefits, with increases in wellbeing related to greenspaces, combined with economic benefits for the tourist industry, enabling enhanced planning and access improvements.

Solent University: Implementation of ship hybridisation - saving energy and decarbonising coastal ships and other small commercial vessels

Brief description of activity

Inland waterways are one of the oldest transportation infrastructures in the world. Whilst significant contributors to economic growth, most of the existing inland vessel fleet consume fossil fuels, resulting in emissions of greenhouse gases and a range of other harmful pollutants. However, vessel operators face a range of obstacles including: long lifetimes of vessels where retrofitting can be a challenge; limited precedence in alternative propulsion technologies; limited fuelling infrastructures; lack of regulation and certification; and the market control of fossil fuels.

The 'Implementation of Ship Hybridisation (ISHY)' project is a collaboration of 15 partners, including TU Delft, Lloyds Register, and the Port of Ostend supporting vessel operators, ports, and the wider maritime industry to develop the knowledge and understanding of low carbon vessels. Funded under the EU Interreg Two Seas programme, with a total value of €15.9m and Solent awarded an income of £162,250, the project is developing multiple demonstrations of low carbon propulsion technology to move away from our reliance on fossil fuels. Researchers at Solent are leading the second work package of the project, assessing the requirements of effectiveness of alternative propulsion systems; as well as supporting partners with assessments of environmental performance through expertise in Life Cycle Assessment.

Activity supported by HEIF

Internal RIKE, which is drawn from HEIF funding, was awarded in 2017/18 to support buyout of staff time for developing preliminary work and collaboration activities to prepare the application to Interreg Two Seas. This included significant network building activities, developing partnerships, and identifying effective baseline strategies through preliminary studies. The total spend from RIKE was around £5,000 which was critical to the success of the application.

Societal, economic or student benefit

The ISHY project is demonstrating the technological viability, economic feasibility, and environmental sustainability of hybrid battery-electric, and hydrogen power systems. It is also exploring the regulatory and certification conditions which must be met to enable widespread uptake of these technologies. The application of these novel solutions to two passenger vessels, a cargo vessel operating across the North Western European waterways system, and a wind farm Crew Transfer Vessel (CTV) provide demonstrations, as well as a direct reduction in atmospheric emissions of greenhouse gases and other harmful pollutants. Thereby, supporting wider society to improve wellbeing and assist the industry and Government to meet climate targets.

Supporting a government priority area and RE-UKRI and OfS strategic objective

The outcomes of the ISHY project have direct implications to support the government priority areas of growth and innovation in 'UK government Build Back Better: our plan for growth'; and of the 'Maritime 2050 strategy'. The project is delivering tools and demonstrations of technology to support the objectives and technologies for the reduction of greenhouse gas emissions by the UK's maritime sector, through the use of alternative fuel systems as set out in the 'Clean Maritime Plan' and to support the UK transition to net zero by 2050.

Solent University: Enhancing and automating non-destructive testing techniques for railway wheel-sets

Brief description of activity

The inspection and maintenance of rail wheelsets is a time-consuming and highly labour-intensive task. Building on the success of two previous projects supported through internal HEIF awards, the “Non-destructive railway wheel testing” project received £52,875 from the Railway Safety and Standards Board for the period between Mar 2016 and Mar 2017. The project explored the feasibility of creating and implementing a range of contactless technologies, including ultrasound, laser and other current and future sensor technologies for non-destructive testing of wheelsets. The project successfully investigated defect types and sensor technology to develop a prototype demonstration of how these technologies could be used to deliver a non-destructive testing (NDT) system for quick and efficient detection of wheelset defects.

Activity supported by HEIF

HEIF provided support for staff time and equipment through two seed funded RIKE projects underpinning the NDT wheelset work – “Wireless & Distributed Sensor Enhancement (WIDENSENSE)” which was awarded in Oct 2014 for an amount of £14,340; and “Enabling widespread electronic corrosion monitoring in marine off-shore installations”, which was awarded in Oct 2015 for an amount of £8,833. The first of these projects sought to research existing technologies for low-power consumption, wireless, easy to use, robust, small scale-factor and low-cost sensor technologies for use in industry and at home. Two sample prototypes sensor devices were built and tested based on Atmel’s ATtiny integrated micro-controllers. The latter investigated and experimentally analysed new ways of corrosion sensing and monitoring using novel electronic and microprocessor technologies.

Societal, economic or student benefit

Development of an NDT process for wheelset inspection led to a successful patent application for the combination of data from multi-sensor technologies to detect material faults. Replacing the traditional method of manually measuring the many wheelsets of a train with this new approach in combination with a robotic arm mount, will lead to an increase in testing efficiency, quality, and safety thus promoting economic and societal benefits. The seed-funded projects supported curriculum updates based on results of the work to incorporate findings and enable students experience modern technologies. Following the two successful RIKE projects, the University invested £~35k into the same type of bench prototyping and measurement devices for the electronics laboratory use as well as a range of modern micro-controller platforms and sensor kits to train students on.

Supporting a government priority area and RE-UKRI and OfS strategic objective

Outcomes of the work have direct implications for society and tackle important government priority areas in growth and innovation, and rail, under the ‘UK government Build Back Better: our plan for growth’ policies. The technologies present opportunities to deliver improvements in safety and to reduce the time taken for complex wheelset inspections, providing better value for money enabling inspections to be conducted more effectively. Students benefit from cutting-edge technologies feeding back into the curriculum and contact with the industry thus gaining knowledge and skills for driving productivity in the economy.

University of Chichester: Business Hothouse Programme

The University has consistently invested in the provision of support to start-up growth for small businesses since receiving funds from SEEDA in 2010 to develop a Business incubation Centre to provide office facilities and associated mentoring services for start-up businesses in the region. Further funding from local authorities enabled us to deliver business start-up and 'hot house' programmes in the region. These, in part recognised gaps in the availability of support for businesses in the early stages of their development. Traditional support tends to be transactional when there was clear evidence for more sustained support over 12 to 18 months.

This experience was behind the University's January 2020 award of £5.5m Coast to Capital LEP's allocation of European Regional Development Funds (ERDF) for the delivery of a regional Business Hot House programme. The total project value is £11m with additional funds of £800K coming from the project's strategic partners: The Princes Trust, West Sussex County Council, Brighton and Hove City Council, and the Greater Brighton Economic Board. The University is leading the project alongside Sussex Innovation Centre, Eastbourne and District Enterprise Agency, Brighton and Hove City Council, WSX Enterprise, Princes Trust, and YTKO Ltd.

It is delivering support over 6 strands: Start up; Productivity and Growth; Innovation; Leadership and Management; Growth Grants; Access to Finance.

Although we only began to receive HEIF funds in 2019-20, KE staff posts and academic buy out assisted the University to complete a protracted set of commercial activities with partners and the managing authority, MHCLG necessary to bring this project to initiation.

Although not designed, the focus of the project is already having a significant positive impact in this transitory period out of Covid. It is providing individuals opportunities to develop new businesses and SMEs with the opportunity to invest and grow in new directions. To date the programme has worked with 433 potential entrepreneurs providing a total of 4435 hours of support. The University has delivered 24 business boot camps and a number of business planning workshops and digital marketing workshops.

502 registered businesses have accessed the Growth, Innovation and Access to Finance & Start-up initiatives receiving a total of 2500 hours of often one to one.

We have approved some £550k of grants with a project value of £1.4m.

The focus on supporting SME start up and growth within a region is core to government priorities for the Business Environment regarding people and place. As the project develops, specific activity is being designed to support student led business start up mapping to the OfS strategic objectives.

University of Chichester: Occupational Performance Research Group

The University of Chichester's Occupational Performance Research Group (OPRG) develops evidence-based solutions to enhance the health and performance of personnel working within physically demanding occupations. Applied multi-disciplinary research techniques are used to quantify the demands of a task, which are then used to inform evidenced-based solutions that can be implemented by organisations.

Research and commercial activity include the development and implementation of gender-free, role-related physical employment standards, the impact of nutrition on the recovery of muscle function, the application of mathematical models to estimate load carriage ability and application of wearable sensors to quantify physical training load. The OPRG, through competitive bidding has secured and successfully delivered contracts with a value in excess of £5M since 2015 to UK Armed Forces, Emergency Services and Industry. This funding has been secured through funding networks and direct contracting, primarily with the OPRG as the project lead, but also as a subcontractor to SMEs.

Formed in 2015, the OPRG is led by two academics, and currently employs 6 full-time researchers (5 Research Fellows (RFs) & 1 Research Assistant (RA)) and 2 PhD students through the university and funded by commercial income. Expertise is also drawn from academics and staff in the Institute of Sport (IOS). The OPRG has employed a total of 13 RFs and 6 RAs, many of whom have subsequently been employed with MOD research organisations, academia or moved themselves into PhD studentships.

Although UoC only began to receive HEIF funds in 2019-20, KE staff posts and academic buy out assisted the University to establish and grow the research and commercial activities with organisations and commercial frameworks such as the MOD (e.g. ASTRID), Dstl, National Ambulance Resilience Unit, Cervus Defence and Security Ltd and the Royal National Lifeboat Institution. These activities have been supported by KE staff posts and academic buyout including;

- Bid preparation and submission
- Contract and legal advisors reviewing funding networks applications and commercial non-network contract T&Cs and NDAs
- University Data Protection Officer reviewing data protection elements of MOD Research Ethics Committee applications prior to submission
- The employment of a Projects Support Administrator within the IOS
- Finance Department support for review, approval and management of finances

The OPRG is fully embedded in the IOS with its staff contributing to activities that have direct benefits to students such as:

- Delivery of Doctoral programmes of research in aligned areas
- Hosting Undergraduate and Postgraduate work placement students
- Contributions by RF staff to teaching and student recruitment
- Hosting and contributing local, national and international research events

The work conducted by the OPRG has significant societal and economic benefits, including:

- Development and implementation of new practices to improve the health and performance of personnel working in physically demanding occupations, including the Armed Forces, Emergency Services and Industry.

- Engagement with stakeholders in government departments to inform policy changes.
- Conducting research and innovation activity with SMEs leading to development of technology and skills and income generation.
- Undertaking International research collaborations resulting in the facilitation of knowledge exchange.

Edge Hill University: Productivity & Innovation Centre - supporting profitable growth through innovation

The Productivity & Innovation Centre (PIC) at Edge Hill University works with businesses in the North West in order to support business innovation, leading to new products, processes or business models in order to increase growth and profitability. Through its *Innovation Sprint* Programme, the PIC provides a systematic and evidence-based process through which businesses can address innovation opportunities or challenges. Business experts within the PIC work with businesses to capture information about each business and apply data science technologies to identify key insights and actionable knowledge to inform innovation decision-making and implement solutions.

The PIC is part-funded by the European Regional Development Fund. HEIF funding has been, and continues to be, a vital source of support for the PIC used both to support the cost of the development and set-up of the PIC and as match-funding to support its operation. This includes contributions to the cost of:

- Enabling academic expert involvement
- Business development experts
- Marketing, administration and compliance.

European Regional Development Fund (ERDF) support was originally secured for the Lancashire Local Economic Partnership area. Following its success in Lancashire, further ERDF support has now been secured to deliver PIC support in the Liverpool City Region.

The PIC enables Edge Hill University to develop collaborative relationships with local companies and links to wider University student employability and knowledge exchange work can take a range of forms including:

- Curricular activities intended to promote student employability
- Extra-curricular activities intended to promote student employability
- Placements
- KTPs

By supporting business innovation in the Lancashire and Liverpool City Region areas the PIC contributes directly to a number of government priorities and Research England/ UKRI objectives, including:

- Increasing rates of productivity in businesses and in regional economies, contributing towards the People and Place themes of the Industrial Strategy.
- Levelling up (increasing rates of economic growth in the north of England).

St Mary's University: Man with a Pan, in partnership with Age UK

St Mary's has worked with AgeUK Richmond to provide local retirees with a range of learning and training activities, delivered on campus and at The Exchange community venue. Activities have encouraged retirees to connect socially and intellectually with other participants and the University. AgeUK Richmond have been vital to the success of these events: their insight into the local retired community has shaped the activities offered and their event referral and signposting has resulted in excellent uptake.

The programme of activities began delivery in March 2016 and has three strands:

- 'Man with a Pan': On-going training sessions providing a combination of nutritional information and practical sessions for retired men who have no food or cooking knowledge. Sessions are delivered on campus in the Nutrition kitchens, with content designed by university Nutritionists and delivered by staff and Nutrition students, thereby giving students opportunities to work with 'clients'. Participants have fed back positively, reporting increased confidence in cooking for themselves. Another reported benefit is the opportunity for peer group social-interaction, with one participant commenting *"It's been great for meeting men of my own age as we're a bit thin on the ground!"*
- Exercise Referral: Group exercise sessions, designed specifically for older people, provided for AgeUK Richmond clients, between 2018 and 2019. Sessions were delivered on campus, in a dedicated gym and designed by Exercise and Health academics. Delivery was via qualified St Mary's alumni.
- St Mary's University and AgeUK Richmond Lecture Series: On-going series of free lectures, designed to provide stimulating content about contemporary topics, delivered at The Exchange. Live presentations have covered 3D-Printing and Artificial Intelligence and were followed by discussion groups. During recent lockdowns, we have delivered two workshop sessions over Zoom on 'How DNA and Ageing affects Food Choices' and 'Beatle Fandom'.

HEIF funding has been used in several ways: purchasing equipment for the 'Man with a Pan' sessions; buyout of academic time for programme content design across the range of programmes; as well as KE staff time planning and co-ordinating activities internally and liaising with AgeUK Richmond.

The opportunities we provide for learning new skills, learning about contemporary topics and gaining health benefits through safe exercise and healthy eating, enables retirees to remain engaged, interested and connected to our local community and the wider world. Additionally, the activities provide a socialising 'space' that benefits everyone involved – enriching students' learning, generating research ideas for academics and alleviating isolation for some retirees.

Our programme of activities has been guided by the 'Ageing Population' Grand Challenge, as set out in the government's Industrial Strategy: to 'ensure that people can enjoy at least five extra healthy, independent years of life by 2035'. Retirees need intellectual and social engagement to stay healthy and fulfilled; the activities we deliver encompass all these requirements and we aim to build on existing success, with new activities introduced over the next three years.