



University of Limerick
Sustainability Report 2020



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Introduction

“True education is a kind of never-ending story – a matter of continual beginnings, of habitual fresh starts, of persistent newness.” J.R.R. Tolkien

The rapid pace of societal growth has caused us to exceed many of Earth’s planetary boundaries. We are now living in a deficit – consuming resources at a rate at which they cannot be replenished.

By prioritising economic growth, we have disregarded the needs of the natural world. In the process, we have also created unprecedented rates of inequality and social injustice. The impact of this on the well-being of people and the planet is now evident. The defining challenge of the 21st century will be to balance social progress with these environmental boundaries: to learn how all life on Earth can flourish as one.

The more we learn about the challenges of our time, the more we come to understand that they are systemic. They are interconnected and related in ways that can seem invisible to us. Action is being taken around the world to address these systemic challenges; for many, it has led to the realisation that we must reconsider the very fundamentals of society that we have taken for granted.

While many transformative innovations will be required to overcome these systemic challenges, our first step must be to restore our relationship with the natural world and heal the divisions that pervade our society. We are all part of the web of life, and until this understanding is instilled within the core of our institutions, we will continue down our current path towards ecological and social decline. UL has always been committed to enabling our students to become engaged and socially responsible citizens – individuals who can create positive impact both within the region and internationally. We are now building on this commitment by wholly aligning ourselves to the UN Sustainable Development Goals (SDGs).

This commitment brings with it two central responsibilities:

- 1 To provide the space and mentorship for our students to develop into citizens who act as stewards of sustainability, both in their personal and professional lives
- 2 To fulfil our role as custodians of social and environmental responsibility by leading through example within our grounds and communities

To deliver on these responsibilities, I promise to ensure that sustainable development lies at the heart of everything UL strives to become. From today onwards, sustainability should be evident across all aspects of our campus. It should be an integral part of our ethos, our governance and our leadership. It should guide our research and shape our students' experiences. It should exist at the core of our partnerships and collaborations. Most importantly, it should become an integral part of our home and community life – allowing us to lead the way and inspire the next generation of leaders to come.

Ambitious goals such as these cannot be achieved in isolation; they are too grand for any single individual, team or discipline to tackle alone. Instead, they require a commitment to fostering meaningful collaboration so we can envision the world we wish to create and spark the desire to act in solidarity for the good of all life on Earth.

This is our opportunity to take bold action – to have the courage to explore the unknown and pioneer a better path forward.

I invite you to join me in making this our story; the story of how UL became a leader within the transformation towards an equitable and sustainable society: a world where people and planet thrive together.



A handwritten signature in blue ink that reads "Kerstin Mey". The signature is fluid and cursive, with a long, sweeping underline that extends to the right.

Professor Kerstin Mey
President
University of Limerick

UL's Sustainable Development Goals (SDGs) Working Group

Actively driving commitment and action towards a more sustainable university, society and planet

In partnership with its regional partners, University of Limerick is committed to developing and implementing an integrated approach to sustainable development with the aim of empowering its students, graduates and staff to become active citizens who contribute to the well-being and future of our planet.

Our Purpose

With the active support of UL's Executive Committee, a newly appointed Sustainable Development Goals (SDGs) Working Group was established to bring together expertise from multiple disciplines and functional areas across UL and beyond. The group's aim is to guide UL in actively working towards achieving the United Nations SDGs and ultimately the journey towards becoming a sustainable university. The first task of the group is to craft a holistic strategy for January 2022 centred around a series of ambitious missions with clear and measurable targets. This strategy will map out an agile path forward and enable the UL community to make active and transparent progress towards achieving the SDGs.

The Working Group

The working group is currently engaging in a series of online participatory design 'workathons'. These sessions are designed to collectively identify and craft a 'sustainable university strategy' across four key areas: 1) Learning, Research and Students, 2) Leadership, Governance and Staff, 3) Campus Community and Operations and 4) Partnership, Society and Engagement.

The SDGs Working Group is committed to the principles of the UN SDGs:

- 1 Pioneering educational experiences for our students to acquire the knowledge, skills and attitudes needed to promote sustainable development.
- 2 Undertaking research that provides insights and potential solutions to the SDGs.
- 3 Contributing to the achievement of the SDGs by ensuring that our campus is environmentally sustainable and socially inclusive.
- 4 Shaping our interactions with external stakeholders to support the implementation of the SDGs across our region and beyond.
- 5 Reporting on our activities in support of the SDGs.



The establishment of this group has been successful in identifying UL colleagues who are informed, caring and passionate with respect to UL becoming a sustainable university. The range and complement of multiple disciplines and functional areas represented across the working group membership leads to the identification of essential principles, characteristics and practices that UL needs to embrace if it is to become a nationally and internationally renowned sustainable university.

Professor Ann MacPhail, Physical Education and Sport Sciences
(Chair SDGs Working Group)



Building advocacy and giving voice to our campus community

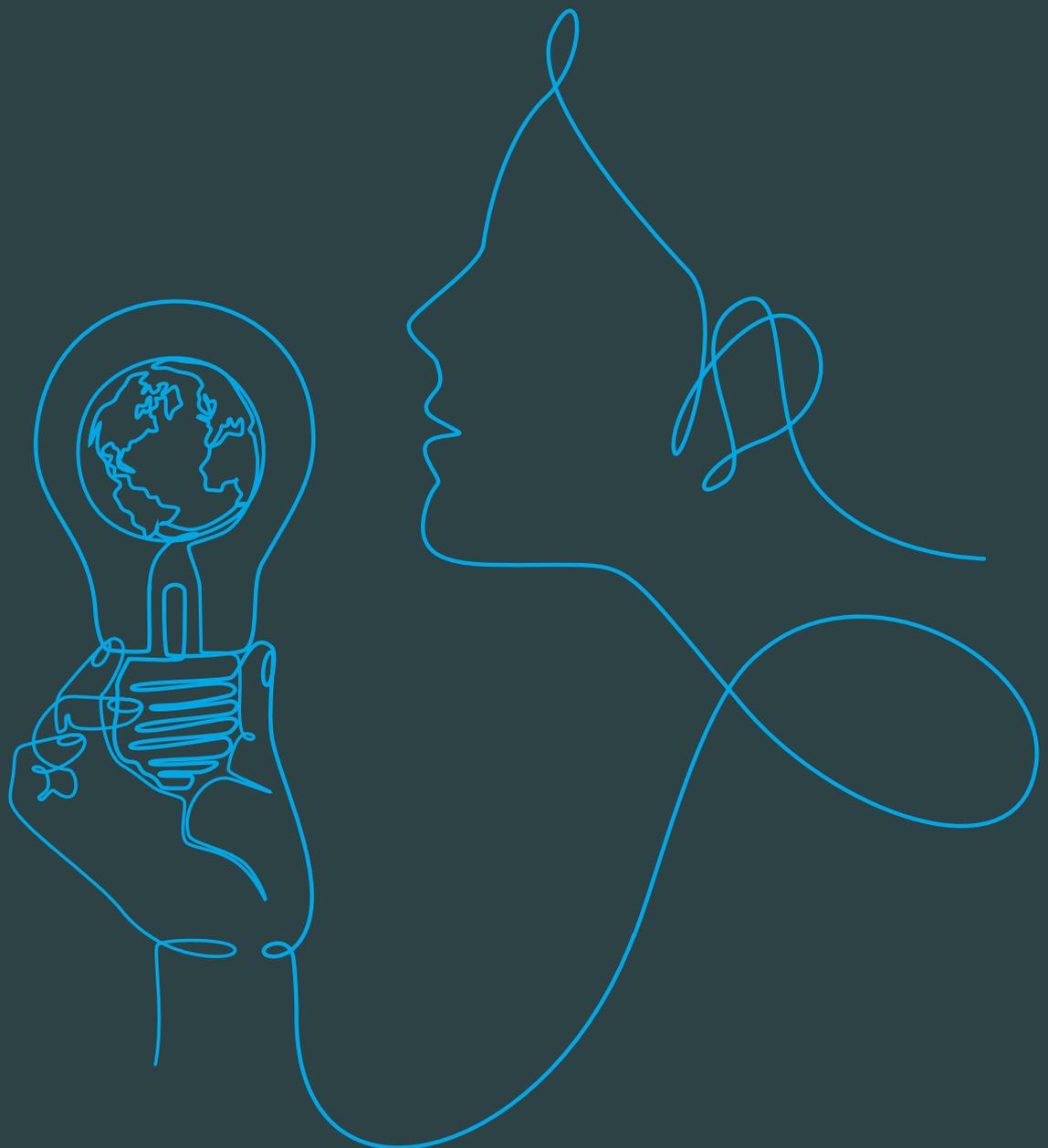
This report features the voices of a diverse group of sustainability advocates from across all walks of life on campus. Each voice adds to the growing momentum towards becoming a sustainable university.

Showcasing our students' sustainability projects

Through the 'Student Showcase' segments, this report features some of the work our students are doing to contribute to achieving the SDGs and building increased awareness among the student community.



We must reconsider
the very fundamentals
of society that we have
taken for granted.



End poverty in all its forms everywhere.

1 NO
POVERTY



Enactus UL awarded European funding to integrate refugees and asylum seekers

University of Limerick's Enactus communities project 'ReStart' has been awarded European funding to help integrate refugees and asylum seekers to the local community through a portfolio of different initiatives. Enactus is a national organisation that aims to tackle today's challenges while creating the leaders of tomorrow. Its mission is to empower third-level students to become the socially conscious leaders of tomorrow and to enact positive social change using social entrepreneurial business models.

Enactus UL is a diverse community of students, staff and business representatives working together to deal with different social issues by using entrepreneurial and business ideas. Representing UL within the Enactus Ireland network since 2012, Enactus UL aims to make projects sustainable, constantly sticking to the triple bottom line of People, Planet, Profit.

The 'ReStart' initiative aims to integrate international protection applicants to the local community through a portfolio of different initiatives. Examples include 'ReStart Cooking', which involves cooking traditional dishes from international protection applicant home countries and selling them at a stall in the weekly Tuesday market in UL, and 'ReStart Gardening', which enables international protection applicants to enhance their agricultural skills and integrate with the local community.

'Anytime of the Month' aims to alleviate the effects of period poverty

'Anytime of the Month' is a student-led social enterprise that aims to alleviate the effects of period poverty by creating a network of friendly strangers.

The project was founded by Clodagh Guerin, a student at University of Limerick, who is passionate about ending period poverty for sanctuary students on her university campus. Upon researching period poverty in Ireland, Clodagh realised it was a much larger problem, and impacted many more people, not just minorities. In fact, it impacts the lives of one in two teenagers in Ireland. By advocating for free sanitary products for students, Clodagh brought about real change on the UL campus, with the Student Life building now supplying free sanitary products in all bathrooms.

In early 2020, the project joined Enactus UL to grow and to make even more positive changes. Together with a passionate team, the project transformed the campaign into a viable sustainable social enterprise. The team carried out a primary needs assessment to research the extent of period poverty in our local community, with 33% of those surveyed finding it difficult to pay for sanitary products. A massive 75% of people surveyed reported wearing a sanitary product for longer than the recommended four hours because they had a shortage of money or did not have access to the products. Those surveyed did not even realise they were experiencing period poverty, and the team believes this needs to end.

Launched in 2019, the 'Anytime of the Month' website enables people to become an ambassador or learn more about the project's educational programmes for workplaces, schools and third-level institutions. According to Clodagh Guerin, "Anytime of the Month is the culmination of months of hard work and dedication from an amazing team. Lockdown for many meant that work stopped, but the 'Anytime of the Month' team worked tirelessly to get the website up and running, to run workshops, to design a new educational programme for second-level schools and to make sure that we reached as many people as possible! Our partnerships with corporates and bodies such as Aoife McNamara, Piquant Media, the Irish Women Lawyers Association, the Labour Party and eBay raise both awareness and funds to help end period poverty in Ireland. Our donation partnerships with Doras Luimnigh and Thomond Homeless Shelter mean that the profit we generate goes straight to the people that need it most. We do this by providing environmentally friendly period products to homeless shelters and direct provision centres. We cannot wait to welcome more people into the network of friendly strangers as this project grows!"

Executive Leadership Programme: Limerick City and County

The Executive Leadership Programme was designed and delivered by staff from the Research Evidence into Policy, Programmes and Practice (REPPP) project, which is a strategic research partnership between the Department of Children, Equality, Disability, Integration and Youth and the UL School of Law. The programme attracts people with responsibility for addressing complex problems. While the causes of such problems are structural and rooted in poverty, inequality and deprivation, they also involve difficulties

or limitations with services or facilities and feature people whose behaviour causes difficulties to themselves and others.

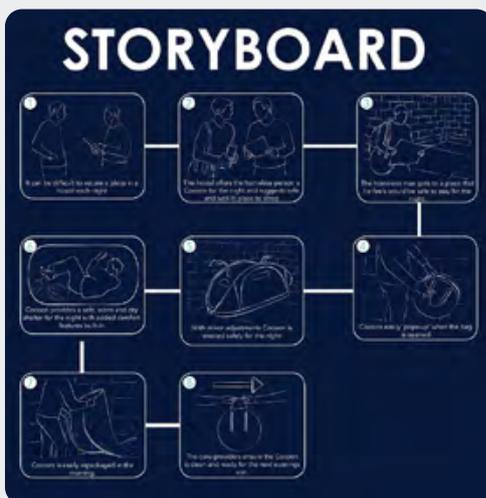
The Limerick programme took place over three overnight blocks between September 2019 and January 2020 and brought together 26 people from the community, voluntary and statutory sector

throughout Limerick city and county. Programme participants were a mix of frontline and management level from across the spectrum of statutory and voluntary agencies. The programme involved a collaboration between the REPPP team and the Limerick Children and Young People's Services Committee (CYPSC).

Student Showcase

Cocoon: An inventive homeless shelter (Sean Redington)

Cocoon is a pop-up shelter that enables homeless people to feel safe and comfortable when sleeping on the streets at night. It aims to deter people from potentially harassing the user while offering the user ways to protect themselves in the event of an attack. To reduce the likelihood of it being stole, the Cocoon shelter is returned after each use to the homeless shelter so that it can be inspected and cleaned. It is made from low-cost but durable materials so that it can be easily purchased and distributed by charitable organisations throughout Ireland.



Giving Voice

“Anytime of the Month’ proves that even the smallest actions, such as wearing a badge or educating yourself on an issue like period poverty, can have amazing results and deep impact. It is incredibly important to take action to end poverty both on these micro, everyday levels and on a bigger scale, such as working on national policy.”

Clodagh Guerin, student and founder of ‘Anytime of the Month’, BA in English and History, currently studying MA in English, UL

End hunger,
achieve food security
and improved nutrition
and promote sustainable
agriculture.

2 ZERO
HUNGER



Food production with zero carbon emissions

A UL-led research team has designed a self-contained greenhouse that provides its own water, which could have a major impact on global food production. The C-MINUS project brings together partners from industry and academia to address a new disruptive approach to farming – self-contained greenhouses that provide their own water and CO₂ powered by sunlight.

“Not only could C-MINUS technology enable decentralised food production, it will do so with a negative carbon footprint,” according to project lead Professor Michael Zaworotko, Bernal Chair of Crystal Engineering and Science Foundation Ireland (SFI) Research Professor at UL’s Department of Chemical Sciences. “Our goal is to grow food anywhere in the world, at any time, regardless of the environmental conditions – in a self-contained greenhouse, where there is no need for electricity, water or sunlight,” he added.

C-MINUS is a UL–National University of Ireland, Galway project in partnership with Molecule RnD, a UL-based international think-tank, research group and incubator fund. The project has just successfully progressed to the seed phase of the SFI Future Innovator Prizes as part of the Zero Emissions Challenge announced by Heather Humphreys TD, Minister for Business, Enterprise and Innovation.

Bernal study finds that food preservatives show potential for development into the next generation of antibiotics

Antimicrobial peptides, commonly used today as food preservatives, show potential for being developed into the next generation of antibiotics, where traditional antibiotics have become ineffectual. This study introduces a highly tailorable injectable hydrogel that could protect and deliver these food preservatives to a site of infection, such as a surgical site, topical wound or internal infection. The published study was added to the Top 50 Authors of 2020 in the Journal of Materials Chemistry B.

The paper’s lead author, Dr James Flynn, explains: “The incorporation of glycol chitosan (GC) into an injectable polysaccharide hydrogel allows the swelling and stiffness of the gel to be modulated without sacrificing ideal conditions for an encapsulated antimicrobial peptide (AMP). In other investigations, the strength of hydrogels has been modulated through means of varying salt concentrations within the gel, however this would render the gels unsuitable for peptides and other biologics. By introducing GC into these gels, the mechanical strength of the gels was increased through varying GC concentrations and reducing the degree of covalent bonding in the gels formed. The incorporation of GC does not affect the cytotoxicity and was also found to act synergistically with nisin in the inhibition of the growth of *Staphylococcus aureus*, a problematic pathogen. This study introduces a highly tuneable platform for the encapsulation and subsequent release of the AMP nisin for at least 10 days. Further development and in vivo testing will help define, develop and utilise this system for a range of different clinical applications, such as anti-biofilm coatings, coating for medical devices, controlled release delivery depots for infection control and prevention and other AMPs.”

First ‘social grocery’ in Munster to open in Limerick in fight against food poverty

An initiative offering food at reduced prices for those experiencing food poverty is being developed by Midwest Simon, a homeless charity in Limerick city. UL academics came to the aid of Midwest Simon by carrying out a feasibility study on bringing the ‘social grocery’ concept to the city. The charity says it will open a social grocery in the next year, offering people in food poverty the chance to buy food at a heavily subsidised price. The venture, which will be the first to open in Munster, will offer subsidised or free food to those in need and act as a “one-stop shop” by linking in with other social services. In other jurisdictions, the initiative has been shown to reduce stigma for people in food poverty while also giving them greater ownership over what they can eat. Midwest Simon opened a foodbank in 2014 and has seen demand for food grow since the start of the COVID-19 pandemic, with around 9,000 people from across Limerick, Clare and North Tipperary availing of the facility so far this year.



Community roof garden

Roof garden brings together UL community to collectively learn about organic farming on campus

The UL Community Roof Garden was formed in 2012 by the Environmental Committee when a group of volunteers saw its potential as an informal learning space. Our concept was to create a relaxed atmosphere where students and staff could come to interact and discuss matters related to food and sustainability, with the gardening as an anchor point for a weekly gathering. A series of workshops was organised to establish the operating principles and to ensure the sustainability of the project itself.

We established the roof garden as a space for everyone and open to all, where people can come to learn and teach about gardening as well as a place for relaxation. No membership is required to participate, nor commitment implied by coming along. We aspired for it to be a model for urban farming and an inspiration for others. The actual gardening itself is led by experts, and the volunteers carry out the work in maintaining a variety of plants including vegetables, fruits and herbs. However, the produce that is generated is secondary to the social experience and the value of the conversations and sharing of opinions from people of different backgrounds and generations around the complex roles that food, eating, nutrition, nature and farming play in sustainable development.

Exploring the barriers to the uptake of sustainable agriculture using a speculative design approach (Liam Lennon)

Currently in Ireland, organic farming makes up just 1.6% of available land, the second lowest in Europe. The sustainability goals set by the EU for 2030 will mean that Ireland will have to reduce emission levels by 30% compared to 2005. Accounting for 33% of all emissions in Ireland, agriculture will have a significant role to play in meeting the targets set. One way this can be achieved is by farmers switching to more sustainable production methods, such as organic farming. Organic farming is a specific system of farming that aims to produce quality food in a manner beneficial to the environment and to wildlife. This project aims to explore the possible barriers to the low uptake of organic farming in Ireland and to look at how farmers can be encouraged to adopt more sustainable practices.



Through the process of Speculative Design, the app FarmCloud was created as a tool to facilitate discussions between various stakeholders involved in the issue. The app speculates on a future in which the farmer's emission levels are tracked through the app based on a calculation of their emission levels and sequestration levels. Farmers who stay within their emission quotas will be rewarded with discounts on farming products, and those violating their quotas will have their livestock automatically auctioned by the app to reduce their emission levels.

Through a series of workshops, a number of various stakeholders were recruited to participate in activities that encouraged discussion and debate. The discussions and objects produced were mapped and used to rapidly create prototypes to be further used as design probes.

Grow it Yourself (Michael Kelly)

Our graduates can have a significant impact on the SDGs. Kemmy Business School alumnus Michael Kelly has won numerous awards for the not-for-profit organisation Grow it Yourself (GIY), which he founded after graduating with a Business Studies degree. GIY aims to inspire people to grow their own food and give them the skills they need to do so successfully. GIY is passionate about the power of food growing experiences to set people on a journey to good health and an improved understanding of food and nutrition, which Michael refers to as 'food empathy'. GIY works with progressive partner corporations in the food sector and has aligned its ambition with the UN SDGs and the UN Decade of Action. Through their awareness programmes and support of community food projects in Ireland and overseas, they have set the target of inspiring over 100 million people around the world to grow some of their own food by 2030.





Giving Voice

“At the East Room, we take seasonal inspiration directly from our surroundings. Linking in with key local producers and suppliers, our product not only mirrors the region, but also contributes to sustainable food consumption. This is made possible by low food mileage and organic farming practices with minimal impact on the land.

“The magnificent verdancy of the University of Limerick’s parkland campus, visible from the restaurant, is a constant reminder to us of the natural world. It is a delicate world of seasonal balance that we have learned to work with. Much of our produce is grown organically on-site in the University of Limerick rooftop garden which helps to maintain biodiversity across this blooming campus.

“The future of sustainable fine dining is already beginning at the East Room and we look forward to sharing it with you.”

John Shine, Restaurant Manager, East Room Restaurant



Ensure healthy lives
and promote well-being
for all at all ages.

3 GOOD HEALTH
AND WELL-BEING



'A nation of couch potatoes?' Physical activity, sedentary behaviour and health in Ireland

UL researchers are working to address the epidemic of sedentary behaviour in Ireland. Effective national-level health guidelines and policy must be based on accurate information about how physical activity and sedentary behaviour contribute to health. Professor Alan Donnelly explains: "Low levels of physical activity are attributed to 6–10% of coronary heart disease, type 2 diabetes, breast and colon cancer and over 20% risk of Alzheimer's disease in Europe." Health and well-being are human rights that are put at risk by sedentary behaviours and lack of physical activity. In their research, Professor Donnelly and his colleagues Dr Ciarán MacDonncha, Dr Kieran Dowd and Dr Fiona Ling of the Department of Physical Education and Sport Sciences applied technology to accurately measure levels of physical activity and sedentary behaviour. The team related these findings to health indices and behavioural determinants. The research highlighted alarmingly high levels of sedentary behaviour among female teenagers in Ireland, with 79% of their total day or 19 hours spent lying or sitting down. According to Dr MacDonncha, "Our research has had a significant impact on national policy. National physical activity guidelines, a dedicated dissemination platform for these guidelines and a national physical activity plan comprise a sea change for promoting physical activity in Ireland. UL has made a significant contribution to these achievements."

UL's research is helping Ireland and Europe to identify the most effective strategies for combatting these ever-increasing threats to health and to promote health for citizens of all ages. The research was supported by the Health Research Board (HRB), the Irish Heart Foundation and the Health Service Executive (HSE).

€42m European digital health research project

University of Limerick is collaborating on a groundbreaking new €42 million European digital health research project to examine fatigue and sleep disturbances in neurodegenerative disorders and immune-mediated inflammatory diseases. UL Vice President of Research Professor Norelee Kennedy is project lead on IDEA-FAST – Identify Digital Endpoints

to Assess Fatigue, Sleep and Activities of daily living – a European research project focusing on the neurodegenerative disorders (NDD) Parkinson's disease and Huntington's disease and the immune-mediated inflammatory diseases (IMID) rheumatoid arthritis, systemic lupus erythematosus, primary Sjögren's syndrome and inflammatory bowel disease.

IDEA-FAST is co-funded by the EU (represented by the European Commission) and the European pharmaceutical industry (represented by EFPIA, the European Federation of Pharmaceutical Industries and Associations) under the Innovative Medicines Initiative Joint Undertaking (IMI JU) programme. It comprises 46 members from 14 different European countries, including pharmaceutical companies, academic and not-for-profit institutions, small- and medium-sized enterprises and patient organisations that fulfil complementary roles in achieving the agreed goals.

Bernal scientists join global biomaterials consortium

Scientists from 26 leading universities around the world joined forces to pioneer a new standard of testing biological materials such as skin, arteries and bone, from brain tissue to blood vessels. Known as C4Bio, the consortium aims to achieve consensus on the testing protocols for material characterisation of biological tissue, to disseminate the results to the regulatory bodies and to lead to the development of improved stents, catheters and novel medical devices.

Led by Dr John Mulvihill, Bernal Institute biomaterials researchers form one of the groups selected to join this international initiative. Other experts involved come from 26 universities including University of California, University of South Africa and Fudan University, China. The consortium will publish a white paper on biological tissue characterisation, which will break down barriers that hinder computer-based modelling (also known as in-silico methodologies).

While computer models and simulations are important tools for building medical devices and therapies, accurate input data on the strength and stiffness of biological tissues is required to build reliable models. While there are many scientific studies to characterise and examine the strength and stiffness of biological tissues, there is high variability in the reported parameters for how 'stiff' these tissues are.

Dr Mulvihill's work focuses on understanding traumatic brain injury (TBI); he characterises the tissues of the brain that can aid computer-based modelling to mimic concussive impacts and to view how a TBI can instantaneously deform our brains and lead to knock-on effects. Sixty-nine million individuals are estimated to suffer a TBI from all causes each year. Commenting on the C4Bio initiative, Dr Mulvihill said, "Standardising these test methods will lead to improved models to help us design and develop medical devices from biodegradable stents in our arteries to enhanced helmet design to improved robotic-led surgical procedures. C4Bio will drive forward in-silico medicine research by contributing to a key breakthrough in one of the most significant barriers to ubiquitous adoption of computational biological models." The Bernal Institute C4Bio partners are Professor Michael Walsh, Dr David Newport, Dr John Mulvihill and post-doctoral researcher Dr Darragh Walsh.

Department of Electronic and Computer Engineering spinout company successful in Disruptive Technologies Innovation Fund award

Dr Gabriel Leen, founder of UL spinout company Radisens Diagnostics, is a partner in one of 16 projects that have been awarded a total of €65m from the Irish Government's Disruptive Technologies Innovation Fund. Led by Radisens Diagnostics, the successful project, FerrTest, will develop a point-of-care iron stores/ferritin diagnostic, which is particularly relevant to at-risk blood donors, women and children. Ferritin is the principal storage protein for iron in tissues and is involved in its uptake, accumulation and release in cells. Current clinical measurement of ferritin is restricted to laboratory testing as no suitable quantitative point-of-care in vitro diagnostic solution exists. The FerrTest project aims to develop disruptive technologies and automated manufacturing processes for a quantitative point-of-care platform to measure ferritin.

New treatment to protect kidney function in diabetes

A clinical trial involving UL researchers has demonstrated the potential benefits of new drugs in protecting kidney function in diabetes. The new study has found that combining two treatments that lower uric acid concentrations in the blood reduces the leakage of albumin in the urine. The UL researchers believe that the discovery could help prevent kidney failure in diabetes patients. Working with investigators from the University of California and from AstraZeneca, researchers from the UL School of Medicine and University Hospital Limerick found that the combination of Verinurad and Febuxostat reduced albuminuria in the urine by 39.4% in patients with Type 2 diabetes after 12 weeks of treatment compared to placebo. "This is exciting news as the leaking of protein is the earliest clinical sign of kidney damage," said Professor Austin Stack, Foundation Chair of Medicine at UL's School of Medicine and Consultant Nephrologist at University Hospital Limerick, who was lead author of the study.

'Identical' survival rates for kidney dialysis patients using different forms of treatment

UL research has shown that life expectancy outcomes for two of the most common forms of kidney dialysis treatment are virtually identical. In the largest study of its kind, researchers from the UL School of Medicine compared the survival of patients with kidney failure that were treated with either peritoneal dialysis (PD) or haemodialysis (HD) at a dialysis centre, two of the most common forms of available treatments. The researchers found that the survival of new patients with kidney failure was similar irrespective of treatment type – PD or in-centre HD – and have recommended that this new knowledge be incorporated into policy documents to enable patients and their providers to make the best decisions on optimal treatments. "There has been huge debate on this issue, as they are very different treatments for kidney failure," said Professor Austin Stack of the School of Medicine. "Defining whether one treatment confers a survival advantage over another for patients who develop kidney failure is of the utmost importance."



Building resilience – revolutionising the way we treat back pain

UL researchers are revolutionising the understanding and treatment of back pain and other musculoskeletal conditions through an integrated approach that ranges from diagnosis and treatment to impacting public health policy. Dr Kieran O’Sullivan explains: “It’s all about treating the person, not just the bones or the muscles. Globally there are vast levels of misinformation around conditions like back pain, such as the idea that structures such as bones and discs can go out of place. Not only is this inaccurate but the fear it creates adds to disability. What is important is that we identify the impact pain has on people’s lives, understand their personal and unique barriers to recovery and empower them to regain control of their lives. There’s an opportunity here to embed real change which will have lasting impact on people’s lives.” Co-led with the HSE, the team of researchers established the first-of-its-kind national musculoskeletal triage initiative across 12 HSE hospitals, which reduced hospital waiting lists by 22,000 patients. Back pain accounts for 25% of GP visits in Ireland and is one of the costliest conditions to diagnose and treat. Professor Norelee Kennedy explains: “Each year, thousands of patients present in our hospitals with back pain and other musculoskeletal conditions, which, if not treated appropriately, will reoccur and put further strain on our healthcare system. Our ethos is to evaluate the person quickly and to give them the appropriate advice and treatment.”

UL study to examine mental health effects of ‘lockdown life’ during COVID-19 crisis

The COVID-19 coronavirus crisis and the resulting ‘lockdown life’ has led to major disruptions to the lives of young people and their families that could threaten their well-being. That is according to a team of UL experts who have launched a new study to explore how children, teenagers and their families are coping during the health crisis. Entitled ‘Co-SPACE (COVID-19 Supporting Parents, Adolescents and Children during Epidemics)’, the study will focus on those aged 4 to 18 years and their families. The researchers aim to track children and young people’s mental health throughout the COVID-19 crisis to identify what advice, support and help can protect their mental health. According to Dr Jennifer McMahon, Lecturer in Psychology of Education at UL, “Anecdotal reports suggest that many families and students are struggling with the restrictions imposed by COVID-19, and while general mental health supports are available, there is a distinct lack of information about what type of supports could be most effective in the context of COVID-19”.

UL projects among €5.5m COVID-19 research fund

Three UL projects are among those funded through the COVID-19 Rapid Response Research and Innovation Programme announced by Simon Harris TD, Minister for Further and Higher Education, Research, Innovation and Science. Minister Harris announced €5.5m in funding to 41 new projects under the SFI-led COVID-19 programme, which focuses on supporting projects that respond to the immediate and pressing needs of society arising from the pandemic. The UL projects are led by Dr James Sweeney, Mathematics and Statistics, who received €54,243; Dr Ahmad B. Albadarin, Chemical Sciences and the Bernal Institute, who received €255,731; and Dr Peter Davern, Chemical Sciences, who received €78,000. Minister Harris said that he was “pleased to announce a further investment of €5.5m in research and innovation related to COVID-19. It is clear this virus is with us for a significant period and yet we still have a lot to learn about it. Research, development and innovation will play a significant role in tackling the COVID-19 pandemic.” The three UL projects are described below.

A dashboard for policies to slow the spread of COVID-19

Lead researcher:

Dr James Sweeney, University of Limerick

To reduce the spread of the COVID-19 virus, we need to bring the transmission rate (the R number, or the number of people each infected person infects) to below 1. This is the aim of public health measure interventions and advice such as washing hands, social distancing and restricting the number of close contacts. An SFI-funded project will develop a dashboard of information and build a framework to help optimise decisions about public health policies, including their potential to reduce transmission in association with their likely economic cost. The results will help policymakers to make evidence-based decisions at national and regional levels in an attempt to balance the sometimes-conflicting aims of reducing disease transmission while facilitating economic activity.

Novel inhalable antiviral drugs to tackle COVID-19

Lead researcher:

Dr Ahmad B. Albadarin, University of Limerick

When you inhale medication for respiratory-related illnesses, it travels to the airways directly and can potentially be more efficient than if you take the medicine orally or by injection. However, to date, there are few inhalable drugs to counteract viruses, and none of them targets SARS-CoV-2, the virus that causes COVID-19. An SFI-funded project at UL aims to develop and optimise antiviral drugs so they can be inhaled. Researchers at UL’s Bernal Institute, Trinity College Dublin, Waterford Institute of Technology and Teva Pharmaceuticals will test how well the inhalable antiviral drugs target SARS-CoV-2 in the lab with the goal of developing inhalable versions of existing antiviral drugs for use in clinical trials against COVID-19.

Self-sufficiency in lysis buffer for Ireland

Lead researchers:

Dr Peter Davern and Dr Emmet O’Reilly, University of Limerick

Lysis buffer is a critical component in the COVID-19 testing process and will likely remain so for the foreseeable future. Ireland must compete on the open international market for stocks of lysis buffer, which are mainly limited due to the scarcity of guanidine thiocyanate, the key reagent in the buffer’s makeup. SFI is funding research at UL to validate the chemistry needed for the scalable preparation of guanidine from readily available raw materials and its subsequent conversion to guanidine thiocyanate for use in lysis buffer. The scalable process will be made available under licence to organisations in Ireland that can manufacture the buffer, thus securing Ireland’s supply.

UL scientists prepare essential COVID-19 testing solution

Scientists at UL have created a testing solution for COVID-19 amid worldwide shortages of the crucial materials. In response to the global shortage of reagents and extraction kits for COVID-19 testing, scientists at UL's Bernal Institute and departments of chemical and biological sciences joined forces with other research centres and institutes to source materials and prepare a testing solution, which had fallen short of supply. The lysis buffer solution, which is critical for RNA extraction, was validated at University Hospital Limerick, where it is now being used. Dr Edel Durack, Instrument Scientist at Bernal Bio Laboratories, and a team of technicians from UL's School of Natural Sciences prepared the solution, which is required to generate results from patient swabs. The solution can now be used for COVID-19 testing across Ireland. Pharmaceutical companies can now rapidly produce batches of the solution to help meet the demand for testing patients.

UL students hoping to 'make a difference' through contact tracing

UL students involved in contact tracing in the fight against COVID-19 have said that "the lists are long" but they are hoping to "make a difference". In partnership with the HSE, the university set up a UL Virtual Hub with over 50 senior health sciences students trained to engage in contact tracing. As well as providing health advice, the students – from medicine, allied health and nursing – made calls to inform people that they had tested positive during the height of the COVID-19 pandemic. The virtual contact tracing hub was managed by UL staff, who provided technical support and advice. Seventy staff from Revenue, who were trained in UL, are responsible for follow-up calls to identify contacts of the person who has tested positive. "I am incredibly proud of both staff and students, who have put in huge amounts of work in relation to training and setting up the virtual hub while continuing with their other work," said Professor Rachel Msetfi, Executive Dean, Faculty of Education and Health Sciences at UL, who is supporting the contact tracing scheme. "Contact tracing is an incredibly important part of reducing transmission rates. When someone tests positive, they receive phone calls to inform them that they are

positive and to provide advice on the steps they need to take in recognition that the person being called might be very upset and anxious as a result of this news," Professor Msetfi added.

100,000 face visors to fight COVID-19

A collaboration between UL and UL Hospitals Group led to the design and production of 100,000 face visors for HSE frontline staff at the beginning of the COVID-19 global crisis. The Rapid Innovation Unit at UL, which is supported by the UL-based SFI CONFIRM smart manufacturing research centre, funded 3D printing activity that works in collaboration with University Hospital Limerick and mobilised a team to innovate immediate solutions in response to the COVID-19 crisis. The unit has previous experience in rapid design and 3D printing of medical devices in response to clinical requests. Following a request from Professor Paul Burke, Chief Academic Officer at UL Hospitals Group and Vice Dean of Health Sciences at UL, academics and clinicians at the Rapid Innovation Unit worked to design and manufacture novel solutions where doctors had identified potential shortages of equipment should COVID-19 cases surge. In less than two weeks, the team designed solutions to three critical clinical challenges facing clinicians due to the pandemic. This included capacity to manufacture 100,000 face visors for HSE frontline staff, refine a shield concept to protect anaesthesiologists during patient intubation for ventilation and design adapters for respiratory technologies to undergo a clinical trial.

Science paper opens new research line for the development of drug materials

In October 2020, a new drug product that combines multiple anti-inflammatory steroids in a single crystalline and stable material was described in a paper published in IUCrJ Crystallography Journal. From a practical point of view, the paper shows the potential to make drugs that are more easily administered with fewer side effects. The paper was authored by Bernal Institute researchers Professor Vivek Verma, Dr Monica Lestari, Dr Kieran Lyons, Dr Luis Padrela, Professor Kevin M. Ryan and Dr Matteo Lusi. The research was funded by an SFI Starting Investigator Research Grant and Enterprise Ireland.

€5m in ERC funding for ‘cutting-edge, exploratory’ research

Two UL researchers have been successful in securing a combined €5m in European Research Council (ERC) advanced-grant funding. Professor Orla Muldoon and Professor Michael Zaworotko were awarded almost €2.5m each. The funding awards for UL are two of just four awarded to Ireland and are the first ERC advanced grants to be hosted at the university. “These are very significant funding awards for our researchers and for the university. The research speaks to the university’s research profile of excellent research with impact that addresses societal challenges,” said UL Vice President of Research Professor Norelee Kennedy. “Both Professor Muldoon and Professor Zaworotko lead high-calibre research groups and these awards will add further to the knowledge and understanding of these major challenges. We are delighted with the success of these applications,” added Professor Kennedy. Professor Muldoon’s project was recommended for funding because of its “ground-breaking potential as it bridges the relationship between social and political forces, clinical trauma and behavioural medicine.” “At its core, the project has a single aim – to develop a new social paradigm to understand the impact of extreme stress and trauma. The research will explore the foundations of differing responses to stress and trauma,” explained Professor Kennedy. The research proposes to examine how shared experience and the social relationships they generate impact on posttraumatic stress disorder (PTSD), cognitive functioning and biological responses to stress. According to Professor Kennedy, “In an important paradigm shift, this work will consider the idea of collective growth as a potential attribute of groups that may drive attitude change and collective political action in the wake of trauma.”

Healthy diet could reduce risk of severe COVID-19 infection

A group of UL researchers have established a clear connection between a healthy diet and fighting inflammation linked to COVID-19. In a wide-ranging review, the academics evaluated evidence that suggests that nutritional status and the role of diet and lifestyle are important in the outcomes of COVID-19 patients. Entitled ‘COVID-19: The Inflammation Link and the Role of Nutrition in Potential Mitigation’, the article has been published in the journal *Nutrients*.

The article was written by Dr Ioannis Zabetakis and Dr Alexandros Tsoupras of UL’s Department of Biological Sciences and Health Research Institute (HRI), Dr Catherine Norton of UL’s Department of Physical Education and Sport Sciences and HRI, and Dr Ronan Lordan of the Institute for Translational Medicine and Therapeutics, Perelman School of Medicine, University of Pennsylvania, who was awarded his PhD at UL.

Collaborative UL and UK study finds coronavirus-related children’s diseases linked to blood cell changes

Researchers from UL and the UK have found that analysis of a newly described disease occurring in children linked to COVID-19 could allow doctors to better predict the outcome of young patients with this disease and develop new treatments for it. Although children are less frequently affected by COVID-19 than adults, a new ‘hyperinflammatory syndrome’ in children associated with SARS-CoV-2 has emerged among some younger patients. Known as paediatric inflammatory multisystem syndrome, the new disease temporally associated with SARS-CoV-2 infection (PIMS-TS) shares many clinical features with a well-defined childhood illness known as Kawasaki disease, a leading cause of acquired heart disease in children caused by inflammation of the blood vessels. Experts in the study examined blood samples from children admitted to Birmingham Women and Children’s Hospital with both diseases during the UK’s coronavirus lockdown and discovered large changes in the monocytes (a type of white blood cell) in patients with PIMS-TS and Kawasaki’s disease.



SSPC delivers a Limerick Lab Box to schools for Science Week

In 2020, the UL-based Synthesis and Solid-State Pharmaceutical Centre (SSPC) introduced the Limerick Lab Box – Handwashing Edition, a learning aid kit containing equipment to conduct a variety of experiments around handwashing. The experiment kits were delivered to every second-level school in Limerick city and county. Each student had the opportunity to participate in multiple experiments, which enabled them to actively learn about ways in which to wash their hands while also comparing the effectiveness of different washing techniques and materials. Martin McHugh, SSPC Outreach Manager, said, “Although working from a distance is tough this year, we feel this initiative not only gives teachers a new and unique way of teaching but also empowers students to be responsible and informed citizens in light of bacteria, viruses and communal health and hopefully have a bit of fun.”

New sperm selection technology for use in assisted human reproduction

UL researchers have developed an exciting new technology for the selection of better-quality sperm for use in assisted human reproduction. With an

estimated one in six couples experiencing infertility problems, the microfluidics technology developed at UL could offer some hope to those seeking to start a family.

With the benefit of funding secured from Enterprise Ireland’s Commercialisation Fund, the new technology has led to the formation of UL spinout company NeoMimix, which has since been announced as a winner of the EIT Health Headstart competition for 2020. The prestigious competition supports the most innovative European start-ups to accelerate their market launch through a €40,000 cash prize. “Infertility problems have been driven by increasing maternal age as well as by the halving of sperm counts over the last 40 years,” said Dr Sean Fair, Reproductive Biologist and project lead at UL. “The most common fertility treatment couples undergo is in vitro fertilisation (IVF), and despite major advances in IVF over the last 40 years, two out of three cycles fail, resulting in financial and emotional pain for couples.” The research is a multidisciplinary collaboration between Dr Fair, Ms Karen Browne (Commercial Lead), Dr David Newport (Fluidics Engineer), Professor Leonard O’Sullivan and Dr Eoin White (Product Design) as well as with local fertility clinics.

Student Showcase

Co-Pi: Time management for those with cognitive disabilities and degenerative diseases (John Shanahan)

Co-Pi (Co-Pilot) is a time management and orientation system for those with cognitive disabilities and degenerative diseases. Co-designed alongside young adults with Down syndrome (DS), Co-Pi aims to enable increased independence and life skills development by externalising the cognitive load, comparable to a mental prosthesis. These issues are faced not only by individuals with DS but also by people struggling with Alzheimer’s, dementia and similar cognitive disabilities/diseases. Co-Pi’s mission is to facilitate guardians to assist the user in the development of their numeracy and life skills while giving them the opportunity to develop their independence, self-confidence and overall well-being. Over time, the system will allow users to experience higher levels of social inclusion, positive self-image and overall numeracy competency.



NebuPod: Sterilisation device for young people living with cystic fibrosis (Jessica Quinn)

NebuPod is a sterilisation device designed for people living with cystic fibrosis who require a nebuliser. The user-friendly design reduces the time and effort required to properly clean and sterilise the nebuliser and its accessories after each use. This reduces the risks of bacteria build-up and contamination, which can lead to a chest infection. The combination of ultrasonic cleaning and steam sterilisations allows for effective and discreet nebuliser sterilisation for all lifestyles. The aesthetic of the NebuPod is simple and modern to create a non-medical appearance that can be proudly placed in the user's home. It is compact and portable, which guarantees, with a push of a button, a safe nebuliser experience wherever the user may be.



Unwind: Haptic technologies to alleviate symptoms associated with multiple sclerosis (Declan O'Dwyer)

Unwind is a device that uses haptic technologies to alleviate symptoms associated with multiple sclerosis, such as tremors, muscle spasms and stress. The suite comprises 'the Pill', which is the main user interaction component, and 'The Dock', which is a dual function component that acts as both a wireless charger and holder. The Pill uses rhythmic vibrations to interrupt and distract the brain from the physical sensations of tremors caused by an error in the body's sensorimotor feedback loop. Unwind also uses haptic feedback to guide the user through a series of paced breathing steps, which allow the user to relax and regain composure when they become stressed. Finally, Unwind is designed to reduce the impact of muscle spasming and stiffness by using haptic technology that relaxes muscle tightness, improving blood flow as well as muscular functionality.



Giving Voice

"I believe we can all play a central role in supporting health. I have seen how small steps can lead to positive change for you, your families and loved ones. Here in UL, we are committed to supporting health and sustainability for all our students, staff, and wider community, 'its people,' its places and this planet."

Professor Catherine Woods, Chair, Physical Activity for Health;
Chair, Healthy UL; and Department of Physical Education and Sport Sciences

Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

4 QUALITY EDUCATION



University of Limerick wins Best Student Campus award for second year in a row

University of Limerick won the award for Best Student Campus in Ireland for the second year in a row. The university took home the prize at the 2020 Irish Education Awards, which recognise, encourage and celebrate excellence among third-level education providers across the island of Ireland. UL's international division, UL Global, won the award for Best Erasmus Programme for the third successive year at the Education Awards.

Understanding the impact of technology in education on student progression and learning outcomes Integrating technology into classrooms is a significant challenge facing education. The rapid move to online teaching perpetuated by the global pandemic brings into sharp focus the inequity of digital access, the impact of technology on students' abilities to learn and the lack of policy, guidance and quality pertaining to digital pedagogy. The digital divide continues to disadvantage students, and the potential impact on their progression is grave. Research undertaken by Dr Ann Marcus Quinn at UL has identified factors impacting student progression as well as highlighting the need for a national, evidence-based, blended learning policy. The impact of this research has been to inform technology adoption policy in Irish education. Teaching in a national context is important to our educational experience and cultural heritage. It is vital that quality resources are tailored to the needs of a country's learners. Part of this research explored digital resources for post-primary students and the resources' localisation. It found gaps in resourcing for important subjects.

UL secures 700 funded education places for upskilling as part of COVID-19 response

Funding for more than 700 education places has been approved for people looking to upskill or reskill at UL after the Government announced a national funding strategy through the Springboard+ 2020 and Human Capital Initiative (HCI) Pillar 1 programmes. Reacting to the Government's announcement of an additional €10m for training and upskilling in response to the COVID-19 pandemic, Professor Ann Ledwith, Dean of Graduate and Professional Studies at UL, said, "We are very excited about the funding that we have

been awarded. We will be able to deliver 23 new programmes to over 700 students with 477 of them starting in September."

The National Training Fund (NTF) Advisory Group has considered NTF's principles and priorities and the transformed economic and labour market landscape arising from COVID-19. These priorities were confirmed by the National Skills Council. Among the principles were:

1. The need for an immediate focus on providing relevant skills for those affected by the crisis with a view to underpinning their employability and access into sustainable and quality employment
2. The need for focused and agile programmes consistent with the current priorities for skills provision

FLEURIR – French language learning as part of the UL Academy for Children

UL's Access Office is developing an academy for Limerick primary-school children who are experiencing socio-economic disadvantage and has partnered with Our Lady Queen of Peace in Janesboro as a pilot school. The Access Academy offers a French language programme, co-designed with the school to meet its identified needs. The programme was delivered by UL's School of Modern Languages and Applied Linguistics. COVID-19 restrictions meant that the programme was delivered online accompanied by an activity workbook to support and track the children's learning. In addition to language learning, the children will also increase their cultural and language awareness and be exposed to the concept of global citizenship.

The objective is to foster closer collaboration and stronger links with communities and to enhance children's opportunities to access further education. Through a number of collaborative meetings with the school, one of the school's identified needs was a modern foreign language to assist the children in the crucial transition to second level. Following a series of discussions with parents and schoolteachers, French was chosen because it is the most taught foreign language in all the local second-level schools.

'Responsible' as a graduate attribute tracked in Kemmy Business School

The Kemmy Business School (KBS) has undertaken a comprehensive mapping of how the 'Responsible' UL graduate attribute is taught and assessed across the full suite of degree offerings at undergraduate and postgraduate levels. The 'Responsible' attribute has been embedded in the Assurance of Learning element of the School's AACSB (Association to Advance Collegiate Schools of Business) accreditation, which mainstreams the inclusion in all degree programmes of elements that overtly foster responsibility and responsible behaviour among the student body. As well as recording the modules in which responsibility is developed in the curriculum and classroom activities, the various ways in which the development of responsibility in students is assessed are examined to ensure that the attribute is being taught and tested. This exercise enables the KBS to locate points at which the students are developing the values of the UN Global Compact and learning to make more sustainable decisions and lead in a more responsible way.

New education programme for upskilling teachers

A new education programme for upskilling teachers will take place at UL. Minister for Education Norma Foley TD and Minister for Further and Higher Education, Research, Innovation and Science Simon Harris TD announced the launch of three new level 8 programmes for upskilling registered post-primary teachers. The announcement came on foot of a funding call from the Department of Education to the higher education institutions (HEIs) for proposals for upskilling programmes for post-primary teachers.

The new programmes will enable participants to meet curricular subject requirements, and, on graduation, participants will be able to register to teach the new subject at the highest level in post-primary education. "I am delighted to announce, with my colleague Minister Harris, the establishment of these innovative new upskilling programmes," said Minister Foley. "Our post-primary schools have highlighted teacher recruitment challenges in certain subject areas, including STEM and modern foreign languages. These programmes will support the supply of teachers to meet the needs of our schools and students over the coming years in three key subject areas, mathematics, physics and Spanish."

Educating for sustainability at second level

A UL team approached Castletroy College seeking a partner for the E-Mining@School project under the European EIT Raw Materials initiative in order to design and deliver an educational package aimed at raising awareness among students about critical raw materials in e-waste. This coincided with the ongoing unit planning in the area of sustainability within subject departments in the school. Therefore, it was an opportune time for teachers across several subject departments to come together and design a unit of work on sustainability with the support of UL researchers and experts. Teaching students about sustainability in their use of smartphones from the perspective of the different subject specifications would enable them to make meaningful and progressively more challenging connections between learning in different subjects.

Achieving the ambitious SDGs will require collaboration across sectors and disciplines at various levels. The UL programme provides an example of how educational institutions from different levels can work together to address the complex challenge of sustainable consumption and production under the UN SDG 12. Early findings suggest some significant and consistently incremental changes in the environmental orientation of second-level students in the desired direction. To gather more robust evidence, future research might focus on tracking the impact of the intervention on individual students.

A pioneering and enriching shared learning experience: the international structured PhD at UL

In January 2020, the first cohort of 134 PhD students from Algeria arrived in Limerick to take up their places on the International Structured PhD (ISPhD) programme at the Faculty of Arts, Humanities and Social Sciences. Their arrival in Ireland had been delayed due to the COVID-19 pandemic, which had also made it necessary to move the first year of this taught PhD programme to online delivery mode. This challenge was addressed by developing a comprehensive range of online systems and supports, which have been implemented by the ISPhD programme team led by Course Director Dr Angela Farrell with the support of Professor Helen Kelly-Holmes, former Executive Dean; Professor Mairead Moriarty, Assistant Dean International AHSS; current



ISPhD students (Rayene Larkeche, Oum Charrak, Randa Brachouche and Meriem Zine) with the Mayor of Limerick, Councillor Daniel Butler, and further members of the Limerick Irish Algerian Friendship Group (Professor Gisela Holfter, ISPhD Course Director Dr Angela Farrell, and Intercultural Advocate Michelle Daly) at a cultural event at the Milk Market in Limerick in 2021.

Executive Dean AHSS Professor Shane Kilcommins; and PhD supervisors, faculty and support staff across the university, including the UL Global team, the University of Limerick Language Centre and the Postgraduate Students' Union team led by PG President Andrea La Touche. The successful online transition of the ISPhD programme over the course of its first year is a testament to the commitment of all involved to this pioneering, flagship international programme and to each and every one of the students involved.

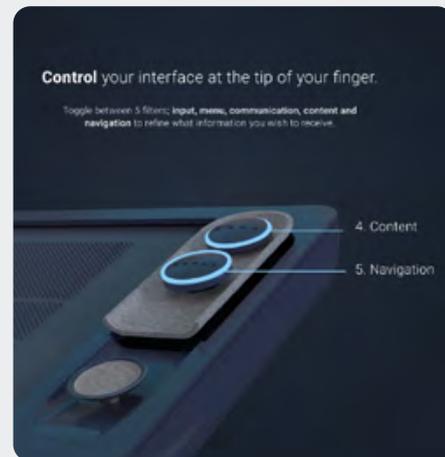
This experience has brought new and valuable learning experiences for the students, not least the opportunity to upskill technologically, gain access to cutting-edge online learning materials and resources, engage in disciplinary-specific modules and workshops and develop key transferable skills as well as more advanced general and academic English proficiency. The ISPhD students have embraced these new e-learning opportunities although the online transition has not been without its challenges. For instance, for some students, there were issues around the quality of the internet service in their home environment prior to their arrival in Ireland, and they all needed to become familiar with, and adapt to, the new institutional norms and practices within a relatively short space of time, which they have coped with admirably, supported by the ISPhD management team and the Postgraduate Students' Union.

The scale and scope of the ISPhD programme has created opportunities for innovation at the level of PhD research supervision. The supervision process began with an initial extensive mapping exercise followed by the implementation of a new supervision model involving multidisciplinary teams that helped guide the students as they developed their research proposals. From this, each of the 134 students was successfully matched with a supervisor/s, with more than 50 main, internal supervisors appointed, including UL President Kerstin Mey, as well as more than 20 joint supervisors from other faculties and universities. The successful progression of the entire ISPhD cohort to the research component of the programme in the second year was a significant accomplishment.

The pioneering approach to PhD supervision that has been adopted has brought valuable opportunities for interdisciplinary collaborations and networks to be created both within UL and with internationally acclaimed academics from universities in the UK, Germany, Poland and Algeria. In these ways, the ISPhD programme is strengthening and diversifying our research partnerships and links, raising our international profile and reputation, and enhancing the quality of international education at UL, thereby enabling us to advance our own UL@50 strategic goals around internationalisation and contribute towards achieving a key UN sustainable development goal (SDG 4).

Tixel: Computer interface for the blind or visually impaired (Emma McLoughlin)

Tixel is a physical computer interface for people who are blind or visually impaired. The objective of Tixel is to enable people to feel and hear an interface rather than just listening to it. This is achieved by converting a graphical 2-D interface into a 3-D tactile format. People who are blind or visually impaired will typically use a software application to comprehend the content of a screen. This is most commonly done through a speech output and is a linear, text-based experience. However, Tixel uses the sense of touch to provide users with a layout and an overview, which in turn creates a holistic, simpler, more accessible experience. Users can simply touch the pins to hear the content or double tap to interact with it. Tixel aims to accelerate the target user's ability to adapt to using a computer.



Giving Voice

“The sustainable university is about creating a better version of life on Earth. We can do this by educating ourselves, our students and the wider society to be citizens of the world. I believe in teaching, learning and producing knowledge, with an increased appreciation of the interconnectedness of all people and life. We have a duty to rediscover and promote a sense of ‘reverence for life’, the respect and sense of wonder towards all human beings, all that lives and the planet that is our collective home.

“My own expertise is in fighting social injustice and inequalities, in helping people see beyond prejudice and cultural differences, to find common humanity and work towards joint goals. Sustainability is much more than creating a world that respects the human rights of all its people, their equality of opportunities and diversity! It is about our active and collective responsibility to revisit our economies, politics and energy production and consumption. It is about reassessing our personal role in this large ecosystem and leading change for a better present and future. We want to create a better world for all: people and planet alike. To do this, we need to be collectively involved, as individuals and as a university, to develop a global mind-set, to have a holistic understanding of life, to promote awareness of the impact of each single action on the whole ecosystem. Be the ones who protect and promote life in all its forms, at multiple levels, in all its complexity and interdependence. Enhance and respect ‘life for all’ as the true miracle it is.”

Dr Anca Minescu, Assistant Dean International, Department of Psychology and Thematic Lead for Learning, Research and Students, SDGs Working Group

Achieve gender equality
and empower all women
and girls.

5 GENDER
EQUALITY



First ever woman president of an Irish university appointed at UL

On 1 September 2020, the first ever woman president of an Irish university was appointed at University of Limerick. Following an open competition, UL Chancellor Mary Harney confirmed the appointment of Professor Kerstin Mey as Interim President of University of Limerick. Professor Mey had held the position of Vice President Academic Affairs and Student Engagement at UL when she replaced outgoing president Dr Des Fitzgerald. The Interim President serves as Chief Officer of the university until a new president is appointed through an open international recruitment process.

The UL Governing Authority ratified the appointment of Professor Mey. Speaking at the time of the appointment, Chancellor Mary Harney said that Interim President Mey would be a “great appointee and one in whom we have every faith to lead the university at a challenging time. She has already demonstrated her capacity for leadership in her role as Vice President. There has long been a significant gender imbalance at the senior leadership level in Irish universities, and it is fitting that UL now has the first female President given our consistent leading position on gender equality in higher education in Ireland,” Ms Harney said. The senior leadership at UL is notable for its gender equality, with five out of eleven members of the Executive Committee being female. For the second time in its history, UL has a female chancellor, while two of UL’s three vice presidents and three of UL’s five deans are women.



UL Chemical Sciences receives Bronze Athena SWAN award

UL’s Department of Chemical Sciences (CS) has been awarded Bronze Athena SWAN status. Athena SWAN (Scientific Women’s Academic Network) recognises and celebrates good practice towards the advancement of gender equality: representation, progression and success for all. Established in 2005, it is a charter managed by the British Equality Challenge Unit. Athena SWAN was established to encourage and recognise commitment to advancing the careers of women in science, technology, engineering and mathematics (STEM) in higher education and research.

The Bronze award is in recognition of the commitment of the Department of CS to promoting gender equality and identifying and addressing gender-related challenges within the department. The department is committed to implementing a four-year action plan to promote an inclusive culture where all staff and students feel valued, welcome and integrated and have equal access to opportunities. Led by Chief Technical Officer Maria Munroe, the department’s Athena SWAN committee included a well-rounded group of representatives from all roles and career grades within CS.



Same-sex parenting and the best interests principle

Dr Lydia Bracken's monograph *Same-Sex Parenting and the Best Interests Principle* has been published with Cambridge University Press. The book presents arguments in favour of the legal recognition of gay and lesbian families that are based on consideration of the best interests of the child. In this context, 'best interests' is informed by reference to children's rights and to social science data. Applied in this manner, it is argued that the best interests of children can be used to demand that same-sex parenting arrangements are afforded legal recognition and protection. Suggestions are also presented as to the most appropriate manner of providing for this recognition in the areas of parental responsibility, adoption, donor-conception and surrogacy. These suggestions are drawn from comparative case studies, focusing on England and Wales, Ireland and South Africa, that are used to facilitate assessment of the best interests principle.

Strategies for supporting women in engineering in industry and academia

Dr Sinéad O'Keeffe recently took part in a panel discussion on "Strategies for Supporting Women in Engineering in Industry and Academia" as part of the Institute of Electrical and Electronic Engineers (IEEE) Sensors Council Gujarat Chapter Women in Sensors Week. Dr O'Keeffe was joined by researchers from industry and academia across the globe to discuss the current state of supports for women in engineering and strategies to improve gender balance in the field. Dr O'Keeffe is Chair of the IEEE Sensors Council Women in Sensors Committee and the Council's Committee on Diversity and Inclusion. In addition to introducing new policies within the Council to support and promote female participation in various Council activities, she secured funding of €10,000 from the IEEE Sensors Council to run several different Women in Sensors events globally in 2020 in conjunction with the Council's local chapters.

UL and TENI launch gender identity e-resource for schools

UL and the Transgender Equality Network of Ireland (TENI) have launched a new e-resource to help ensure that schools are more inclusive of young people who are trans and gender diverse. The resource arose from a two-year research project exploring the

experiences of trans and gender diverse youth in second-level schools in Ireland. The research was a collaboration between the School of Education at UL and TENI and was co-funded by the Irish Research Council (IRC) and Marie Skłodowska-Curie Actions as part of the Collaborative Research Fellowships for a Responsive and Innovative Europe (CAROLINE) programme.

The e-resource was designed to work in tandem with the school-based training and supports offered by TENI. Dr Aoife Neary, Lecturer in Sociology of Education at UL and principal investigator and academic mentor on the research project and e-resource development team, said: "We are very thankful to the CAROLINE programme for enabling the development of this e-resource. The research from which the e-resource arises confirms unequivocally that schools need supports in order to ensure that trans and gender diverse young people are included and feel like they belong at school. This is a comprehensive, proactive e-resource that responds to this need, providing an accessible, open-access platform through which teachers and school leaders can learn about gender identity and gender expression and support trans and gender diverse students."

Call It Out campaign

The Call it Out Campaign, run by the Transgender Equality Network Ireland and the Hate and Hostility Research Group (HHRG) at UL (now incorporated into the European Centre for the Study of Hate), was part of a 10-country project funded by the European Commission Rights, Equality and Citizenship Programme. The campaign in Ireland sought to challenge homophobia, biphobia and transphobia in society and consisted of a billboard and radio campaign as well as one on social media, including the production of a video. The video won the Video Campaign category award at the Social Media Awards (Socksies) in 2020. The campaign as a whole also won the Silver Award in the Best in Government and Not for Profit category at the 2020 Digital Media Awards. At the LGBT+ Awards (the GALAS) on 8 February, the HHRG and Call it Out were shortlisted for two awards: Best Event and Digital Changemaker.

The campaign resulted in 40 media items with a reach of 1 million, 1 million video views and 5 million impressions. For details of the campaign, please contact Professor Amanda Haynes and Dr Jennifer Schweppe.



Giving Voice

“Goal 5 of the 17 sustainability goals is to achieve gender equality and empowerment for all women and girls. As set out in the SDGs, women’s equal participation in decision-making is crucial if we are to achieve gender equality by 2030 in the world – a target that is quite unattainable if we continue as we have always done. Leadership is key to driving institutional change, and thankfully in UL our human rights/EDI agenda is driven from the top.

“We are committed to building and maintaining an inclusive environment that promotes equality, values and diversity and respects the rights and dignity of our staff and students. We embrace equality, diversity and inclusion through our people, structures, actions, values and culture. UL continues to be a leader in the sector, embedding gender equality across the institution at all levels. However, we still have a lot to do. Eliminating gender-based violence is another key priority for the institution as committed to in our Consent Framework Action Plan. We are an institution that sends out a clear message that no form of bullying, harassment, sexual harassment or sexual misconduct will be tolerated on our campus. Educating our staff and students on establishing healthy sexual relationships, understanding consent and the dos and don’ts on handling disclosures are all key priorities. New policies for staff and students on sexual harassment, sexual misconduct and violence are in development.

“I fully agree that the achievement of Goal 5 is integral to all dimensions of inclusive and sustainable development and, as the CEO of Telstra states, “when COVID hit we didn’t just accept it and do nothing. We were spurred into action ... so why are we comfortable with the news that we still won’t reach gender parity for almost 100 years? We need to move with the same speed and rigour for equality as we did for the virus” (Andrew Penn, The Sydney Morning Herald, 10/10/21).”

Dr Marie Connelly, Director Human Rights, Equality, Diversity & Inclusion, Office of the Provost



Ensure availability and sustainable management of water and sanitation for all.

6 CLEAN WATER AND SANITATION



Bernal professor develops low-cost method to treat toxic pollutants found in wastewaters

Led by Bernal Chair of Process Engineering Professor Vivek Ranade, a research collaboration between CSIR National Chemical Laboratory (NCL), Pune, India and the Bernal Institute, UL has demonstrated a cost-effective green methodology to remove ammoniacal nitrogen from effluent streams. Ammoniacal nitrogen is a measure for the nitrogenous matter as ammonia, a toxic pollutant that can directly poison humans and upset the equilibrium of water ecology systems. It cannot be treated using conventional biological and physico-chemical methods. Industries such as dyes and pigment, nitrogenous fertilizers and specialty chemicals generate wastewaters with high ammoniacal nitrogen (1500–3000 mg/L), which demand specific solutions for wastewater treatment. Similarly, industries such as fisheries generate huge volumes of wastewaters with ammoniacal nitrogen levels of 400–600 mg/L.

The collaborating research groups from UL and NCL used hydrodynamic cavitation for removing toxic pollutants from water. Hydrodynamic cavitation is a process of in situ generation of strong radicals which destroy pollutants. These in-situ generated radicals were harnessed for wastewater treatment. The research group developed novel, vortex based hydrodynamic cavitation devices to optimise utilisation of generated radicals for removing pollutants. In addition to hydrodynamic cavitation, the process was further improved by using simple aeration. This simple trick improved the removal of toxic pollutants like ammoniacal nitrogen by an order of magnitude. The developed vortex-based cavitation devices and aeration may be used alone or in combination with existing established effluent treatment processes to facilitate water recycling and reuse. Further research on scale-up/scale-out (numbering up instead of scaling up) of these cavitation devices is in progress.

UL to remove seven million plastic water bottles a year from circulation on campus

A plan to dramatically reduce single-use plastic waste from the UL campus could take seven million water bottles out of circulation every year. As part of its drive to maintain its position as a leader in environmentally friendly university management and gain the Foundation for Environmental

Education's internationally recognised Green Campus accreditation, UL has embarked upon an exciting project to cut down on single-use plastics. The project involves the deployment of strategically placed water-filling stations at student-friendly locations across campus to provide a convenient and free alternative to the purchase of single-use plastic water bottles. The stations, which are fitted with a counter to record the number of units that are dispensed, utilise mains water that is chilled and filtered before being dispensed. To date, 15 water bottle filling stations have been installed.

The four initial water-filling stations situated in the Glucksman Library have dispensed 550,000 (330ml) refills over the last 12 months, thus avoiding the generation of a significant quantity of single-use plastic waste from just one location on UL's stunning 367-acre riverside campus. Based on this usage, the four stations should provide savings of approximately 2,750,000 bottle refills over a five-year period. It is estimated that by the end of year 3 (2019–2021), once the intended target of 43 water bottle stations are installed and commissioned, the generation of approximately 7 million water bottles will be avoided each year.

The original idea to install water bottle filling stations came from the UL Environmental Society, which presented the idea to the Green Campus Committee. Funding was made available via the Higher Education Authority (HEA) Educational Sustainable Development Fund, and UL's Buildings & Estates Department teamed up with the Education Procurement Service (EPS), UL Procurement and UL Student Life to complete the project. Speaking about the initiative, Dr Chris Fogarty, UL's Energy Manager, said, "Working with the EPS to ensure the appropriate specifications were included as part of the procurement has facilitated the ongoing effectiveness of the project to be quantified. Specifically, the inclusion of a bottle counter as a mandatory requirement facilitates users in tracking their contribution to the reduction of single-use plastics on campus and can be used to help bring about behaviour change."

EPS estimates that in the first year alone, the usage of water filling stations in a single building has had the effect of taking 13 freight containers of plastic-bottled water out of circulation. As the filling stations are connected directly to a mains supply, it also eliminates the need for water supply companies to drive through campus to replenish bottle-fed water coolers, which reduces cost and traffic through the campus. The significant reduction in water bottle consumption also contributes reducing recycling waste, which

needs to be managed on campus weekly. This saving will increase as the water-filling stations are further installed. The procurement element of the project was a collaborative effort between Buildings & Estates and the EPS. The initiative gave rise to the EPS and UL winning Best Green Procurement Project of the Year at the National Procurement Awards in late 2019.

Water stewardship action plan developed at UL

In October 2020, UL Energy Manager Dr Chris Fogarty enrolled on a water stewardship training programme. Funded by Irish Water and run in partnership with Central Solutions and the Lean & Green Skillnet, the aim of the programme is to provide business customers with training on how to lower water consumption and reduce operating costs while also protecting the environment. The programme was broken into four modules: introduction to water stewardship, water mapping of your business, water conservation and quick wins at your site, and

developing a strategy and action plan. As part of the certification process, a water map of UL's site was completed, which resulted in the development of a water stewardship action plan. The plan was signed by senior management.

UL sports pitches modernised to enable the harvesting of rainwater for irrigation

In 2020, Buildings & Estates began an ambitious project to resurface a total area of 35,000m² of sports facilities on campus. These works required the installation of an IAAF-approved full non-porous cast elastomer system. As part of the development, floodlighting systems were installed for the synthetic and natural grass playing pitches and storm and foul drainage infrastructure was installed. Pitch irrigation systems were designed to include storage tanks for the harvesting of rainwater. In addition, a running trail, known as 'The Golden Mile', was created to encourage a healthy and active lifestyle among students and other campus users.



Giving Voice

"The establishment of the SDGs Working Group builds upon UL's longstanding commitment to sustainability on campus and provides a mechanism through which the SDGs can be deeply embedded across all aspects of UL's campus community and operations. The SDGs are integrated by nature and, therefore, a coherent and collaborative approach will be central to realise their successful implementation. Delivering on the SDGs at UL is a long-term undertaking and will require ongoing campus-wide support and engagement to ensure their continued and meaningful impact."

Dr Chris Fogarty, Energy Manager, Buildings & Estates and Thematic Lead for Campus Community and Operations, SDGs Working Group



Ensure access
to affordable, reliable,
sustainable and modern
energy for all.

7 AFFORDABLE AND
CLEAN ENERGY



Molecule discovery leads to breakthrough on how data is stored

Scientists at UL's Bernal Institute have contributed to the discovery of a molecule that could have a major impact on how data is stored and processed. The UL researchers found that a simple metal-organic molecule can go beyond simple binary (0 – OFF, 1 – ON) computing logic and can, in fact, switch between three distinct, long-lived states. This first demonstration of a ternary 'molecular traffic light' device could provide a low-energy means of storing and processing unstructured 'big data' required for the Internet of Things (IoT) and artificial intelligence (AI).

The research solves a 50-year-old puzzle in physics. The work, which has been published in the world-leading journal *Nature Nanotechnology*, is the result of an international collaboration with the National University of Singapore, Indian Association for the Cultivation of Science and Texas A&M University.

Collaboration between UL and industry leads to Europe's largest battery energy storage facility

The official commencement of construction of 200 MW of electricity grid stabilisation systems in Co. Offaly was attended by Mr Richard Bruton TD (Minister for Communications, Climate Action and Environment); Mr Woon-ki Lyeo (Ambassador of South Korea to Ireland); Mr Mark Foley (CEO, Eirgrid); Mr Du Hyoung Ryoo (CEO, Hanwha Energy Corporation, Korea); Mr Nigel Reams (CEO, Lumcloon Energy Ltd); and Dr Robert Lynch (Lecturer in Energy, Department of Physics, UL). Based in Lumcloon and Shannon Bridge in west Offaly, the two 100 MW battery energy storage plants will involve a combined investment of €150m and provide more than 120 jobs during the construction phase. Once completed, this will be one of the largest battery-powered grid stabilisation facilities worldwide and the largest facility of its type in the EU. This project is driven by Offaly-based Lumcloon Energy Ltd and its South Korean partners Hanwha Energy Corporation.

There are positive environmental effects of the plants, both in terms of pollution and energy stability. The two facilities are unobtrusive, almost silent in operation and not power plants in the conventional sense. Dr Robert Lynch (Department of Physics) points out that "Currently, whenever there is a large fraction of power from wind energy penetrating the electricity grid, fossil fuels must be burnt to stabilise the grid while not delivering power. These facilities, and facilities of this type, will allow power coming from renewable energy to reach 70% of the instantaneous power being delivered by the Irish electricity grid while keeping the grid stable, reducing our dependence on imported fuel." According to Nigel Reams (Lumcloon Energy), "The project will help the state to greatly mitigate hefty emissions fines threatened by the EU, related to Ireland's failure to fully meet 2020 targets, and will benefit consumers and business alike." Mr Reams also stated that "Our electricity traditionally came from highly pollutant sources, like coal, peat, gas and oil, which is no longer sustainable. The new plants at Lumcloon and Shannon Bridge will help make Offaly and Ireland a world leader and pioneer in renewable energy."

UL has led in the field of electrochemical energy storage for over a decade and is currently the leading research facility in Ireland; related research is concentrated across the Bernal Institute and the departments of Physics, Chemistry, and Electronic & Computer Engineering. The project in Co. Offaly follows on from several research projects between Dr Lynch and Mr Reams.

Device co-discovered at UL could improve smartphone battery life

A team at UL played a central role in the discovery of a new device that promises to end overheating in portable devices and prolong battery lifetimes. Working with an international team of researchers, the Bernal-based Materials Modelling Group co-discovered an exciting new type of molecular switch that could greatly reduce power consumption in electronic devices. The finding has just been reported in the world-leading science journal *Nature Materials* and comes at a time when global consumer demand for ever lighter, more compact smartphones and tablets has never been higher – driving the discovery of new science and innovations at an astonishing pace.

Dr Damien Thompson, Associate Professor in Physics at UL and leader of a Bernal research team in predictive materials design, collaborated with Professor Christian Nijhuis at the National University of Singapore and Professor Enrique del Barco of the University of Central Florida to produce this new molecular-scale solution for high-density computing. “Support from SFI and the EU allows us to push forward our capabilities to the point where our designs are providing solutions to global challenges,” Dr Thompson said. “Deciphering the underlying mechanisms of how smart materials work gives us confidence to propose bold new device designs. As the scientific community continues to advance the field of predictive materials modelling, we are enabling new developments in AI, environmental monitoring and biopharma that will improve lives,” Dr Thompson added.

Managing energy usage on campus

Prior to the onset of the pandemic, the Office of Public Works (OPW) was nearing the end of a process to install and commission its energy monitoring and targeting (EM&T) system at UL. The purpose of the work is to enable the rollout of the Optimising Power @ Work initiative, the core principle of which is to intensively work with staff to encourage behavioural change leading to energy wastage being identified and eliminated.

The OPW appointed two energy consultants to look after two distinct clusters of buildings on campus – Tipperary Energy Agency (TEA) is tasked with overseeing student villages and sports facilities while Aramark (Workplace Solutions) is driving improved energy efficiency in educational buildings. The recent relaxation in government restrictions has permitted the OPW and UL to schedule the installation of the remaining elements of hardware and intensify commissioning the OPW’s EM&T system.

Giving Voice

“Improved energy efficiency, renewable energy and aggressive carbon emission reduction are all pillars of several of the UN SDGs. We believe that novel and advanced structural materials play a key role in achieving those objectives, particularly in the areas of health, energy and the environment. At Bernal, we are committed to meaningful partnership with industry, the region and globally to develop disruptive solutions related to those vast challenges in sustainable energy and resilient climate.”

Professor Luuk Van Der Wielen, Director Bernal Institute and Department of Chemical Sciences

Promote sustained,
inclusive and sustainable
economic growth,
full and productive
employment and decent
work for all.

8 DECENT WORK AND
ECONOMIC GROWTH





Who speaks for whom at work: worker voice and social dialogue

Over the last few decades, academic research has often neglected issues of power and influence concerning labour market institutions, employment regulation, models of collaborative partnership between workers, unions and employers, and systems for inclusion and wider stakeholder voice. Through a body of research involving international collaborators, UL's Tony Dundon has provided evidence on new processes and forms of worker voice and social dialogue that can enhance decent work goals, expose labour market inequalities and support collaborative employment partnerships. The research was undertaken with policymakers, consultancies, employers, employer associations, trade unions, HR managers, workers, and shop steward and non-union employee representatives. The work has impacted employee voice mechanisms at workplace levels; employee information and consultation policy, including European Directive transposition issues at national and organisational levels; labour market reforms for enhanced collective bargaining and work futures; and policies on accessing apprenticeship skills and learning in Ireland.

UL to receive €16m as part of Human Capital Initiative

More than €16m is to be allocated to UL under the Human Capital Initiative (HCI). The projects include the use of virtual laboratories in higher education; a new hub to upskill the building sector on green construction; and the establishment of a Creative Futures Academy to support digital and screen culture, cinema, literature and broadcasting, art, design, and fashion. Innovative methods of teaching and delivery will be promoted on these projects so that learners will benefit from improved quality and more engaging ways of learning on enterprise-focused courses, providing lifelong learning and upskilling opportunities for all.

HCI Pillar 3, Innovation and Agility is the final pillar to be announced and commands a total budget of €197m over the 2020 to 2024 five-year period. The UL project – UL@WORK – will receive €16,297,375 in total and is a new initiative developed to deliver on the enterprise priority set out in the university's strategic plan, UL@50. President Professor Kerstin Mey said the project would “build a flexible, technology-enhanced learning platform that responds to digitisation and the future world of work” and that it will “develop digital,

industry 4.0, talent through flexible, innovative and technology-enabled, experiential learning; bringing enterprise expertise into education, and education into the workplace to form a co-designed future learning environment.” Minister for Further and Higher Education, Research, Innovation and Science Simon Harris said, “I am delighted to be able to announce the broad range of projects that will be funded under the HCI Pillar 3. These projects will develop and change teaching and learning. This global pandemic has reinforced the need for us all to be agile and diverse.” Minister Harris added, “Crucially though it requires us to develop new skills and equip the next generation with the critical importance to the economy and the workplace of the future,” he added.

UL researchers awarded funding under COVID-19 rapid response call

Two UL research projects are to be funded under the newly established national, coordinated research and innovation response to the COVID-19 pandemic. Professor Donal Fortune and Professor Alice Coffey have had studies funded as part of the first 26 projects to receive €5m in the initiative, which complements existing third-level research activity. The projects will address key areas such as frontline healthcare, diagnostics, infection control, contact tracing, mental health, potential treatments and management of the mitigation measures related to social distancing and isolation. Alice Coffey, Professor of Nursing & Midwifery and Lead of the Health Implementation Science Research Cluster at UL, was awarded €199,647 for her research entitled ‘A Rapid Resource Repository for Health Professionals (RRR-HP): an online and social media individualised support intervention for return to practice, reassigned and new to practice, nursing and allied’. Donal Fortune, Professor of Clinical Psychology at UL, was awarded €175,013 for his research entitled ‘An investigation of psychological responses to COVID-19 in healthcare workers during the delay and mitigation phase of disease management: longitudinal and nested qualitative study’. More than 350 applications were received, of which 26 were successful under the scheme, which was overseen by a coordinated Rapid Response Research, Development and Innovation programme established by the HRB, IRC, SFI, IDA Ireland and Enterprise Ireland.

The research projects are part of a broader initiative by the Irish State to mitigate and manage the COVID-19 pandemic by unlocking the potential of Irish-based researchers and innovators and to complement similar work around the world. All the projects were internationally peer reviewed at the assessment stage. According to Minister for Business, Enterprise and Innovation Heather Humphreys, “Research, development and innovation will play a significant role in tackling the COVID-19 pandemic. The projects announced today are part of a national drive to find solutions to the challenges we face. Right across the country, our research community in our higher education institutions and businesses, both indigenous and foreign owned, have mobilised to address these key issues.”

UL receives €2.3m for extra places under jobs stimulus package

UL is to receive almost €2.3m to provide extra places under the Government’s jobs stimulus package. Minister for Further and Higher Education, Research, Innovation and Science Simon Harris announced over €30m for free and subsidised higher education places under the package to help get people back to work, upskill workers and build economic confidence while continuing to manage the impact of COVID-19. The funding has been approved to support the provision of 11,597 places on short, modular courses together with an additional 2,555 postgraduate places nationally. UL will receive €1,218,850 for 180 places under the postgraduate skills provision and funding for 910 places, valued at €1,029,500, for modular skills – for a total of almost €2.3m. According to UL President Professor Kerstin Mey, “The world has changed dramatically as we deal with the COVID-19 pandemic and the measures outlined within the July stimulus package show Government’s commitment to driving a post-pandemic recovery. Education, critical thinking, and innovation are all key to that.” Professor Mey added, “At UL we have mobilised, like many other HEIs, and responded to the health crisis. Our community has worked hard to assist frontline services and civil engagement during the past months and now we can see that further education is one of the most powerful currencies we have. Teaching and learning have been transformed and these extra places offered under the stimulus package will assist in delivering the next cohort of change-makers who can help our society recovery and thrive again.”

The 2,555 postgraduate places will be on 207 existing courses in 23 public and private HEIs. The places are available on courses in a wide range of skills areas, including data analytics, environmental sciences, engineering, tourism and hospitality, ICT, and health and welfare. Modular courses are short and focused and will be offered in a flexible manner, allowing people to gain important skills without taking a considerable period away from the labour market.

Each module will be standalone so that participants can gain skills and put them into practice immediately in the workplace, but modules are also accredited in such a way as to provide building blocks to a full qualification, should the student so wish. These 538

modular courses across a broad range of subjects in 32 HEIs represent a new route into lifelong learning and provide upskilling and reskilling opportunities for those who need it while ensuring that they remain close to the labour market. Minister Harris said, "This is exactly the kind of initiative we need to increase Irish university capacity to extract and adapt high-demand modules from existing programmes, and develop tailored courses, to suit the needs of enterprise and lifelong learning." According to Alan Wall, HEA CEO, "It is great to see the HEA working in partnership with higher education institutions to unlock the flexibility of third level in dealing with difficult times."



Giving Voice

"Education for sustainability is no longer a peripheral, "nice to have" element of a university education, but an essential underpinning. As governments commit to net-zero emissions by 2050, all aspects of economic life will need to innovate in response to the inevitable new regulation, incentives, new societal norms over the next 30 years. We need to prepare our graduates to excel in that environment."

Professor Sheila Killian, Director Principles for Responsible Management Education (PRME), Department of Accounting and Finance



Build resilient
infrastructure,
promote inclusive and
sustainable industrialisation
and foster innovation.

9 INDUSTRY, INNOVATION
AND INFRASTRUCTURE



Building R&D excellence in one of Ireland's largest industries

Ireland is the second-largest pharmaceutical exporter in the world. The industry employs over 49,000 people and accounts for 50% of all exports. The role this industry plays in the Irish economy cannot be overstated, and the importance of maintaining competitiveness and excellence in R&D is crucial to its continued success. Funded by SFI and industry, the UL-based SSPC is a unique collaboration between 22 industry partners, nine research-performing organisations and 12 international academic collaborators. SSPC General Manager Jon O'Halloran explains: "The pharmaceutical sector in Ireland is facing several global challenges, including the emergence of low-cost economies, the rise of generic medicines and the patent cliff. Traditionally there has been a lack of cohesion between research and the pharmaceutical industry, where confidentiality and competition are paramount. Through SSPC, collaborations have been formed, which ensure that best practice and process knowledge is shared, making the sector more competitive, leading to a concentration of high-value R&D innovation and advanced manufacturing here in Ireland."

The SSPC research programme spans the entire pharmaceutical production chain from synthesis of the molecule to isolation of the material and formulation of the medicine. The overarching objective of the research is to better understand mechanisms, control processes and predict outcomes for the efficient and environmentally sustainable production of safe medicines. Professor Kieran Hodnett, Scientific Director and lead principal investigator, explains: "At the SSPC there are three distinct but interlinking strands of research comprising environmentally sustainable ways to make active pharmaceutical ingredients, crystal growth and design, and drug formulation and manufacture. A key theme to the research is its focus on process efficiencies and 'greener' chemistry, which will have a positive impact on the environment by reducing, and in some cases eliminating, the use of environmentally hazardous materials."

The untold story – understanding the multinational sector in Ireland

A team of UL researchers are working to better understand the landscape of multinational companies (MNCs) in Ireland. Patrick Gunnigle, KBS Professor of Business and Leader of the Work, Knowledge and Employment Research Theme, explains: "Ireland is arguably one of the countries that most depends on multinational companies. It is vital that we understand the landscape of multinational companies here to better inform policy debate on this sector."

IDA figures state that over 160,000 jobs are generated from multinational companies in Ireland. However, as study co-author Dr Jonathan Lavelle (KBS) points out, "The true figure is actually much higher since IDA figures exclude certain categories of MNCs, such as retailers LIDL and ALDI. While just over 40% of MNCs in Ireland are of US origin, almost one in six are Irish, examples of which include CRH, Kerry Group, Paddy Power and Ryanair." Attracting multinational investment has been a central plank of Irish industrial policy for over five decades, and, traditionally, Ireland would have been remarkably successful in attracting US foreign direct investment (FDI). In 2006, the gross stock of American FDI in Ireland was greater than the gross stock of American FDI in Brazil, Russia, India and China combined. Indeed, US MNCs represent a distinct group in many respects. Manifestations of such distinctiveness include more centralised and standardised approaches to subsidiary management, frequent deployment of shared service centres, utilisation of performance-related pay systems and a strong preference for trade union avoidance. In contrast to our success in attracting US MNCs, Ireland has failed to attract significant levels of inward investment from emerging economies in Asia, South America and Africa.

As Professor Gunnigle and Dr Lavelle point out, the sector is ever-changing and has a wide impact on Irish society, from labour and management practices to influencing future entrepreneurship, skills and technology transfer and FDI investment. According to Professor Gunnigle, "Expansion of the indigenous MNC sector in Ireland has been a relatively recent phenomenon and its makeup is not widely understood. Indeed, there is something of an untold story in discourse on multinationals in Ireland."

Understanding the risk in developing autonomous vehicles

Autonomous vehicles (AVs) challenge technology and design in many ways. Their deployment on roads raises interesting legal, liability and ethical questions. Dr Finbarr Murphy and Dr Martin Mullins, both members of the KBS and Lero – the Irish Software Research Centre, have undertaken research in risk and liability that addresses these challenges. Their research impacts industry competitiveness and expanded industry networks with numerous public and private partners through three EU-funded projects. Their work informs policy through their involvement in the European Commission expert group on future liability law (2019), which provides guidelines for testing AVs. A year-long collaboration resulted in a public report, after Dr Murphy was invited to present his findings and be questioned by the European Parliament Legal Committee (JURI). Ultimately, this will result in EU legislation on civil liability for AI, which will be directly influenced by the Emerging Risk Group's (ERG) research.

UL projects share in investment on new COVID-19 research

Two UL-based projects are to share an investment of €1.4m in state funding for 11 projects under the SFI-coordinated research and innovation response to the pandemic. The investment builds on previous funding and complements the existing research work underway in HEIs across the country. Two UL projects have been funded in the latest round – COVIGILANT, led by Lero, and RAPID, led by CONFIRM – receiving more than €430,000 in total between them.

COVIGILANT

COVIGILANT is led by Dr Jim Buckley of Lero, Professor Liam Glynn of UL's School of Medicine and Professor Derek O'Keefe of NUI Galway. The project, which received €200,000 in funding, will gather evidence to inform and optimise Ireland's digital contact-tracing strategy and practice. The research will carry out largescale public surveys to capture end-user perceptions of digital contact tracing, identify barriers people may have to using contact-tracing apps and, finally, tailor information campaigns. It will review a range of existing contact-tracing apps to determine best practice and identify design modifications to inform updates to the HSE's chosen digital contact-tracing solution. Dr Buckley said, "Contact tracing can play a huge part in the ongoing effort to minimise the spread of the virus nationally, and this project aims to inform best-of-breed digital support for that contact-tracing effort."

RAPID

RAPID (Rapid Advanced Production Responses to Frozen Supply Chains in Hospitals) is led by Professor Leonard O'Sullivan, School of Design, UL and a funded investigator in CONFIRM. The project, which received €240,000 in funding, will overcome blocked or frozen supply chains in healthcare in a time when COVID-19 has disrupted and threatened supply chains around the world. "When this happens in healthcare, it can cost lives," explained Professor O'Sullivan. "The RAPID project will identify problems being experienced in Irish healthcare as a result of insecure supply chains and design ways to overcome these problems using 3D printing and smart manufacturing. This project is responding to the immediate needs within the healthcare system, to different needs at different stages as they arise. This is particularly important as we move into the next phase of the pandemic, which will bring with it new challenges regarding medical supplies and ways of treating patients," he added.



SSPC to develop national advanced drug product manufacturing facility at UL

SSPC, the SFI research centre for pharmaceuticals hosted at UL and the Bernal Institute, will soon have access to a suite expanding research capabilities through SFI Infrastructure Awards. Professor Gavin Walker, SSPC co-director and Bernal Chair in Pharmaceutical Powder Engineering at UL, will receive €1.9m to develop a national advanced drug product manufacturing facility to enable industrial collaboration and support SSPC research projects with industrial and academic partners. Professor Walker will lead the team helping to bridge the challenging engineering and scientific gap for process scale-up from lab to manufacturing. “The move towards continuous manufacturing will be the next major innovation for the pharmaceutical industry, and it is essential that the Irish pharmaceutical manufacturing industry move towards continuous processing to remain globally competitive,” said Professor Walker. “The implementation of continuous pharmaceutical processes is an opportunity to substantially reduce costs, reduce manufacturing times and bring medicines quickly to market, improve product defects, and encourage innovation by an integrated manufacturing approach. This research infrastructure will build on the University of Limerick’s reputation of internationally leading research in pharmaceutical manufacturing at the Bernal Institute.”

UL-hosted CONFIRM research centre launches ‘fantastic’ new digital manufacturing facility

Supported by a €3.1m investment by UL, the UL-hosted CONFIRM SFI research centre in smart manufacturing has launched a brand-new digital manufacturing facility. CONFIRM hosted a virtual launch of the bespoke 1,619 m² Digital Manufacturing facility located within the UL Digital District at Park Point. Minister for Further and Higher Education, Research, Innovation and Science Simon Harris sent a video message to congratulate CONFIRM on opening the new facility. “The opening of the CONFIRM SFI Research Centre’s new digital HQ provides an important hub for digital and smart manufacturing in Ireland, which will support the transformation of industry through excellent research, providing for our future skills needs in this important sector and enabling the general public to see the future of manufacturing,” said Minister Harris. “The Centre extends far beyond its fantastic new facility through its partnership across the higher education institutions and its significant industry and international collaborations. I wish the Centre every success in the future,” he added.

UL and Analog Devices partner on digital learning tool to recreate lab environment at home

A new remote active learning device has enabled UL engineering students to recreate the lab environment at home through technology developed by Analog Devices Inc. Over 400 students have been using equipment provided by Analog Devices to further learn the fundamentals of electrical and electronic engineering from the safety of their homes. The innovative partnership has helped UL students overcome the challenges to on-campus teaching and learning presented by the COVID-19 pandemic. The project represents one of the first attempts across Europe to build a structured curriculum for fully remote experimental learning.

Professor Martin Hayes, Head of UL's Department of Electronic and Computer Engineering, said that the project was a practical response to the restrictions that COVID-19 had placed on face-to-face contact with students. "Working with Analog Devices, we came to the conclusion that not only was it possible, but actually it was desirable to give our students Analog Devices kit in order to allow them to work at home," Professor Hayes explained. He added, "We have found that students are spending longer studying the material, they are spending longer validating the concepts that have been presented through practical work that they are required to build themselves – they are becoming experts more quickly just by learning how to recreate their lab environment."



Giving Voice

"The UL systems-wide approach to sustainability connects our diverse research strengths to our community engagement and partnerships as well as to our students. By orienting our research to many of the SDGs, our researchers, by connecting with colleagues locally, nationally and globally, are responding to many of the pressing societal challenges of our time."

Professor Norelee Kennedy, Vice President Research and School of Allied Health



Reduce inequality within and among countries.

10 REDUCED INEQUALITIES



Examining zero hours and low hours work in Ireland: regulation and the 'grey zone' of work

Zero hours work is work with no guaranteed hours. Researchers at the KBS have been examining the prevalence and impact of zero hours work and low hours work among Irish employees. Entitled 'A Study on the Prevalence of Zero Hours Contracts Among Irish Employers and Their Impact on Employees', the government-commissioned 2015 report contained a series of recommendations on how to improve workers' rights. These recommendations aimed to improve workers' income security and formed the basis of public policy discussions on how to regulate zero hours and low hours work.

Multiple political parties and workers' rights organisations were involved in the public discussions, leading to a new piece of employment legislation, the Employment (Miscellaneous Provisions) Act 2018, which was directly informed by the study. This legislation was the first significant enhancement of employment rights relating to working hours since the 1990s. The Act introduces a number of workers' rights: the right to more information about terms and conditions, the right to more secure hours for people who regularly work more hours than those stated in their contracts, and the right to a minimum payment where a worker is required to be available for work but is not provided with work by an employer. The Act also restricts employers' use of zero hours contracts.

COFFERS tax and inequality

COFFERS was a three-year international research project funded by the EU Horizon 2020 (H2020) framework programme for research. The focus of the project, which ended in January 2020, was on SDG 10 – Reduced Inequalities – and the role of tax policy and practice in furthering that goal. Led by Professor Sheila Killian, a team from the KBS worked on tax practice and the role of tax experts and focused on how ethics interact with tax expertise and how tax practice varies in conditions of high secrecy or lax regulation. The team presented to tax and accounting bodies in Ireland and internationally and published in practice-facing as well as academic peer-reviewed outlets with a view to influencing large firms and professional bodies to engage in more sustainable and responsible tax practice.

Irish Human Rights and Equality Commission

On Friday 16 October 2020, the Irish Human Rights and Equality Commission announced funding for projects under its Human Rights and Equality Grants Scheme 2020. The scheme awarded small grants of up to €6,000 and general grants of up to €20,000 to support civil society organisations, rights-holder and community-led groups, and trade unions in Ireland to promote access to justice for people who face the greatest barriers to accessing their rights.

Dr John Lombard (School of Law) and Dr Owen Doody (Department of Nursing and Midwifery) were named co-applicants in a successful funding bid led by the All-Ireland Institute of Hospice and Palliative Care. Entitled 'Shaping Palliative Care Policy Using a Human Rights Approach', the research project aims to give voice to nursing home residents, their families and care workers in relation to their experience and expectations of palliative care to ensure that any changes to palliative care policy, especially due to COVID-19, will be informed and shaped by the needs and perspectives of rights holders. The research will also educate and inform policy makers, service providers, healthcare professionals, the public and, specifically, people living in nursing homes, their families and care workers on their rights in relation to palliative care during a pandemic.

Partner organisations in the project include the Health Information Quality Authority; HSE; Mental Health Commission; Nursing Homes Ireland; Irish Hospice Foundation; Age Related Health Care Department, Tallaght University Hospital; and Medicine for the Elderly, St. Vincent's Hospital.

Excellent research generating long-term policy impact

John Reddy and Professor Seán Redmond's work on data collection in the area of youth justice was identified by the IRC in its strategic plan as "excellent research generating long-term policy impact". The work will be used by the Department of Justice to inform changes in data collection practices across the youth justice system with the objective of providing better evidence to enable the design of more effective youth diversion services. Located in the School of Law and led by Professor Redmond, the Research Evidence into Policy, Programmes and

Practice (REPPP) project is a partnership between UL and the Department of Justice. REPPP was awarded first prize by the European Crime Prevention Network for its ground-breaking 'Greentown' project to reduce the effects of criminal networks on vulnerable young people and communities.

My Uni Life: UL student's unique story features in RTÉ documentary

A UL student's unique story featured in a RTE documentary series in November and December 2020. Shaun Fogarty, a fourth-year student on the BSc in Mobile Communications and Security who is in a wheelchair and on a ventilator, appeared in 'My Uni Life', a series following the lives of seven students at various stages of their university journey. The Irish Universities Association partnered with RTÉ to create the five-part series, which focused on seven out of more than 5,000 students each year whose desire to succeed at third level is facilitated and supported by the access and disability programmes run by Irish universities. Shaun, who lives in Cahir, Co. Tipperary, had his life and university experience transformed overnight when he was severely injured in a road traffic accident in 2012. He had just finished his first year of Applied Physics at UL. Despite a long recovery in hospital and the need for full-time care, Shaun was determined to complete his education. "I enjoyed filming the documentary and it allowed me to demonstrate my ability to take part in a wide range of activities. I hope it shows that it's possible to achieve your goals with hard work and perseverance," explained Shaun, who suffered a C1 spinal injury leading to paralysis.

Shaun has a network of care support around him that he manages so that he can travel to UL for his studies. Staff in UL's Student Affairs Division say he is "an amazing person", and the university's Disability Support Services has been vital for Shaun's progression through college. The service's head, Brenda Shinnors-Kennedy, said, "Shaun's story is unique, his courage and determination is beyond anything that I have seen in my 25 years' experience as a Disability Officer. We did know Shaun prior to his accident. He is an example of the type of determination that is required to be a 'good' student and displays this in everything he does. In my many years of working in the area of disability access my experience has taught me that access without supports is an opportunity loaded with risk. Access with supports is an opportunity to succeed."

The series provided a unique and authentic insight into the lives of the seven students across the country as they navigated through personal challenges and the COVID-19 pandemic while trying to grapple with the move to remote learning. Every year, approximately 32% of first-year students enter UL via alternative access routes from under-represented groups. Over the last three years, 662 students have entered through the Higher Education Access Route (HEAR) and over 511 students through the Disability Access Route to Education (DARE).

Educational inequalities facing transgender youth highlighted

New research by UL has highlighted the educational inequalities transgender and gender diverse youth face in school settings. The study shows that transgender and gender diverse youth in Ireland feel marginalised within post-primary schools, which inhibits them coming out and affects their academic attainment. The report, the first ever study of the post-primary school experiences of transgender youth, was a collaboration between the Transgender Equality Network Ireland (TENI) and researchers based in the School of Education, UL. Co-authored by UL's IRC Fellow and Marie Curie Fellow Dr Ruari-Santiago McBride, the 72-page report entitled 'The Post-Primary School Experiences of Transgender and Gender Diverse Youth in Ireland' is based on 18 months of research, several workshops and over 50 interviews with transgender and gender diverse youth, parents, educators and stakeholders from education bodies, unions and the public sector.

The research was co-funded by the IRC and Marie Skłodowska-Curie Actions as part of the Collaborative Research Fellowships for a Responsive and Innovative Europe (CAROLINE) programme. According to Dr McBride, "This report builds on, and aims to enhance, the vital work that TENI has been undertaking across Ireland's education sector since 2013. The goal of the research was to provide an in-depth understanding of the educational challenges that transgender and gender diverse youth face in Ireland and to determine policy and practice recommendations that will help us reduce the educational inequalities they experience." Dr McBride added, "The research findings suggest that transgender and gender diverse youth do not have equality of educational opportunity in Irish post-primary schools. This Working Group should be provided with the resources by government to develop a National Gender Identity and Gender

Expression Policy and Procedures for Schools to guide educators in providing wrap-around support to trans and gender diverse students and working to make their schools more inclusive spaces. If this is achieved, we can begin to reduce the educational inequalities transgender and gender diverse youth face and work towards ensuring they have equality of educational opportunity.”

The European Centre for the Study of Hate

Building on and incorporating the successful Hate and Hostility Research Group, the European Centre for the Study of Hate (ECSH) was established at UL in 2020 and awarded the status of Priority Research Centre the same year. The ECSH explores the prevalence, manifestations and impact of hate and the means by which hate can be challenged within and across societies. Led by co-directors Professor Amanda Haynes and Dr Jennifer Schweppe, the work of the ECSH is organised around five themes:

- European Understandings of Hate
- Growing Up in an Inclusive Europe
- Criminalising Hate
- Populism, Politics and Exclusion
- Margins and Marginality

The aim of the ECSH is to understand the hate that excludes and divides and to provide the tools to respond to hate effectively. An open, inclusive and safe society is under threat from the growing influence of those who wish to exclude minorities from society because of who they are or what they represent. Where hate is politicised, cultivated and spreads across borders, it makes the European way of life unattainable for minority communities.

The ECSH operates across multiple levels of orientation, with members working on interrelated topics – from individual prejudice (micro) to community impact (meso) to structural and legal contexts (macro). The ECSH advances evidence-informed dialogue at European and national levels on challenging hate towards those who are marginalised or stigmatised. The ECSH is the nexus for research-policy-practice linkages and the originator of translational interdisciplinary European scholarship on one of the most important issues facing Europe today.

Giving Voice

“I am delighted to take on the role of thematic lead for Leadership, Governance & Staff in respect of working towards UL’s goal of becoming a globally recognised sustainable university. The aspirations of the SDGs Working Group build on decades of work instigated by departments and colleagues across the university, and the proposed schedule of work is perfectly timed to set out the blueprint for UL over the next decade. I am excited to hear from, and work alongside, colleagues across the university who want to help reaffirm UL’s commitment to sustainability and have ideas and plans on how we can truly achieve the university we want and need.”

Dr Jennifer McMahon, Lecturer, Department of Psychology and Thematic Lead for Leadership, Governance & Staff, SDGs Working Group

Make cities and human settlements inclusive, safe, resilient and sustainable.

11 SUSTAINABLE CITIES AND COMMUNITIES



Go Green: UL leads €10.5m EU project to transform environmental and human health

A €10.5m European project that aims to transform both environmental and human health is to be led by University of Limerick. Funded under H2020, coordinated by the UL-based HRI and with almost 40 different stakeholders, Go Green Routes is a four-year project that applies visionary and integrated solutions to improve health in cities. The overall objective is to position European cities as world ambassadors of urban sustainability. The project will take COVID-19 into consideration and will evaluate the impact of reduced air pollution during lockdown and its aftermath as well as the impact on the mental health of urban citizens and their views on re-greening their cities. "Evidence is emerging that people flocked to green spaces during lockdown for mental health, physical activity and connectivity with their communities," said Dr Tadhg MacIntyre, a lecturer in psychology at UL and coordinator of project. "The impact on social cohesion, connection to nature and their perceptions of their cities may be long lasting. One solution to reduced transmission of the disease and the negative psychological consequence of confinement is spending more time outdoors in greenspace, which will be addressed by the project" said Dr MacIntyre. "We need to optimise how nature is integrated into urban spaces and used and create a rapid means of knowledge creation and knowledge transfer to enable upscaling and future proliferation of

nature-based interventions. We aim to create a unique knowledge ecosystem to transform citizens, planners, researchers and entrepreneurs into innovators, leaders and visionaries in nature-based solutions. Nature is our future," Dr MacIntyre added.

UL will receive €1.6m to fund a team of doctoral and post-doctoral researchers and a project manager. Other Irish partners will benefit to the tune of €3.68m across SMEs – Nutritics, ICEP, Connect the Dots and Horizon Nua – and Irish universities TCD and TU Dublin, while Limerick City and County Council is to receive €530,000.

The consortium will cultivate technological and nature-based solutions for health across six cities – Burgas, Bulgaria; Lahti, Finland; Umea, Sweden; Versailles, France; and Limerick – and lay a foundation for future implementation in Munich, Germany; the Murcia region of Spain; and the Gzira municipality of Malta. The project also has partners in China, Mexico and Georgia, enabling a global knowledge exchange and a focus on mental health and well-being. Speaking at the launch of the project, UL Chancellor Mary Harney said, "As a former Minister for Health, I am acutely aware of the links between human and environmental health. Indeed, I know first-hand that the banning of smoky coal in Dublin in 1990 had a huge impact on air pollution and a positive impact on health. Today we need to be ambitious in how we promote health in cities, through active travel, renaturing streets and ensuring nature and people are at the nexus of urban life."



+CityxChange

The +CityxChange (Positive City Exchange) H2020 project explores the development of a structured approach to decarbonising cities by 2050 through the creation and replication of Positive Energy Blocks and Districts. Through the +CityxChange project Limerick has become a Smart Cities and Communities lighthouse city, testing innovative approaches to decarbonisation within the historic built environment of Limerick city centre and acting as an exemplar in Europe. The project's focus on the clean energy transition (SDG 7) is positioned within a broader UN SDG context and prioritises citizen engagement in its holistic approach to enable the co-creation of the future we want to live in (SDG 11).

Climate change (SDG 13) is a societal challenge with accelerating impacts on our day-to-day lives. Feeling powerless to meaningfully act is individually felt. Providing pathways and infrastructure to empower citizens, to enable individual action and to encourage collective responses to address local and global challenges is vital to realising more sustainable places and ways of life. Within +CityxChange, six integrated concepts known as CommunityxChange have been developed to help make citizen participation meaningful. Implementation of CommunityxChange – the development of which is led by University of Limerick (UL) – is designed

to initiate an open innovation ecosystem in the participating cities (SDG 8, SDG 9). Intended to leverage existing resources, knowledge, networks, skills and infrastructure, CommunityxChange can be localised to a range of contexts and adapted to suit broader sustainable transitions. Full details are published on the +CityxChange Knowledge Base. The CommunityxChange concepts will become tangible in Limerick through the Citizen Innovation Lab – a new place for observation, co-creation and experimentation in the city. Co-located with UL's School of Architecture (SAUL) Fab Lab Limerick in UL's City Centre Campus, the Citizen Innovation Lab will host a co-created programme of research, events and activities focused on the city innovation agenda.

+CityxChange implementation in Limerick is a cross-departmental collaboration between UL's Department of Economics, SAUL, Fab Lab Limerick, Department of Computer Science and Information Systems, LERO, SMEs and Limerick City and County Council. The project emerged from earlier collaborations between the university and the city led by SAUL's Intelligence Unit and Adaptive Governance Lab. The CommunityxChange approach and collaboration will continue in Limerick through the Decarbonising Together project, funded through Creative Ireland's Creative Climate Action Fund, to be implemented through the Citizen Innovation Lab during 2022.



Giving Voice

"There is too much waste in the world, and a huge mentality shift must come if we are going to change. I want to be part of that change by making it easier for people to engage with the world around them."

Niamh Damery, Product Design Student, UL



Ensure sustainable
consumption
and production
patterns.

12 RESPONSIBLE
CONSUMPTION
AND PRODUCTION



Bernal Director Luuk van der Wielen appointed Platform Bio-Economie Chairman in the Netherlands

Platform Bio-Economie (PBE) consolidated its strategic reorientation towards becoming the leading industry organisation by targeting the development of a fully renewable and sustainable, CO₂-neutral society in which product chains are as circular and bio-based as possible. In December 2020, Bernal Director Luuk van der Wielen was appointed to chair the board. With over 30 years of mixed academic/industrial experience in developing bioeconomy technology, business and policies, Professor van der Wielen leads the implementation of the PBE vision “that energetic and non-energetic use of sustainable bio-based resources and other renewables are indispensable for the transition to an affordable, reliable, CO₂-neutral, circular economy.” Central to this vision is the development of a concrete investment agenda, flanked by a quantitative macro-economic and climate impact study and proactive communication supporting a green, post-pandemic economic recovery in the Netherlands.

According to Professor van der Wielen, “Responsible energetic and non-energetic use of biomass are integral parts of sustainable bio and circular economic development. It is based on sustainable production, trade and use of sustainably certified bio-based raw materials in the context of other renewables. While wind and solar energy and circular materials are developing seriously, they are still far from complete coverage of the Dutch needs. I think of domestic needs, such as those of the Dutch chemical, food, energy, transport and construction sectors and the global opportunities that underpin the flourishing Dutch economy.” Integral Knowledge and Innovation Agenda for Climate (IKIA Climate) targets all resources, products and processes in Dutch industry to be nett carbon neutral in 2050 and for at least 80% circular. This requires new pathways for resource-efficient process/product combinations using bio-based and circular feedstocks, including cascading, and a cross-sector approach.

UL President Professor Kerstin Mey said, “In line with our sustainable development goals, University of Limerick is committed to the development and implementation of a holistic approach to sustainable development, in partnership with the communities we serve, locally and regionally, and through our national and international alliances. Luuk van der Wielen’s dual footprint as director of our Bernal Institute at UL and as chair of the Platform Bio-Economie is an exemplar for further enhancing Irish/Dutch relations as we aim to enable our students, graduates and staff to engage as ‘active citizens’ who contribute to the well-being and future of our planet and our communities.” Professor Mark Ferguson, Director General of SFI and Chief Scientific Adviser to the Government, commented, “Stimulating broad green and circular industrial developments are priorities in the Netherlands and Ireland alike. Science Foundation Ireland and the centres it funds, such as AMBER, see the current development as a great opportunity for ambitious Green Deal collaborations in a European context.”

Cars made from paper waste

Developed by Dr Maurice Collins, a senior lecturer at UL’s School of Engineering, ground-breaking technology producing cheaper and more sustainable carbon fibre could lead to the cars of the future being manufactured from paper waste.

Carbon fibre is used as a reinforcement in plastic materials to produce composite materials, which are deployed in commercial high-end goods such as cars, aircraft computers and sports equipment like golf clubs. These materials are oil-based and non-sustainable and are environmentally polluting during their production and end of life. However, researchers based at Bernal have produced carbon fibre from sustainable bio-resources. These materials have been used to produce car wing mirrors and sections for wind turbine blades, paving the way towards a more sustainable future for materials used in the automotive and wind energy sectors.

With the global market for composite materials worth upwards of US\$90 billion, UL is leading the way on the production of bio-based carbon fibre, which could signal the dawn of a new green industry for Ireland. “Our team has converted organic waste from forestry into carbon fibres, which have already shown enormous potential in terms of performance in automotive, aerospace and wind-turbine demonstrator tests,” explained Dr Collins. “Our technology drastically reduces energy usage and carbon emissions during production, as well as the cost of carbon fibres. This is particularly significant as carbon fibres are known for their high performance and cost. In the future we can expect higher performance goods at lower cost to the consumer,” added Dr Collins, principal investigator and coordinator of the research project at Bernal.

With biorefineries popping up all around Europe, including in Ireland, to convert plant-matter or biomass to fuel, heat, power and chemicals, vast quantities of waste material called lignin are being produced as a result. Between 40 and 50 million tons of lignin are produced worldwide per year, and the state-of-the-art technology developed at UL can produce material using conventional and newly developed, energy-efficient, dry and waste-free processing and pre-treatment techniques. These lignin-rich waste streams are being converted to carbon fibre at UL using a production process that utilises less energy and produces a smaller carbon footprint. “Our bio-based carbon fibres are being used to produce composite materials for application in the energy, aerospace, biomedical and automotive sectors, offering a high-end commercial route to valorising forestry waste,” explained Dr Collins.

The research that developed this new production process began with LIBRE, an EU project that aimed to free the composite industry of its reliance on oil-based production. With LIBRE now finished, further H2020 funding has been secured for the VIBES project, which seeks to utilise the technology to develop the first fully bio-based and recyclable composite materials.



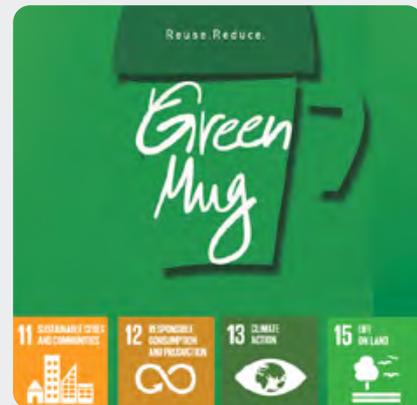
Bernal Institute partners in €6m nanotechnology project

From antiviral coatings for protective masks and gowns to sun creams and cosmetics, nanoparticles are making an inroad to consumer products of a market size that is expected to exceed €115 billion by 2024. ASINA (Anticipating Safety Issues at the Design Stage of Nano Product Development), a €6m EU H2020 collaborative project, will incorporate industrial six sigma practices to ensure nano-enabled products (NEPs) will be as safe as possible while taking on board the targeted function of the nanomaterial production technologies, safety, environmental sustainability, cost effectiveness and regulatory requirements in line with responsible innovation policy. The project is led by Dr Anna Costa of IST European Commission, Faenza, Italy.

In 2020, as part of the project, Dr Tofail Syed, a Bernal Institute member and Associate Professor at the Department of Physics, was awarded €300,000 to conduct physico-chemical characterisation of nanomaterials to determine the size-related health impact of nanomaterials. UL spinouts Trangsgero Ltd and Mica Nanotech Ltd are also partners in the four-year project. Once completed, the project will provide a roadmap to generalise ASINA-SMM and maximise the positive impacts of further products designed to improve environmental quality and human health and wellness.

Green Mug: Sustainability through reuse (Manasai Sheyte)

'Green Mug' is an attempt to promote sustainability through reuse on the UL campus. After extensive field studies, interviews and factual surveys of the waste generated on campus, we concluded that the use of paper/plastic coffee cups ranks the highest, at 2,000 units per day. During the project, our initial emphasis on waste disposal shifted towards waste minimisation coupled with an attempt to change the attitudes and behaviours of individuals and organisations in relation to managing waste. Considering this context of waste minimisation, the project considers zero waste as an answer to the issue of the humungous number of disposable cups used on campus by encouraging reuse as a sustainable solution.



The Green Mug is a reusable coffee mug accompanied by a mobile application that offers features such as a reward system, convenient mobile payment, a report on personal consumption and expenditure using the Green Mug and information on campus cafés. The system also includes an online presence in the form of a website and social media channels to promote the Green Mug concept. The objective of the project revolves around designing the interactions that will encourage the reuse of a travel mug in order to make it more acceptable by the campus community, considering all the issues related to its daily use. In addition, an awareness campaign is being proposed as a solution to promote and encourage the concept of reuse for sustainable waste management on campus.

Giving Voice

"A critical global driver in manufacturing is sustainable production and consumption, and this can be achieved by digitally connecting the customer to the supply chain to the factory. Digital tools are essential so that we can respond quickly to rapidly changing demand signal on the consumer side and to reuse, remanufacturing and recycling at the end-of-product-life side. CONFIRMS's key focus is on the development of cutting-edge digital technologies, such as vision systems, AI, machine learning and system integration, to enhance manufacturing, both in Ireland and globally. We now use these digital tools to solve sustainability challenges in manufacturing with industry; this is particularly exciting as it will have a significant positive environmental impact by promoting recycling and reuse of products, thus helping create smarter supply chains that will help us realise a circular economy."

Professor Conor McCarthy, Confirm Centre Director & Principal Investigator,
School of Engineering

Take urgent action
to combat climate
change and its
impacts.

13 CLIMATE
ACTION



€5m climate change research project

UL will collaborate with a host of industry partners and other HEIs on a new €5m climate change research project. Co-founded by Microsoft Ireland and SFI, the project, known as Terrain-AI, will focus on improving understanding of the impact of human activity on land use and how it relates to climate change. The research will initially focus on test sites in Ireland with the aim of reducing global carbon levels by sharing the insights and models developed with other countries.

Leveraging the latest multimodal sensing technologies, IOT devices and the Microsoft Azure Cloud, the project will build AI models that can inform more effective and sustainable management practices, leading to significant carbon reduction. Led by Maynooth University, the project will be conducted in collaboration with Teagasc, Trinity College Dublin, University College Dublin, Dublin City University and UL. Dr Ken Byrne of UL's Department of Biological Sciences, School of Natural Sciences is a co-principal investigator on the project. Data will be captured from satellites, airborne platforms and in-field instruments from 14 test sites strategically located across Ireland. To ensure a broad representation of land usage and to improve our understanding of the interactions between the land and human activities that lead to carbon emissions, the test sites will include all types of land, from grasslands, croplands, forestry, wetlands and peatlands to urban areas.

Research in this area to date has focused on individual land use types or activities relating to a specific sector. However, this project will integrate insights and data from multiple land types and multiple sectors into a modelling framework that will inform more effective policies to reduce carbon emissions. It will also help to inform future carbon-output-reducing practices such as precision farming, carbon sequestration of grassland and tree planting in urban areas as well as new approaches to public transport.

'Young people want a better future': High-profile climate activist speaks at UL conference

A high-profile activist spoke at a UL conference on why black voices matter in the collective response to the climate crisis. Vanessa Nakate, a Ugandan youth activist who came to prominence when she was cropped out of a photo of herself and her fellow activists at Davos, spoke at the KBS-hosted seventh biennial International Symposium on Cross-Sector Social Interactions (CSSI 2020) conference. CSSI 2020 came to Ireland for the first time at a pivotal moment for the UN's sustainable development agenda and the future of cross-sector partnerships. The event played host to over 100 academics from more than 20 countries and to a range of practitioners, including partnership broker organisations, NGOs and directors of corporate social responsibility (CSR) in a range of multinational organisations.

Vanessa Nakate, who received an apology from the Associated Press for being cropped out of the photo at Davos, stated ahead of her appearance at the conference in UL, "We are seeing very many young people across the world demanding action. We are seeing the power that is in this global activism and the message is very clear: young people want change, young people want a better future, young people want to be able to live. Many of them have dreams, we have hopes, we have many things we want achieve in this world. But how can we be sure we will be able to achieve all these things, with a future that is so uncertain?"

Dr Annmarie Ryan, chair of CSSI 2020 and lecturer in marketing at the KBS – the only school in Ireland championing the UN's Principles for Responsible Management Education – said, "Vanessa Nakate brings into focus the lived experience of climate change, from the perspective of a young person living in Africa. She teaches us that collaboration is important – collaboration among businesses, government and non-profit organisations. But more than this, that this collaboration must be about action and a recognition that the UN sustainable goals cannot be achieved without listening to the voices of those who are affected most. We are delighted and honoured to have Vanessa speak at the symposium."

An important aim of the conference was to enable practice-theory dialogue and harness the expertise of academia to advance practice in the field. The specific theme of the 2020 conference was partnership and place. “Greater sensitivity to how place constrains and enables organising around issues like climate change can enrich both theory and practice of cross-sector partnerships in settings experiencing inequality and fragility,” explained Dr Ryan. “As such, CSSI 2020 aligns well with Ireland’s international development policy, A Better World, in particular aspects of capacity, coordination and working in partnership and has been supported by Irish Aid, which we are very grateful for,” she added.

Irish Aid was one of the main sponsors of the event and has focused its support on investing in the next generation of scholars in the field by providing a new bursary scheme for doctoral and early-career researchers. The bursary scheme will focus specifically on the role of partnerships in localised responses to the COVID-19 crisis.

Composite materials to make space applications more economical

In December 2020, a paper published in Composites Part B: Engineering described the development of a lightweight and compact deployable space boom using shape-changing, composite lattices. The boom can deploy up to 20 times its stowed size while weighing only 400 grams. The new lightweight material is significant to the development of space applications because it currently costs approximately \$20,000 for every kilogram sent into space. This research could facilitate micro satellites to perform more power-demanding experiments and possibly allow them to perform interplanetary missions. The project was funded by SFI, and the paper was authored by Bernal researchers Dr Ciaran McHale, Dr Robert Telford and Professor Paul Weaver.

Decarbonising together

Limerick received funding for the Limerick Decarbonisation Project. This Creative Ireland initiative supports creative, cultural and artistic projects that build awareness around climate change and empower citizens to make meaningful behavioural changes. The project is a collaboration between communities in Limerick and the arts, culture and creative sectors in partnership with UL’s Fab Lab, Colaborativa and Space Engagers.

Identified through an expression of interest, five community groups will be invited to examine decarbonisation and Limerick’s decarbonisation plan, identify an aspect of decarbonisation that matters to them and then work with a creative partner to explore and enable behaviour change towards decarbonisation in their day-to-day lives and activities. The groups will be paired with an arts or creative industries partner selected through an open call process. It is anticipated that there will be five outputs from the collaborations in a range of creative mediums and skills. The collaborations will support learning and working together and will use Limerick’s Citizen Innovation Lab as a collaboration platform to create impact through empowering communities to decarbonise Limerick by 2050.

What planet are you on? Energy and transport expert Professor JJ Leahy explains how to cut down on energy waste at home

UL Professor JJ Leahy played an active role in a national TV series entitled ‘What Planet Are You On?’. The programme aimed to bring conversations around sustainable living into our homes across Ireland. It featured a number of families that, over several weeks, tracked their behaviours and attempted to begin to live more sustainably with the help and support of several experts, one of whom was Professor Leahy. What Planet Are You On? offered a unique opportunity to present a global challenge from the perspective of families living ordinary lives.

Energy and how it is consumed is fundamentally altering the geography and biology of the planet, and the speed and manner in which the global population will adapt to these changes will have consequences. Energy consumption is higher in richer than in poorer countries and is related to our lifestyles and our real and perceived needs. According to Professor Leahy, the energy consumed within households in Ireland is generating a quarter of the nation’s energy-related CO₂ emissions. From 2006 to 2014, there were significant reductions in the CO₂ emissions from homes, primarily due to a shift from coal and oil to gas heating, but this was reversed from 2014 to 2016, probably due to a more buoyant economy. As awareness of climate change and personal responsibility grows, this trend is reversing. For most homes, heating can have almost three times the carbon footprint of electricity.

The Commission for Regulation of Utilities (CRU) suggests that the average Irish household uses 11,000 kW/h of gas and 4,200 kW/h of electricity each year. Actual energy usage differs depending on the size of the home and how many people live there, as well as other factors like whether the house is occupied during the day or not. Some of the families used more. The 4,200 kW/h of electricity used by a typical Irish household compares with 4,000 kW/h for the EU average but we compare poorly against the Netherlands. People will be surprised to learn how much energy they consume in their tumble dryers (more than twice that of their washing machine). In Ireland, we wash our clothes more than is necessary because the tumble dryer provides us with a very convenient way of drying clothes. Electricity is not the major culprit as between 2005 and 2016, electricity usage in households increased by 5% but the associated CO₂ emissions decreased by

20%. However, this was due to reasons outside our personal control, mostly the replacement of coal and oil with natural gas as well as greater penetration of wind on the electricity grid.

All the families who participated in the show were aware that their cars were the biggest contributors to their carbon emissions but were surprised to learn that it was five times greater than all electricity usage in the home. For the two rural-based families, the Gannons and McKeivitts, this was not surprising as their commutes to work were exceedingly long and there was no public transport alternative. When the series concludes, the challenge for the families involved will be to maintain a realistic reduction in energy-related carbon footprint while retaining many aspects their lifestyles. These families provided inspiration for the rest of the country through their humour and persistence.

Student Showcase

GOAL: Global issues tackled at UL (Danial Sabourin-Leduc)

Danial Sabourin-Leduc is a marketing master's student at UL. In September 2019, GOAL asked Danial's class to develop marketing campaigns that would deliver GOAL's values to the campus. Here Danial writes about his experience working on this project and highlights global issues: "After we received a briefing from Eamon Sharkey, GOAL Global Head of Fundraising and Marketing, the class was divided into two groups: one to focus on global issues and the other on local issues. My team was allocated global issues with a focus on climate change. While I first became aware of climate change in geography class in 2006, all the noise surrounding the topic had desensitised me to the issue over the years. I found myself wondering how I could talk about climate change when I could barely explain it myself! We decided on a campaign to educate people on the effects of climate change around the world, regardless of their knowledge on the topic. There are various levels of understanding on the climate crisis. Some people do not know where to start and, for that reason, are unsure where to begin their involvement. Other people dedicate their lives to the cause but may have lost sight of the current climate.

"The campaign was broken into three sections: a social media campaign, a live event, and a post-event round-up. The social media campaign was launched on Instagram and Facebook, where we had a total of 20,500 followers. On these platforms we provided information on the various effects of climate change to educate people on how we can make a global difference. Each day we shared relevant information on climate change and actions we can all take to combat the climate crisis. Social media proved key in promoting our GOAL Mile event in UL, and we were really pleased with the attendance. We included live music, food and sustainable prizes to create a positive atmosphere and discuss why it is so important to be aware of global issues. Those in attendance were invited to measure their carbon footprint via an online calculator as part of the event. Attendees were shocked at the impact they are having on the environment. One group was shocked find out they would need to plant between 150 and 250 trees each year to offset their carbon footprint.

"Reusable cups were gifted to those in attendance to encourage the use of reusable plastic. Speakers included Sinead McDonnell, the Environment Awareness & Education Officer for Limerick City Council, and members of UL's Environmental Society. They appealed to attendees to make local efforts to fight climate change. This and the GOAL Mile at UL were incredibly successful and demonstrated that the students of UL are looking to act against climate change. Every step brings us closer to a greener environment, no matter how small."

Athrú: Tackling Climate Change (Barry McGrath)

Athrú (Irish); to change or alter. The world needs a solution to the problem of climate change. A large contributor to this problem is us, the consumer. We need to change our lifestyles and approaches to buying in order to achieve a more sustainable world. A first step is what we wear on our feet. Disposing of your shoes is a challenging task; however, it is made quite a lot easier when we can simply throw them into our nearest waste bin. Barry McGrath, a Product Design student, designed a shoe that can be disposed of in a simple and more environmentally friendly manner.

By expelling the use of excessive adhesives, the shoe can be taken apart easily and the components disposed of in a more sustainable fashion. Alternatively, worn-out parts can be replaced, thereby extending the life of the shoe.



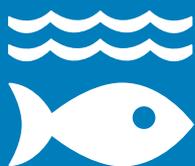
Giving Voice

“The first-year students entering UL today will be working until about the year 2070. By that time, we hope that the world will have been completely transformed in terms of its approach to energy, materials and waste. Sustainability is about considering the lives and careers that our students will experience and how we can prepare them to lead these changes, and we should use every opportunity that a university presents to do this.”

Professor Colin Fitzpatrick, Head of Department and Associate Professor in the Department of Electronics and Computer Engineering

Conserve and sustainably use the oceans, seas and marine resources for sustainable development.

14 LIFE BELOW WATER



Health supplements powered by the ocean

In collaboration with Dublin City University and University of Limerick, Bio-marine Ingredients Ireland (BII) was awarded funding of €200,000 under the Marine Institute's industry-led awards scheme to conduct research into developing a new health supplement based on blue whiting fish protein. Under this research project, BII produced a soluble protein hydrolysate powder, which may be rich in nutrients and vitamins to improve the muscular health of elderly people. Decreased muscular strength and muscle wasting are of concern in the elderly population. Muscle loss can be significant enough to cause weakness, increase the risk of falling, limit a person's independence and decrease their quality of life.

The next stage of the research project will include a clinical study at Dublin City University with healthy elderly subjects taking the nutritional supplements alongside an 8-to-12-week physical exercise programme. Blood samples will be assessed before and after the clinical study to indicate the level of healthy muscle metabolism. The impact of the soluble protein hydrolysate powder on muscle metabolism will be assessed using human muscle cells at UL. BII extracts proteins, oil and calcium from fish caught in the Atlantic for use in food ingredients and nutrition products. BII is a joint venture between Irish fishing vessel owners and Norwegian partners who are experts in marine ingredients. BII has built the most advanced food-grade bio-refinery in the world in Lough Egish, Co. Monaghan.

Dr Snehal Gite, Senior Research and Development Technologist at BII, said, "We are one of the first companies globally to take under-utilised raw fish materials and transform them into powders suited to applications for human nutrition. At BII, we are processing a low-value blue whiting fish into a high-value nutritional ingredient that could offer enormous benefits for skeletal health in older people. The outcome of this research project could see BII enter a valuable global market, which will ultimately benefit Irish fishermen, industry and the associated supply chain." The successful outcome of this project could see the introduction of a new Irish health ingredient into a global market worth €12.4 billion. In developing value-added products from fish biomass, the project can also enhance sustainability in the fisheries sector.

Enhancing sustainability of the fishing Industry

UL's Dr Matthew Lees and Dr Brian Carson published research on enhancing the sustainability of the fishing industry. In the study funded by the Marine Institute, the two academics worked with industry partners Bio-marine Ingredients Ireland to evaluate the potential of a blue whiting-derived protein hydrolysate to increase circulating essential amino acids in older adults and to stimulate muscle protein synthesis in vitro.

A new network for Arctic researchers in Ireland

In collaboration with the Department of Foreign Affairs and Trade, the Marine Institute has launched the Network of Arctic Researchers in Ireland (NARI). NARI aims to create, maintain and develop an informal all-island network of Arctic researchers in Ireland to facilitate collaboration of scientific activities linked to the Arctic and to provide independent scientific advice to the public and policy makers.

According to the Intergovernmental Panel on Climate Change Special Report on the Ocean and Cryosphere, the extent of Arctic Sea ice is declining and getting thinner. Glaciers and ice sheets in polar and mountain regions are also losing mass, contributing to an increasing rate of sea level rise and expansion of the warmer ocean. Sea level rise will increase the frequency of extreme sea level events, and warming oceans are disrupting marine ecosystems. With significant demand for enhanced knowledge and services to observe the changes in our oceans, NARI aims to enhance collaboration and promote Irish-based Arctic research activities, seek international polar cooperation and support the next generation of Arctic scientists. The new all-island network (NARI) brings together multidisciplinary scientists from NUI Galway, UL, National Maritime College of Ireland, Cork Institute of Technology, Queens University Belfast, Maynooth University, University College Dublin, Trinity College Dublin, University College Cork and Dublin Institute of Advanced Studies.

Building innovative vessels

UL is a partner in FIBRESHIP, an innovation project with a budget of €11m, of which €9m is funded by H2020. The project attempts to overcome current market challenges and technology gaps to make feasible the building of innovative vessels by using fibre-reinforced polymer (FRP) materials. The project aims to demonstrate the feasibility of using FRP materials in three vessels categories: light merchant ships, passenger transport and leisure ships, and special service vessels. Stakeholders expect that the use of these materials will significantly reduce the structural weight of the vessel and, accordingly, reduce energy consumption. The project will develop a comprehensive guide covering design issues and approaches within these three categories, and the guide will form the basis for future guides and regulations for all ship types. To complete this task, representative ships for each category will be designed: a container ship, a ferry, and an oceanographic ship.

FRP materials and construction processes proposed in FIBRESHIP will attempt to improve the efficiency of vessels, both in terms of energy consumption and maintenance costs, thereby offering better solutions for the maritime sector. Considering the acquired experience in small-length vessels and naval ships building, a significant weight reduction can be achieved, which would have several advantages. One example of a potential benefit of weight reduction to ship owners is a reduction in fuel consumption because of the use of a smaller power plant, which would, in turn, reduce greenhouse gas emissions. Other benefits relate to the immunity to corrosion (with the corresponding reduction in OPEX) as well as the potential reduction in underwater radiated noise levels thanks to the higher damping properties of composites.



Giving Voice

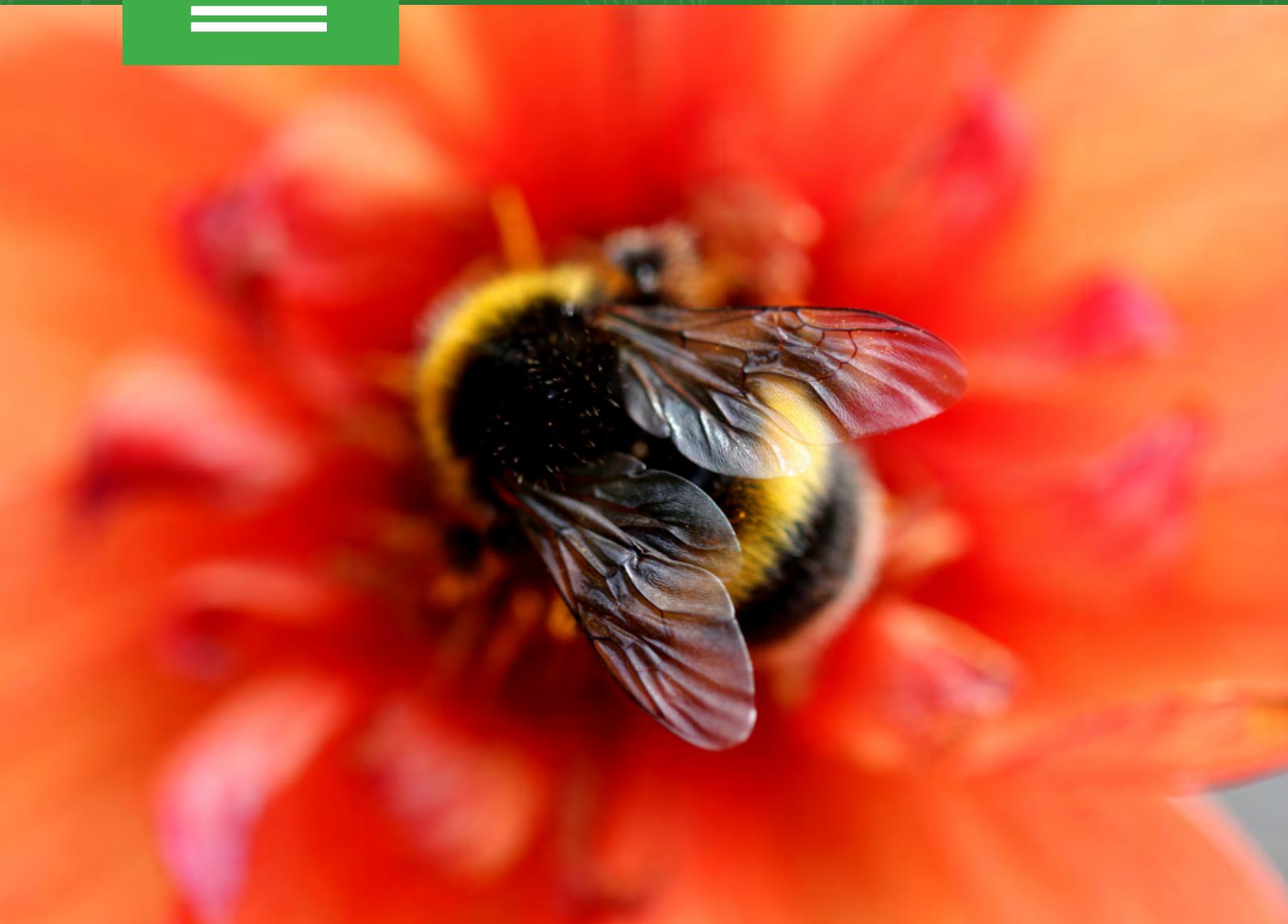
“We are responsible for graduating future sustainability leaders and changing agents. Now, more than ever, we have a historic opportunity to make transformational changes in higher education to contribute to a sustainable world. Let’s do it. Let us change the culture within universities, adopt curricula based on sustainability principles and open our arms to students from developing countries. Let us stand together for the well-being and future of our planet.”

Dr Khalifa Elmusharaf, Director of UL’s MSc in Public Health and Chair of Board of Directors of the Irish Global Health Network



Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.

15 LIFE
ON LAND



Exploring the circular bioeconomy

Professor JJ Leahy, Bernal Institute member and Associate Professor at the Department of Chemical Sciences, is leading two EU projects on the circular bioeconomy – REFLOW and BLOWILL. REFLOW is an interdisciplinary cross-sectoral European Training Network. It combines world-leading scientists and key stakeholders in dairy processing, fertilizer production and phosphorous recycling with early-stage researchers to address important challenges associated with the recovery of phosphorous from dairy processing wastewater and its recycling into fertilizer products with a view to enabling sustainable expansion of the dairy industry in Europe. REFLOW research will (i) mitigate the environmental impact of dairy processing waste on soil and water, (ii) provide safe environmentally sustainable, cost-effective closed-loop solutions for crop nutrient management and (iii) meet the demand for skilled professionals to support the technical, regulatory and commercial development of the market for recycled phosphorous fertilizer products in accordance with the deliverables of the Circular Economy Package.

REFLOW will achieve these goals by creating an innovative and entrepreneurial training environment for the next generation of scientists. Thirteen early-stage researchers will be recruited in a network of 10 beneficiaries and 14 partner organisations that bring complementary expertise and experience of delivering technical solutions, socio-economic modelling, environmental analysis, policy frameworks, high-level training and commercial entrepreneurship. Graduating fellows will be equipped with a unique range of relevant interdisciplinary and cross-sectoral skills for careers as independent industrial or academic researchers, entrepreneurs, regulators or agri-environmental specialists. REFLOW will train the fellows through an integrated and cohesive curriculum of network-wide partner training activities, including industrial secondments and embedded commercially driven research projects. The outputs from REFLOW will influence land management practice, the rural bioeconomy framework and EU policy goals while significantly progressing state-of-the-art phosphorous recycling.

The BLOWILL project aims to be a flagship for rural Ireland through a zero-waste biorefinery that uses all fractions of willow trees to produce high- to medium-based biochemicals/materials and renewable energy in the form of biomethane production and natural fertilisers. The project comprises 10 partners in four countries across Europe.

Natural capital accounting: Unpacking the benefits of nature

Ireland's environment is a priceless asset that we all depend on for food, water, air, energy, inspiration, beauty and wonder. We all have an impact on it, too: our way of life is the major driver of climate change, biodiversity loss and water, soil and air pollution. Integrated, evidence-based solutions are urgently needed to inform policy and support decision-making that recognises nature's limits and enables us to live within them. Natural capital accounting is one such potential solution. Using methods familiar to statisticians and economists, this new approach seeks to connect ecosystems and the benefits they provide to people with the beneficiaries.

Funded by the Environmental Protection Agency (EPA), the Irish Natural Capital Accounting for Sustainable Environments (INCASE) research project commenced in March 2019 and will run until 2023. INCASE is the first Irish project to develop natural capital accounts for different sites in Ireland. INCASE combines the skills of natural scientists, economists and statisticians to account for nature's benefits to people so that we can take stock of what we have in a way that helps everyone to better understand nature's importance and to manage it in a more sustainable way. The INCASE team will map, assess, measure and account for these benefits. The project team will prepare accounts for four catchments across Ireland using the UN System of Environmental-Economic Accounts (SEEA) Central Framework and SEEA Experimental Ecosystem Accounts guidelines. Accounts for the four catchments will map the stocks and flows of ecosystem and geosystem services, highlight challenges, knowledge and data gaps and recommend a framework to operationalise natural capital accounting in Ireland.

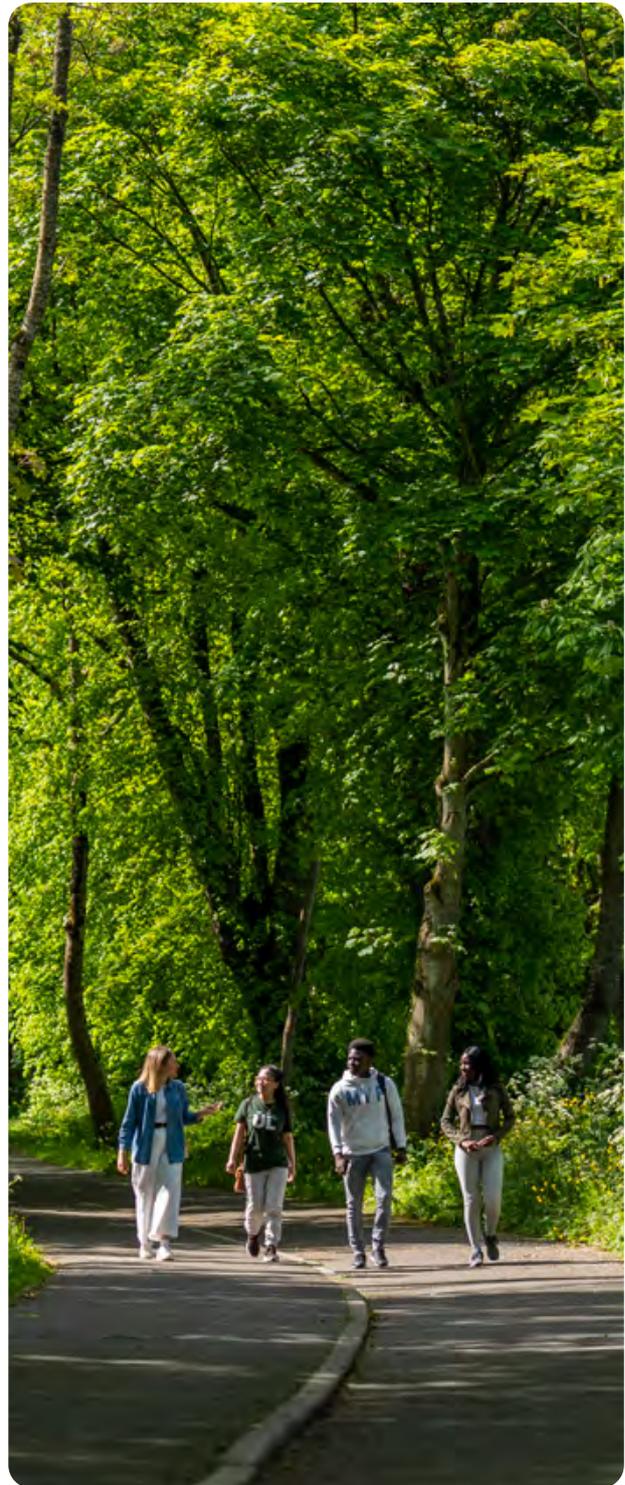
The project has been divided into three phases, each with key associated activities that will drive the partnership across four Irish universities (including UL), the EPA and others. UL's Professor Stephen Kinsella will focus on phase 3, economic analysis.

UL in top 20 in UI GreenMetric World University Rankings

UL has improved its position in the UI GreenMetric World University Rankings, which measures each participating university's commitment to an environmentally friendly future. The university climbed to 17th place out of over 900 universities in the 2020 rankings. The improvement from 20th place in 2019 was welcomed by UL President Professor Kerstin Mey: "We have achieved this by working together on a whole range of green initiatives on campus. Individually, we have followed the lead of areas like the Glucksman Library in getting rid of disposable cups, we are all more energy and waste aware, we have used the dedicated walking and cycle paths that now link our university with the city, we have car-pooled and recycled," Professor Mey explained. "Our UL Green Campus Committee, Environmental Committee and Environmental Society, made up of staff and students from across the campus, have led the way on many of these changes. Our UI GreenMetric ranking is notable, but this success speaks more widely to one of the ways we will develop into the future, aligning ourselves to the UN SDGs and sustainability. Small lifestyle changes individually can make a big difference collectively," Professor Mey added. UL is situated on a stunning greenfield site that was voted Best Student Campus Ireland earlier in 2020. It is the second year in a row that UL's 367-acre campus won the award, a recognition of the unrivalled facilities on offer to the 16,500 students attending the university.

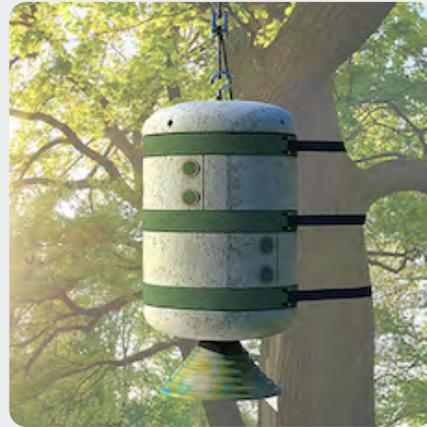
Life on Land Farmhedge

Dr John Garvey of the KBS founded Farmhedge with the support of Enterprise Ireland. Using innovative digital technology, the company enables farmers to make their businesses more viable by forging better links with their suppliers and customers. This reduces the flight from the land and leads to more sustainable rural communities, allowing farming families to thrive.



Econooc: UL student wins James Dyson award for unique beehive design (Niamh Damery)

A University of Limerick student was announced as the national winner of the prestigious James Dyson Award for 2020. 22-year-old Niamh Damery of Product Design at UL won the award for her Econooc design – a digital hive made for conserving wild native endangered Irish Black Bees. Niamh, who graduated last month, has attempted to solve the problem of the declining population of the native Irish Black Bee by harnessing natural materials to create a conservation hive. On winning the James Dyson Award, Niamh said: “I entered into the award because I know James Dyson’s ethos and I think he’s an amazing designer. As designers I think we have the power to make both big and small changes but also make changes in people’s mindsets with what we design and how we design it. “This is what motivates me as a designer, and it’s amazing to receive the recognition of such a prestigious design award.” Barry Sheehan, Head of Design at Technological University Dublin and judge on this year’s panel said: “We were unanimously drawn to Niamh’s creative innovation around this urgent issue of the declining bee population in Ireland. In the current climate people are spending more time outside and in gardens, and the Econooc demonstrates the crucial role that design plays in a sustainable future and the survival of Irish Black Bees.”



Brid Bláth: An Environmental System for the UL Community Roof Garden (Cristina Dobrisan)

The continuous climate changes that have been taking place in the last century have led to an increase in the number of environmental concerns, which, in turn, has resulted in a growing body of research. This research is meant to examine the relationship between computing and the environment, between human computer interaction and sustainability, even though people are still reluctant to associate gardens with technology. The Brid Bláth project explores how environmental data can be used to support members of a community garden in their usual activities. Brid Bláth is an example of an Internet of Things system that people can understand. The system provides the garden members with useful environmental data to make them more aware of the soil and air conditions. It comprises one small box presented as a colourful plastic flower, which represents the waterproof shield for the Arduino circuit, a waterproof shield for one of the sensors and a web camera. The system collects data from the UL Community Roof Garden and display it on the Brid Bláth in a way that appeals to the public.



Furthermore, the system supports a permanent connection between the garden and people through broadcasting images of the UL Community Roof Garden. While dedicated to a community, the system also addresses the individual through ‘bringing’ the garden’s status to the user’s desk. The physical, visual representation of the state of the garden is represented through the Brid Bláth desk plant.

Our Planet: Engaging with climate action through interactive experiences (Mary O'Dea)

The aim of this research on engaging with climate action through interacting with nature is to explore interactive experiences in natural city settings to promote a sense of care for nature. Literature supports the importance of experiences in nature when it comes to fostering a greater appreciation of nature in adulthood. Mary O'Dea specialises in user design and is a student from the Department of Computer Science and Information Systems at UL. The Tree Whispers Trail was created to facilitate interactive tree-based experiences in a natural setting in Limerick city with the aim of doing just that. The trail explores the potential of participatory interactive art to interrogate our relationship with nature.

Participant testing and evaluation of the Tree Whispers Trail indicated that the concept has potential to encourage participants to spend time in nature and, through the interactions, enjoy experiences that foster a greater appreciation of the trees in their local green spaces. The Tree Whispers Trail offers a template for building appreciation and care for nature as a foundation to engaging with climate action.



Giving Voice

"It is a privilege to be responsible for the grounds and river that support our thriving campus. We must never take it for granted but live in harmony alongside our natural surroundings. Here at UL we strive to give nature the space and time to rejuvenate. Personally, I believe that given the opportunity, nature itself has most of the answers, and it is amazing to see the seasons come and go and witness the natural healing ability of the landscape. Sometimes it is better to just let it do its thing while we continue to learn about its delicate balance. We are all responsible to act as custodians of this amazing natural habitat that is our campus."

John O'Sullivan, Grounds Manager, UL

Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.

16 PEACE, JUSTICE AND STRONG INSTITUTIONS



UL's Greentown project wins top award at European Crime Prevention Awards

The UL-based Greentown research project won a major European Crime Prevention award on 27 November 2020. With the aim of disrupting the recruitment of children by criminal gangs, the innovative project is a strategic initiative between UL's School of Law and the Department of Justice on the design, implementation and evaluation of youth justice interventions. The award committee particularly noted that the Greentown project "holds an unparalleled theoretical foundation. It is well designed with a methodological and holistic approach. The project is a good example of a multi-agency approach the project is well documented and as a result can be replicated in other countries. Although the project is in its early stages it is considered one to keep a close eye on in the future." Upon receiving the award, Professor Seán Redmond (UL School of Law) said, "I am delighted to accept this award on behalf of the Department of Justice and the University of Limerick. It is terrific that our work in Ireland has been recognised by crime prevention experts across Europe. We are happy to share our approach with other jurisdictions."

Minister of State at the Department of Justice with responsibility for Youth Justice James Browne offered his congratulations to the REPPP (Research Evidence into Policy, Programmes and Practice) team that developed Greentown. "The Greentown project seeks to reduce the effects of crime networks on children in local neighbourhoods and provide a practical route out of criminal activity for those already caught up," said Minister Browne. "This is important work, as we know the beneficial impacts of early intervention in these types of situations. The work is also very much a team effort involving scientists from the School of Law, Department officials and An Garda Síochána working very closely together, and I want to offer them all my sincere congratulations, and thanks."



UL researchers team up with Brazilian police to target distribution of child pornography

A group of UL researchers have teamed up with the Federal Police of Brazil to tackle the distribution of child pornography on the dark web. Brazilian Minister of Justice Sergio Moro hailed the innovative collaboration between the researchers at UL and Brazilian law enforcement, which sought to make police operations more efficient. Recently published in the Nature's Scientific Reports journal, the research details the results of applying network analysis to assess the effectiveness of Operation Darknet – a Brazilian Federal Police crackdown on one of the largest paedophile online forums hidden by the Tor browser.

Carried out between 2014 and 2016, the police operation led to the arrest and identification of 182 users – 170 of whom were distributors – and the rescue of six children. Of over 10,000 users, 766 were sharing content. The team of researchers from the UL-based Mathematics Applications Consortium for Science and Industry (MACSI) and Centre for Social Issues Research subsequently investigated how effective the operation was in disrupting the distribution of the content. The research team, which included a federal police officer from Brazil, used the analysis to suggest the best ways to target individuals to maximise the effect of the disruption. "Network analysis has previously been applied to drug trafficking networks and terrorist networks to identify structural weaknesses and key figures in these illicit networks," explained Dr Pádraig MacCarron, a post-doctoral researcher at the Centre for Social Issues Research and MACSI, who worked with Dr Bruno da Cunha, Kleber A. Oliveira and Professor James Gleeson on the research.

Dr MacCarron explains: "The dark web network in this study was much denser – there were more connections between users than normal, making it more difficult to break down using traditional network methods. It was found that the 60% of those core 766 distributors would need to be removed to completely fragment the network. This makes the network highly robust. The approach was then taken to try to disrupt the most content shared. Ten of those distributors each had their content viewed more than 100,000 times. This contributed to almost one third of the total views. Of those 10 distributors, eight were arrested. Twenty arrested who had received the most views provided 39% of the content. The best the police

could have achieved with 20 arrests would have been a reduction of 43%. Initially the police investigation was highly effective, quickly arresting those responsible for more than half the content provided. However, subsequent targets were less optimally selected so that the total arrests reduced the posts by 58% of a possible 92%. This analysis hopes to help lead to more efficient police interventions.”

The team believes the collaboration to be a first between Brazilian law enforcement and Irish mathematicians. Minister Moro mentioned the UL research in an interview, outlining that “one should invest in intelligence methods to enrich police work” and that “the publication is an index of the quality of the scientific know-how of the Brazilian Federal Police.” The research was partly funded by SFI and the ERC.

UL and Criminal Assets Bureau to target proceeds of crime on new course

A new course at UL will provide training to law enforcement in the area of proceeds of crime investigation, asset identification, seizure, confiscation and recovery. UL and the Criminal Assets Bureau (CAB) are to work together on the new Postgraduate Diploma in Proceeds of Crime and Asset Identification. The course is expected to start in September and will be run out of UL’s School of Law under Head of School and course director Professor Shane Kilcommins. The objective of the postgraduate diploma is to provide a recognised standard of training for staff in CAB and other law enforcement, regulatory and administrative agencies in both Ireland and internationally who require academic and professional training in the field of specific investigations.

Such training and education will help to establish standard operating procedures and identify established best practice in effective proceeds of crime investigations. UL already accredits the Garda Síochána level 7 and level 9 training programmes; it provides an online level 8 top-up programme in Applied Policing for members of An Garda Síochána and an MA in Serious Crime Investigation for those who have completed the postgraduate diploma in serious crime investigation. UL also offers an undergraduate degree in criminal justice and an LLM/ MA in Criminal Justice and Human Rights. According to Professor Kilcommins, “The new programme also fits with UL’s strategic objectives by engaging with a key stakeholder in the field.” The market for the programme will have an international reach given that CAB is a recognised leader in the field of asset forfeiture, and it will have a very strong domestic reach given the hundreds of regulatory agencies that exist in Ireland.

Chief Bureau Officer Detective Chief Superintendent Patrick Clavin said, “The Criminal Assets Bureau looks forward to building on our close working relationship with University of Limerick. The Bureau welcome this opportunity to upskill its Bureau officers to meet the challenges posed, both nationally and internationally, in asset identification, asset confiscation and asset recovery. The course provides the opportunity to ensure that best international practices are adhered to and that knowledge is transferred to ensure effective continuity into the future.”



2020 impact case study helping voters make an informed choice

To make an informed decision in a democratic election, voters must critically assess the policies and track record of both the political parties and candidates competing for their vote. However, the lack of accessible, objective information in the public domain makes this a challenging task and risks many voters making a decision on more superficial grounds, such as campaign slogans and posters. Research at UL is actively exploring and tackling this problem. Voting advice applications reach a mass audience of undecided voters, helping them to make an informed decision based on policy. Dr Rory Costello of UL's Department of Politics and Public Administration elaborates: "Democratic elections are supposed to lead to a parliament that represents the views of the voters. However, our research shows that there are often significant differences in the policies supported by parties and the views of their voters, especially when we look beyond the main economic issues that typically dominate media coverage. This highlights an 'information deficit' during elections."

To address this deficit, Dr Costello has pioneered the use of voting advice applications (VAAs) in Ireland. VAAs are online platforms that provide voters with a way to quickly compare parties and candidates and find out who they align with most on a wide range of issues. Having collaborated on several VAAs in Ireland and internationally since 2007, Dr Costello developed WhichCandidate.ie in 2015, which is tailor-made for the Irish political system. Dr Costello adds: "The impact these online tools have had is evident both in the volume of traffic they have attracted and feedback from users. WhichCandidate was used by more than 130,000 voters during by-elections and the 2016 general election campaign. Many users were young, unattached voters. These are exactly the type of people who are likely to abstain in an election when they feel they lack the relevant information. Many have commented that using the site has not only helped them to decide but also given them a fresh perspective on politics."

While these projects were developed to address challenges identified by previous research, they have, in turn, fed into further research on political representation. Data collected through the VAAs on the policy preferences of voters and candidates and

data collected by Dr Costello on the performance of parties in office have been used to study the dynamics of political representation in Ireland. To maximize public impact, this research has been produced and publicised through a range of national and local media outlets during the relevant election campaign rather than after the event, as is usually the case with academic research. In this way, the research has helped to shape the public debate at election time.

An Garda Síochána's Expert Review Group on Recruit Education and Entry Pathways and Learning and Development

Professor Shane Kilcommins has been appointed to An Garda Síochána's Expert Review Group on Recruit Education and Entry Pathways and Learning and Development. The Expert Review Group (ERG) will provide strategic advice and make recommendations to An Garda Síochána in respect of the areas that are fundamental to the successful delivery of learning and development interventions in the organisation. The ERG will also advise on the implementation of the specific recommendations set out by the Commission on the Future of Policing in Ireland, including those in respect of recruit education and the revision of entry routes and pathways into An Garda Síochána.

Launch of community safety pilot

Dr Johnny Connolly of the Centre for Crime, Justice and Victim Studies at UL has been involved for the past five years in developing a Community Crime Impact Assessment (CCIA) to inform future approaches to community safety in collaboration with the Citywide Drugs Crisis Campaign, Community Action Network and Fingal United. The evaluation of the pilot CCIA was conducted by Dr Jane Mulcahy before joining the REPPP team. The event took place with approximately 200 people in attendance, including the Garda Commissioner.

Research on hate crime

The Hate and Hostility Research Group has been awarded funding from the EU Directorate-General for Justice for a two-year multi-country research on hate crime. The project will examine the application of criminal laws and sentencing provisions for hate crime across five EU member states – Czech Republic, Ireland, Latvia, Sweden and the UK – capturing best practice in the tools used to combat hate crime across Europe as they relate to strategies of legal intervention and the implementation of these rules.

Over the past 10 to 15 years, EU member states have sought to combat and prevent hate crime by enacting penal provisions that enhance the punishment of hate-motivated offenders. The application of provisions has not been uniform; some countries have created new bodies of legislation to criminalise hate crime offences (UK), others have amended criminal codes to aggravate existing offences (Sweden, Czech Republic and Latvia) and some have no specific hate crime provisions (Ireland). Official reports on the number of annually recorded hate crime in each jurisdiction vary significantly: UK 47,676; Sweden 5,518; Czech Republic 173; Ireland 119 and Latvia 18 (OSCE 2013).

The objectives of the research are to:

1. Detail the operational realities of hate crime legislation by gathering experiential accounts of the legislation ‘in action’ from legal professionals.
2. Document differences in both victims’ and offenders’ experiences of the criminal justice system according to the legislative and policy context.
3. Identify shortfalls in the legislative responses to Article 4 of the Framework Decision on Racism and Xenophobia as well as existing hate crime legislation among participating member states.
4. Identify best practice models of hate crime legislation and supporting policy among the participating member states and tailor these, where appropriate, to common and civil law systems.
5. Develop manuals outlining best practices and recommended legislative models on hate crime.
6. Disseminate information across the 28 member states to enable states to benchmark, learn and develop strategies to combat hate crime.
7. Inform future EU policy and legislative responses to hate crime.

UL hosts election debate on future funding of higher education

In January 2020, UL hosted an election debate on the future funding of higher education for a 200-strong audience of UL students, staff and invited guests. The debate was moderated by Professor Stephen Kinsella of the KBS, and participants included Labour TD Jan O’Sullivan, Fine Gael Senator Maria Byrne, Green Party Councillor Brian Leddin and Aontú candidate Michael Ryan. The event came on foot of the representative bodies for the public higher education system – IUA, THEA and the USI – uniting to make the case for investment in higher education by the next government. Speaking to the candidates and the audience prior to the debate, UL President Dr Des Fitzgerald acknowledged the “key competing priorities for the State and the next government to address – issues relating to housing, health and environment. But the investment in the success of our current universities, in learning, in research, in providing future generations with the principles and knowledge that will allow them to build their future, is critical for individual and societal success.” Dr Fitzgerald added, “At this juncture, it is important that we clearly know from the political parties what they are going to do to make third-level university funding a national priority. I hope that we will hear that they will invest in UL, invest in the future of this great university. We need to know how a new government will support UL so that it can continue to meet the ambitions of our region.”

Each candidate was asked this same question before the debate continued: “The public’s main priorities in this election seem to be health and housing. Higher education has been underfunded since the crisis. We know higher education is important both as an investment in our people and for the future of our economy. What will your priorities be for higher education over the lifetime of the next Dáil?” Professor Kinsella said the aim of the debate was that the participants and audience would “come away with a better understanding of the priorities for higher education and the likelihood of policies coming from the parties that will actually positively impact our students, but also our researchers into the next four or five years.” He added that it was “vital that students understand that policies have a direct impact on their welfare, and it is really vital that students understand that their voice is what needs to be heard.”

UL journalism students sweep the boards at National Student Media Awards

By scooping six top awards, UL journalism students swept the boards at the 2020 National Student Media Awards. The National Student Media Awards is the largest competition of its kind in Ireland dedicated to recognising and celebrating the next generation of media talent. Open to students from every college across Ireland, the awards are judged by key media industry leaders. Mostafa Darwish, who is studying for a master's in journalism at UL, was named Journalist of the Year for his focus on issues relating to asylum seekers living in the Direct Provision system, Syrian refugees, cultural production and the economic crisis in Egypt. An immigrant from Egypt, Mostafa now lives in Limerick. The award was judged by Irish Examiner Editor Tom Fitzpatrick. Fourth-year journalism student Mairead Cleary was named Video Journalist of the Year and third-year journalism student Ronan Coughlan was named Sportswriter of the Year. The awards for Magazine of the Year and Magazine Layout and Design of the Year both went to Grapevine, the magazine produced by second-year journalism students. UL's student newspaper website An Focal won Website of the Year for the second year in a row.

Speaking about the awards, Kathryn Hayes, Course Director BA Journalism and Digital Communication, said, "We are so proud of all of our winners and nominees. We were particularly proud to have three UL journalism students shortlisted in the Journalist of the Year category, which is a tremendous achievement. This is really testament to the calibre of students and the commitment of our teaching staff in the journalism department. I want to congratulate all of the winners, particularly Mostafa Darwish for his outstanding work and achievement given what he has overcome personally. He is a huge credit to our programme and to the journalism profession. Winning national student media awards is wonderful recognition for our students by top industry leaders and great for their portfolios as they prepare for the workforce. Mairead Cleary, who was named Video Journalist of the Year, will next week take up a job as digital journalist with the Irish Examiner. It is wonderful to see so many of our students' securing employment in established media organisations. We are committed in both our undergraduate and MA journalism programme to ensuring that our students are industry ready on graduation."



Giving Voice

"A university like ours must be more than just a responsible and decent neighbour. Globally we should be thought leaders in developing new models of social engagement built around fairness and justice. Locally we should be the skilled help, using our nous to unpick wicked problems in our own city. What are we if we can't or won't put our shoulder to the wheel when we are called on?"

Professor Seán Redmond, Principal Investigator REPPP Programme, Adjunct Professor of Youth Justice, School of Law, UL



Strengthen the means
of implementation
and revitalize the global
partnership for sustainable
development.

17 PARTNERSHIPS
FOR THE GOALS



UL president announces outstanding research collaboration

A decade-long partnership between UL and the HSE has won the first ever outstanding research collaboration award, President Kerstin Mey announced in December. The inaugural winner of the newly established President's Research Excellence and Impact Awards was the long-standing partnership between UL and the HSE, which has benefited patients dealing with multidrug-resistant infections, patients with cystic fibrosis and those with chronic obstructive pulmonary disease (COPD). Led by Professor Colum Dunne, Director of Research at UL's School of Medicine, the collaboration involves a truly transdisciplinary team of microbiologists, designers, engineers, nurses, physiotherapists, paediatricians and respiratory specialists.

Involving strong links between UL and UL Hospitals Group as well as an array of partners and collaborators in the UK, across Europe and the US, the collaboration has developed a track record in assessing children's airways, identifying ways of predicting illness through lung clearance measurement and detecting infectious agents in sinuses, where they can evade antibiotics. The work was led by Professor Dunne and Professor Barry Linnane, Consultant Respiratory Paediatrician, UHL. However, more recently, through participation of respiratory clinicians (physicians, nurses and physiotherapists), the patients and their carers/families, it became apparent that cleaning oscillating positive expiratory pressure (OPEP) devices was challenging and led, due to ineffective cleaning, to repeated bacterial infections in those patients. This observation led to the design of a new device that did not need cleaning but worked just as well. This formed the basis of UL Spinout SoloPep Ltd., launched formally in 2019 at a European Cystic Fibrosis Conference in the UK, which enabled initial engagement with clinicians, patients and advocates and confirmed an interest and requirement for such technology in the 'real world'. In July 2020, SoloPep Ltd. was acquired by an Irish multinational medical device company.

UL's UNESCO Knowledge for Change hub

UL established Ireland's first UNESCO Knowledge for Change (K4C) hub. The K4C programme is a UNESCO initiative that aims to ensure that engagement between HEIs and local communities is of the highest standard and that resulting outcomes are mutually beneficial. The UL K4C hub is only the second of its kind to be established in Europe. The initiative recognises the enormous potential for positive social change that can come about through genuine partnership and collaborative research. K4C is part of UL's commitment to engagement in the UL@50 Strategic Plan 2019–2024, which specifies the aim of ensuring that "engagement with the city and region enriches communities and enhances opportunities for all who live there". UL's involvement in K4C was made possible through funding from the HEA and support from long-standing UL partners Limerick City Community Development Project and Limerick City and County Council. The establishment of a K4C hub at UL provides an exciting opportunity to develop innovative curriculum and to design training and educational opportunities for the next generation of community-based participatory researchers.

In relation to K4C, there is a strong emphasis on developing engagement around sport, languages and culture, STEM and health. The importance of indigenous knowledge and language is strongly promoted globally by UNESCO K4C. Community engagement through Irish will be a key aspect of the UL K4C hub: programme content and resource material will be available in Irish as well as English.

UL is already actively engaged with the local community, as evidenced by the CWELL programme, which is an example of a community-based education programme facilitated by the university. The programme, which is designed by communities for communities, looks at the issues of wellness, empowerment, leadership and life skills. Students are drawn from the community and generally are in leadership roles within their communities. The CWELL programme requires students to identify a need in their community and to design a response to that need. The practical skills gained on the programme – enhanced by students' own lived experience – increases the students' capacity to be catalysts for change. The development of CWELL is overseen by UL in partnership with local organisations.

Let's talk about our Mayor

UL joined forces with Limerick City and County Council to change the face of local government in Ireland. On 24 May 2019, Limerick was the first – and so far, the only – county in Ireland to establish a directly elected mayor with executive functions. On foot of the result, Minister of State for Local Government and Electoral Reform John Paul Phelan TD created an Implementation Advisory Group (IAG), comprising representatives from across the social, economic and political spectrum in Limerick, to advise the Minister on how best to establish and shape the role of a directly elected mayor in Limerick. The IAG agreed that in order to maximise support and buy-in for the new mayoral role, a consultation process should be conducted to allow all stakeholders, including the citizens of Limerick city and county, to contribute to the definition of a directly elected mayor with executive functions.

In January 2020, the IAG and senior officials in the Department of Housing, Planning and Local Government reached out to UL to see if we could help. The original plan for the consultation was to work with established and trusted local organisations and associations, which would share their networks and help us promote a series of 'community conversations' about the new mayor. UL would provide facilitation training and resources to encourage and record the participation and, in doing so, enable a series of locally hosted consultations across the county. Using this common approach, we gathered all the feedback into a peoples' report on the new mayoral role.

As a result of the extremely tight timeframe for consultation and the constraints of working in COVID-19 isolation, the design team was small; it comprised existing collaborative partners who had all worked together before on various community-engaged initiatives. UL hosted 21 facilitated community conversations online and provided the resources and toolkits for groups to host their own conversation with family or friends. In total, 927 people from Limerick city and county participated, which provided a robust evidence base for the report that UL delivered to the IAG and Department of Housing, Planning and Local Government.

HAPPEE – Health alliances for practice-based professional education and engagement

HAPPEE is a collaboration between UL Engage, UL School of Allied Health, Corpus Christi National School (CCNS), CCNS pupils' parents and clinicians provided by the HSE/Blackberry Park. HAPPEE is designed to facilitate UL therapy students (Speech and Language, Occupational, Physio, Music and, potentially, Nursing) to carry out their practice placements in school sites rather than clinical settings. The initiative is intended to benefit the community by reducing 'no shows' for early interventions, providing services in communities with community support, and to benefit UL by creating new and sustainable practice placements for UL therapy students. HAPPEE provides a collaborative community-based approach to practice-based interprofessional education.

Partnership with the Revenue Commissioners

The work done with the Revenue Commissioners through the KBS National Centre for Taxation Studies covers a wide range of issues, enabling Revenue staff to better understand and predict taxpayer behaviour, use data analytics to assess risk, identify and implement key corporate governance initiatives and understand key national and international taxation trends. Students on the partnership programmes are enabled to respond to the changing international taxation landscape and contextualise developments at the UN, OECD, European and wider international levels, all of which have an impact on the Irish tax system and its administration. The partnership facilitates dialogue on sustainability and responsibility in a tax context and enables progress towards efficient and fair tax collection, which supports key public services for Irish society.

Opening of UL Hospitals Group Intermediate Care Facility at UL

Monday 8 June 2020 saw the opening of a 68-bed UL Hospitals Group Intermediate Care Facility (ICF) on the grounds of the UL campus. Located in the UL Sport Arena, the fully staffed and fully equipped ICF was designed to provide care for non-COVID patients who were fit for discharge from any of the acute hospitals in UL Hospitals Group but would benefit from further rehabilitation or who were waiting to go into long-term care. Buildings & Estates played a significant role in carrying out and delivering the physical works required for the facility in a very short time period. Involving UL, the HSE Estates Department, contractors and suppliers, Limerick City and County Council and the Defence Forces, the project was intensely collaborative.

Researchers at UL and NUI Galway design emergency supply donation website for hospitals

Researchers at UL and NUI Galway designed an innovative personal protective equipment (PPE) emergency supply donation website to connect industry stock to hospitals worldwide. The COVID-19 pandemic overwhelmed the resources of the world's health systems, often leaving frontline clinical staff without the required PPE, as traditional supply logistic chains lag behind the surge. Professor Derek O'Keefe,

Consultant Physician, University Hospital Galway and Professor of Medical Device Technology, NUI Galway, developed this innovative solution with his engineering colleague Dr Kevin Johnson, University of Limerick, to help combat this problem.

The new global platform allows local organisations, such as industry, business, universities and laboratories, that may have PPE stock in supply to list the categories of what they have on inventory, such as gloves, gowns and goggles, with contact details and then drop a map pin to show their geographic location. If a COVID-19 surge occurs in their geographic area, for example in Cairo, Cork or Calgary, the local hospital or clinic can simply click on the map of their surroundings and see what emergency PPE/medical stock is in the vicinity and access it quickly. Professor O'Keefe said, "Speaking with my clinical colleagues across the world and looking at the repeating patterns of health supply logistics breakdowns that have occurred as COVID-19 surges have swept across the world, innovative alternative solutions need to be developed to enable frontline staff get vital PPE to keep them and their patients safe." According to Dr Johnson, "Everybody has a role to play in this fight against the COVID-19 pandemic."



Giving Voice

"UL Engage works to amplify, incubate and coordinate the various ways that UL students, faculty and staff can work to make a difference. The SDGs Working Group provides us with new ways to work across the university and share the positive energy that UL engagement has to offer in addressing the challenges ahead!"

Dr Maura Adshead, Head of Community Engagement, Associate Professor in Politics, Department of Politics and Public Administration, UL and Thematic Lead for Partnership, Society and Engagement, SDGs Working Group



Impact Rankings

University Impact Rankings 2020

Times Higher Education (THE) – SDG Ranking Breakdown

SDG	UL
OVERALL – THE IMPACT RANKINGS 2020 RESULT	
SDG 1: No Poverty	101–200
SDG 2: Zero Hunger	79
SDG 3: Good Health and Well-Being	101–200
SDG 4: Quality Education	201–300
SDG 5: Gender Equality	83
SDG 6: Clean Water and Sanitation	101–200
SDG 7: Affordable and Clean Energy	46
SDG 8: Decent Work and Economic Growth	40
SDG 9: Industry, Innovation and Infrastructure	100
SDG 10: Reduced Inequalities	101–200
SDG 11: Sustainable Cities and Communities	31
SDG 12: Responsible Consumption and Production	34
SDG 13: Climate Action	201–300
SDG 14: Life Below Water	58
SDG 15: Life on Land	101–200
SDG 16: Peace, Justice and Strong Institutions	77
SDG 17: Partnerships for the Goals	301–400

International Networks

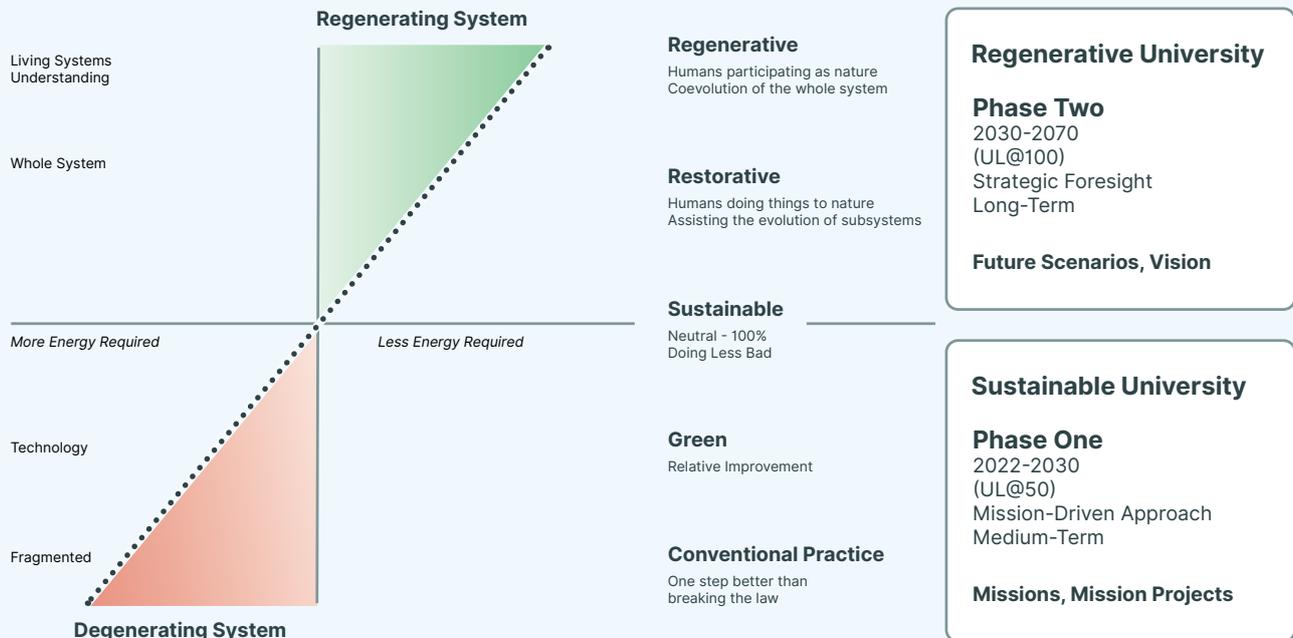


United Nations
Global Compact



Roadmap for Transition

From Degenerative Systems to Regenerative Systems



Reed, B. (2007) Shifting from Sustainable to Regeneration, *Building Research and Information*, 35 (6), 676.

The Journey from a Sustainable to a Regenerative University

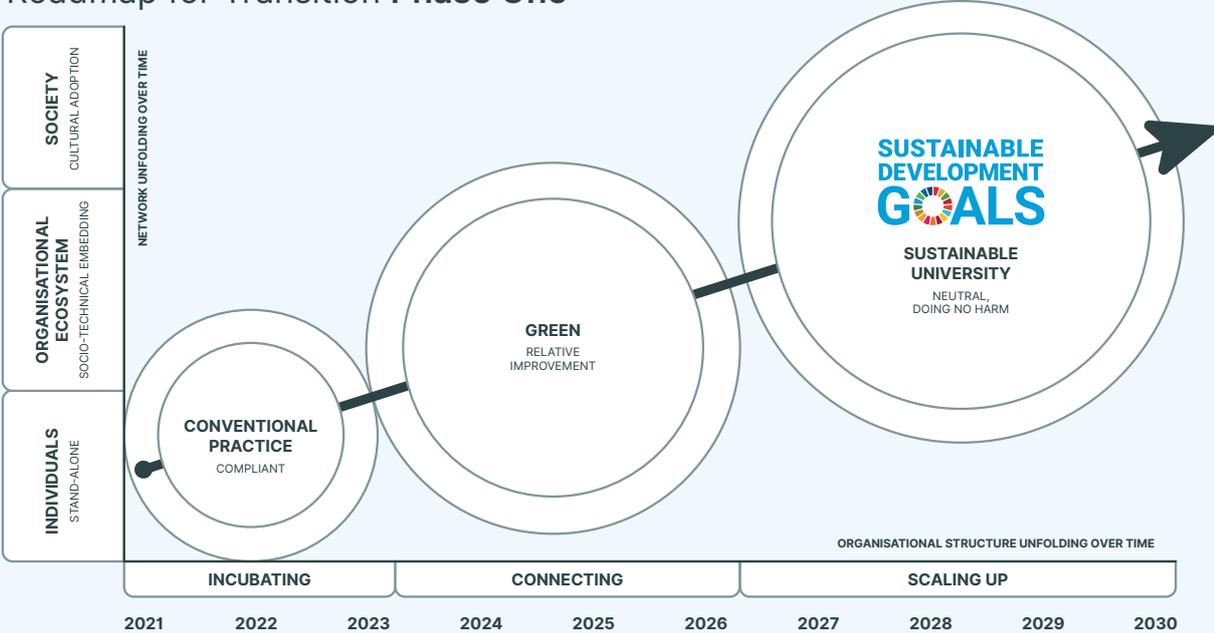
Phase One: Transition to a Sustainable University

UL's initial short- to medium-term ambition is to become a sustainable university. This ambition is closely aligned with the United Nation's Sustainable Development Goals. The SDGs Working Group at UL is currently co-designing and developing an ambitious 'Sustainable University Strategy 2030'. This holistic strategy is designed to be mission-driven. It will identify strategic missions and mission projects across the areas of: 1) campus community and operations; 2) leadership, governance and staff; 3) learning, research and students; and 4) partnership, community and engagement. We are committed to taking the required steps to continue on our journey towards sustainability.

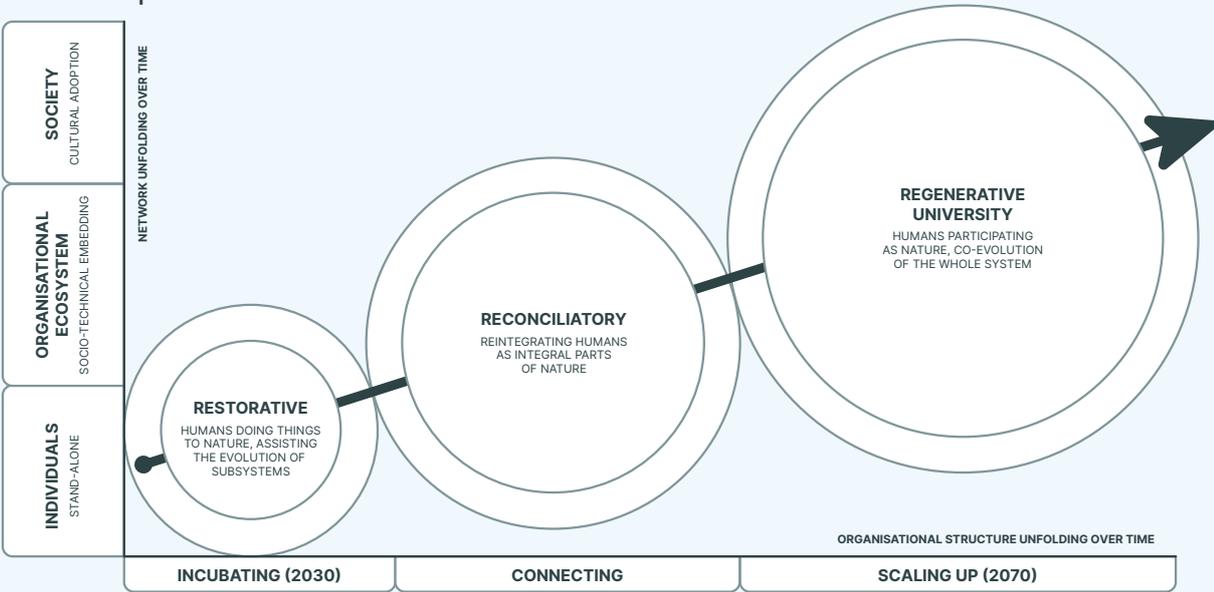
Phase Two: Transition to a Regenerative University

UL's long-term ambition is to become a regenerative university. This means that we must actively explore our role and responsibility as stewards or custodians of a regenerative world. We believe this paradigm shift will require us to collectively move beyond the existing human-centred paradigm of individualism and competition towards a regenerative mindset that sees the world as a living system. To this end, 2022 will see UL begin by collectively exploring regenerative futures with our campus community and in partnership with the broader region.

Roadmap for Transition Phase One



Roadmap for Transition Phase Two



PRME and the Kemmy Business School

The Kemmy Business School (KBS) at UL has long been involved with sustainability issues, from environmental to social and governance.

In 2008, the KBS was the first business school in Ireland to sign up to the UN Principles for Responsible Management Education (PRME), and over the intervening 12 years, has reported every two years on its progress towards meeting six major commitments:

- 1 To develop the capabilities of students to be future generators of sustainable value for business and society at large and to work for an inclusive and sustainable global economy.
- 2 To incorporate into our academic activities and curricula the values of global social responsibility.
- 3 To create educational frameworks, materials, processes and environments that enable effective learning experiences for responsible leadership.
- 4 To engage in conceptual and empirical research that advances our understanding of the role, dynamics and impact of corporations in the creation of sustainable social, environmental and economic value.
- 5 To interact with managers of business corporations to extend our knowledge of their challenges in meeting social and environmental responsibilities and to explore jointly effective approaches to meeting these challenges.
- 6 To facilitate and support dialog and debate among educators, students, business, government, consumers, media, civil society organisations and other interested groups and stakeholders on critical issues related to global social responsibility and sustainability.



Staff from the KBS have devised and taken a lead in many international PRME initiatives, notably in the areas of fostering sustainability research across the community of business schools engaging in PRME and organising at a UK and Ireland level. The KBS has been recognised since 2013 as a Champion for PRME, part of a small leadership group within UN PRME globally. Our commitment to PRME is rooted in the Kemmy legacy of social as well as environmental sustainability.



Closing Comments

The stories featured in this report are merely a window into the diversity of work that goes on across our campus.

This report is not a complete picture. To those whose work we did not feature this year, we would love if you would get in touch and share your story with us for next year's UL Annual Sustainability Report.

It is also important to mention that we have simplified the complex interconnected nature of many of our projects by attaching them to only one goal. This is not ideal as many of the stories connect with multiple goals. The UN SDGs framework is highly interconnected and designed to bring to the surface the complexity of many of the wicked problems we now face locally and globally.

www.ul.ie/sustainability

sustainable development

lies at the heart of everything
UL strives to become

Professor Kerstin Mey, President, *University of Limerick*



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