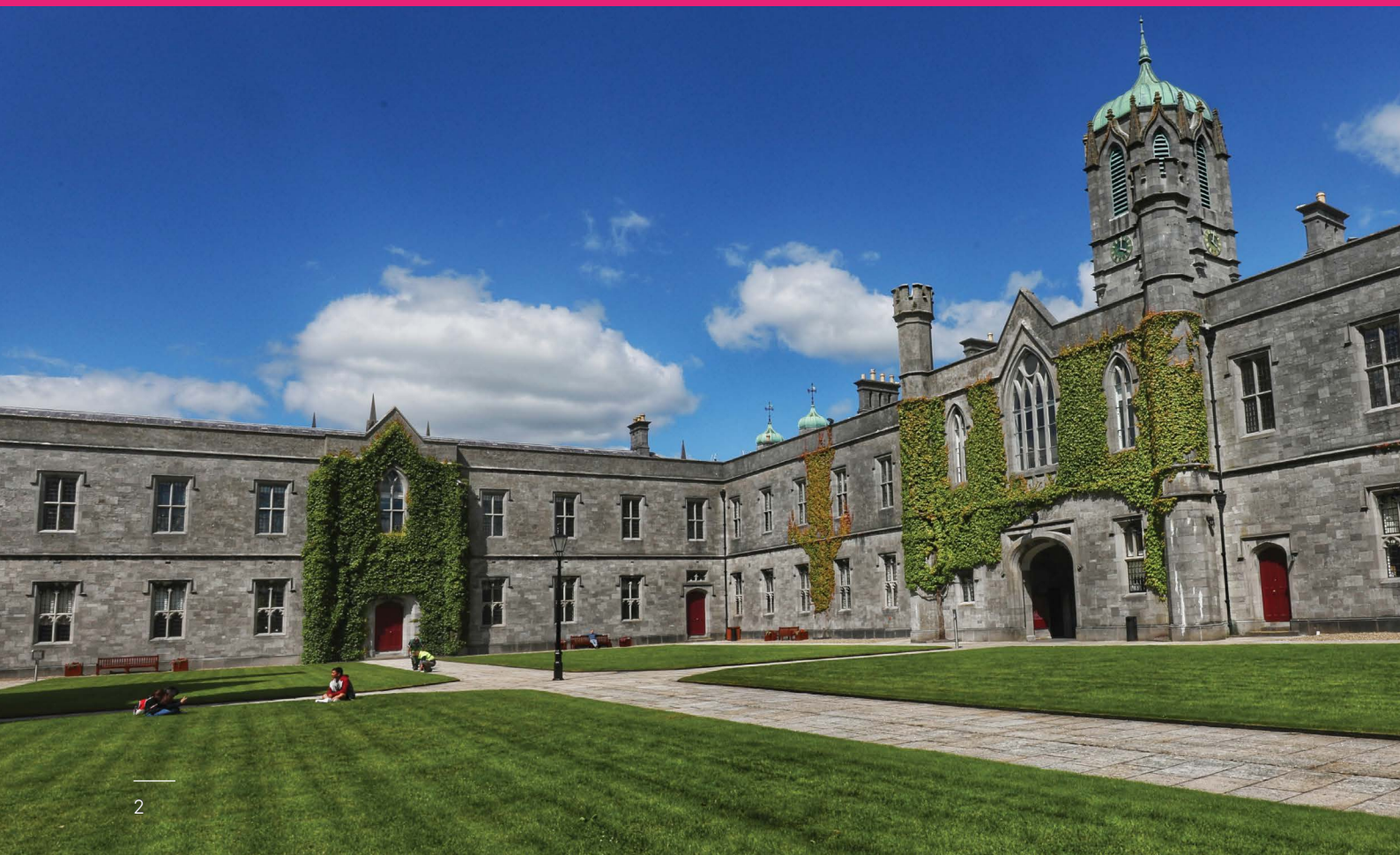
Ollscoil na Gaillimhe
University of Galway

University of Galway Global Challenges

Genuine. Transformative. Potential.

Contents



Introduction

Our university is research-led and for the public good. As a community, we have taken time to actively consider more deeply than ever before how to serve this purpose.

We face a future full of risk and opportunity. As a public university, we have a special responsibility to direct our research toward the most pressing questions and the most difficult issues. We are fully engaged with the global nature of many of the issues that we will address through our global challenges programme, and we know that through our work at this level, we will best serve our city, region and country.

Experiencing a global pandemic has opened everyone's eyes to the role of research and innovation in sustaining society through change. As we look into the future, we face uncertainty about the number and nature of challenges we will face, but we know that we will rely on our research capacity as we work together to overcome them. Our university embraces this responsibility and aspires to build distinction for itself by exemplifying this public research mission.

The challenges we face, such as climate change or the aspiration to a genuine global democracy, demand new thinking and new methods. Through a reflective and discursive consultation with our research and innovation community, we have identified six specific areas where University of Galway has genuine transformative potential to confront global challenges.

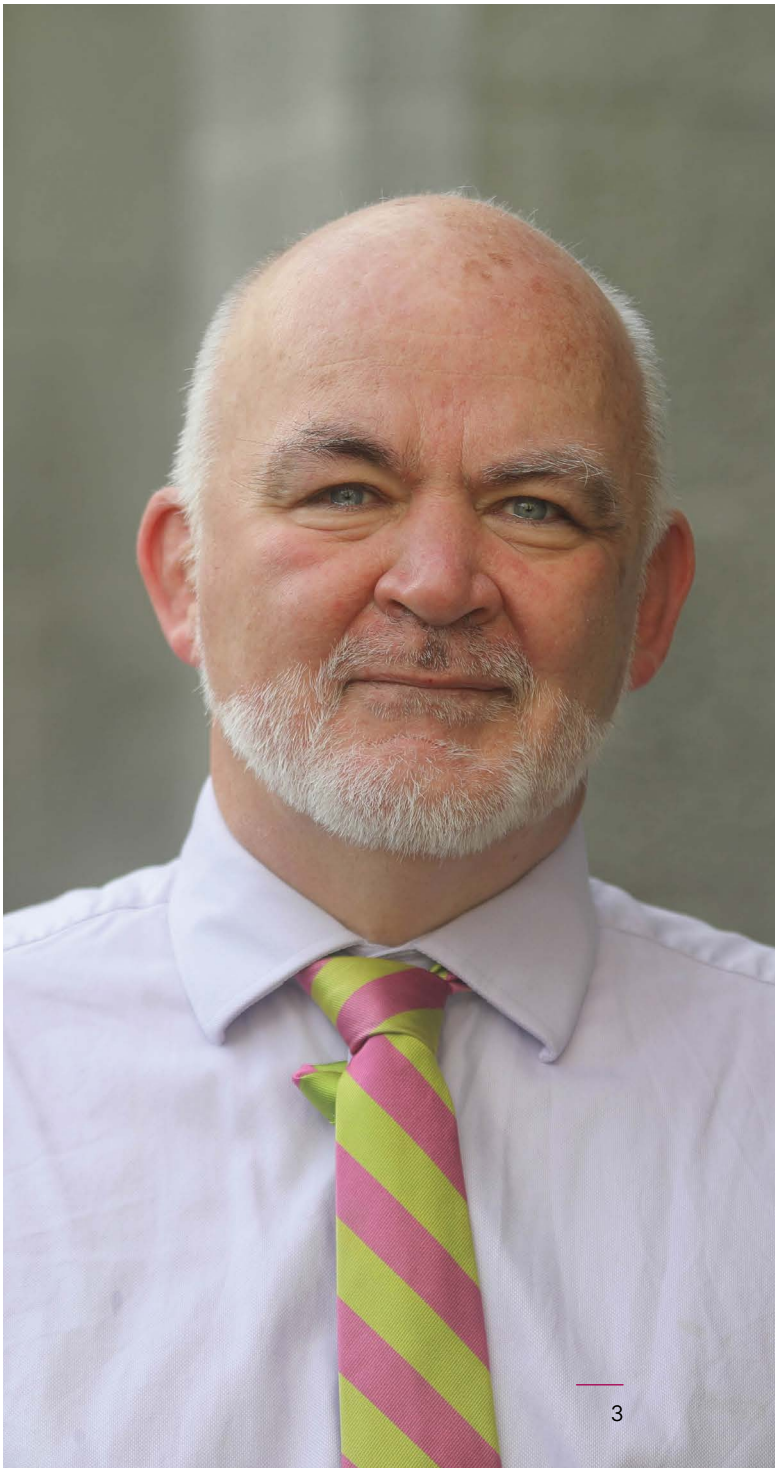
Our Global Challenges Programme will offer support to imaginative, multi-disciplinary teams as they begin to pursue genuinely novel research and innovation. Our process will support emerging researchers to accelerate their programmes, actively look for opportunities to integrate new communities into the research process, and explore heterodox and disruptive ideas.

Ambition is not new in University of Galway. We have realised transformative potential before. The Irish Centre for Human Rights has been instrumental in creating new standards of global justice and our work in the MedTech sector has helped transform the economy of the city and country. We begin from this heritage, with a fresh focus on global challenges.

Perhaps because we live on the periphery of Europe in a region that has experienced dramatic cultural, political and environmental stress, we are intensely mindful of the need for global interconnectedness in facing complex challenges.

We will value deeply engaged approaches that leave no one behind. Even as we explore the most radical ideas, our values of respect, sustainability, openness and excellence will guide us. We will rise together.

Professor Jim Livesey
Vice-President for Research and Innovation, University of Galway



Global challenges

In parallel to our ongoing research mission, we now highlight six global challenges where our research community genuinely believes we have the potential to deliver transformative impacts through engagement with others. We do not imply that we will have every solution in the face of the global challenges listed below, but our university is committed to encouraging this ambition and unleashing our creative and collaborative approach.

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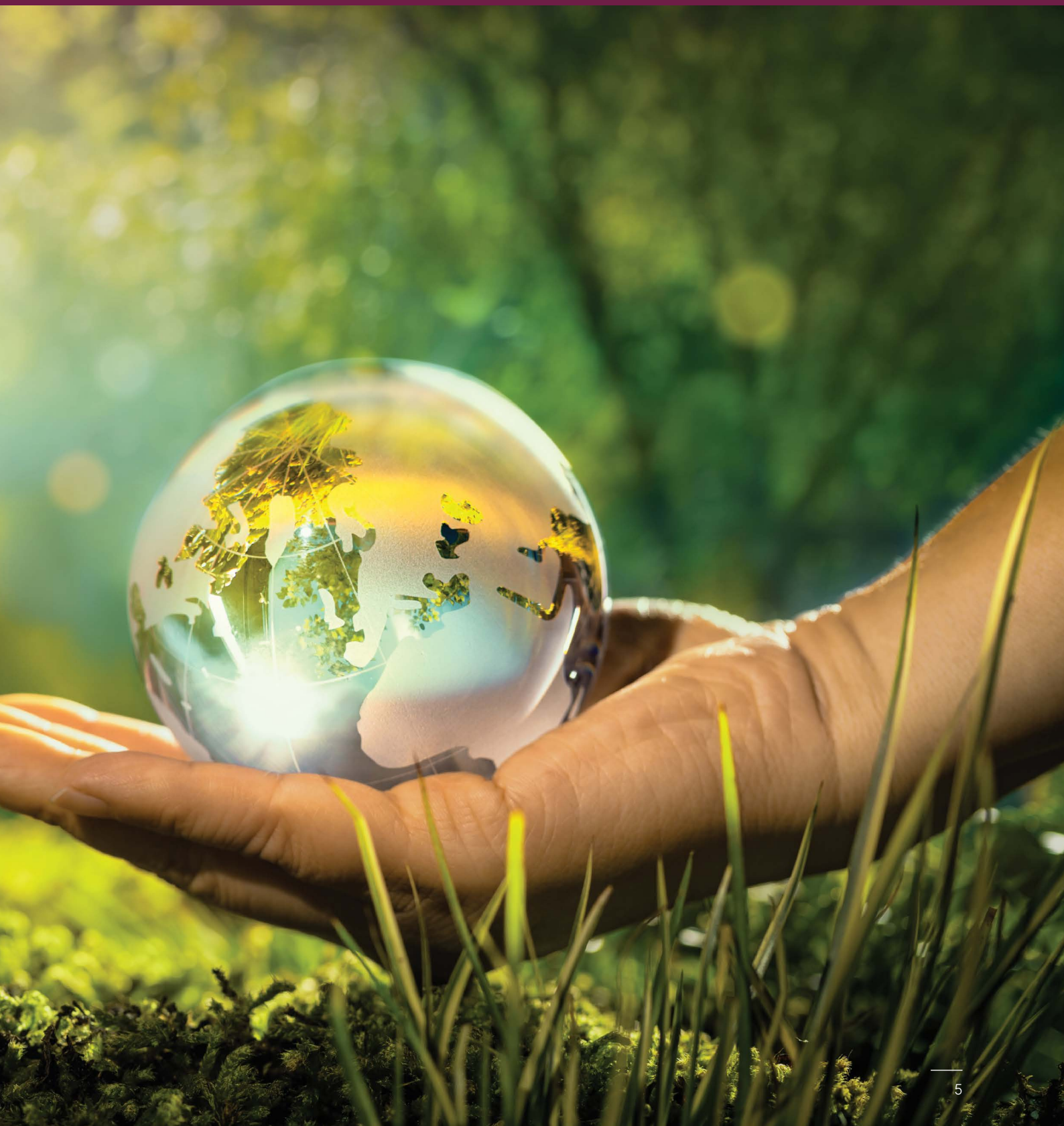


Antimicrobial Resistance

Tackling the silent pandemic

Antimicrobial Resistance

Antimicrobial resistance—which includes the threat from evolving pathogenic viruses, fungi and parasites—is now recognised as one of the most urgent global challenges and one of the greatest threats to human health. Multi-drug resistant bacteria cause the deaths of an estimated 700,000 people worldwide every year.

Antimicrobial Resistance (AMR) is often referred to as the silent pandemic. By 2050—unless action is taken—an estimated 10 million deaths per year will be attributable to AMR, more than currently die from cancer.

Pathogenic AMR bacteria continue to emerge due to excessive and inappropriate use of antibiotics in clinical and agricultural practices. Transfer of AMR genes between bacterial species and between humans, animals and the environment is a regular occurrence. This enables the global spread of AMR bacteria and results in the failure of even relatively new antibiotics to treat infectious diseases.

The AMR crisis compounds the impact of infectious diseases (epidemics and pandemics) in over one-third of the world's population. Food-borne and water-borne diseases are a leading cause of morbidity and mortality globally, with AMR making treatment difficult. Sepsis arising from infection is one of six World Health Organisation Global Health Priorities and is a causative factor in 50% of all in-hospital deaths (60% in Ireland).

An ageing population and improvements in the management of chronic diseases mean the incidence and severity of infectious complications are increasing. Meanwhile, healthcare and device-associated infections cause considerable morbidity and often require prolonged courses of antibiotics.

With the challenge of AMR, there are also the wider considerations of population health, socio-economics and health economics. Also pertinent are human rights issues, and considerations of diversity and gender in relation to current and emerging approaches.

Our university has research expertise across human health, animal health, environmental science, and other disciplines across healthcare, science, engineering and social sciences. Our researchers are also experts in many of the broader considerations related to AMR, such as health economics, relevant gender issues, and human rights dimensions.

Our efforts will support Ireland's National Action Plan on Antimicrobial Resistance and Ireland's endorsement of and contribution to the EU One Health Action Plan on AMR and the WHO Global Action Plan on AMR.

Decarbonisation

Pathways for a just transition

Decarbonisation

The climate crisis we face requires an accelerated reduction in greenhouse gas emissions for all products and services supporting human activity. In essence, a reduction in the carbon footprint of everything that supports human society.

The scale of transformation of our societies and economies will be seismic. From a climate justice standpoint, the transition towards climate-neutral economies and societies must occur in a manner that is fair and socially just. The concept of just transitions requires that decarbonisation pathways are pursued in a socially inclusive manner and does not lead to marginalisation or widening inequalities in society.

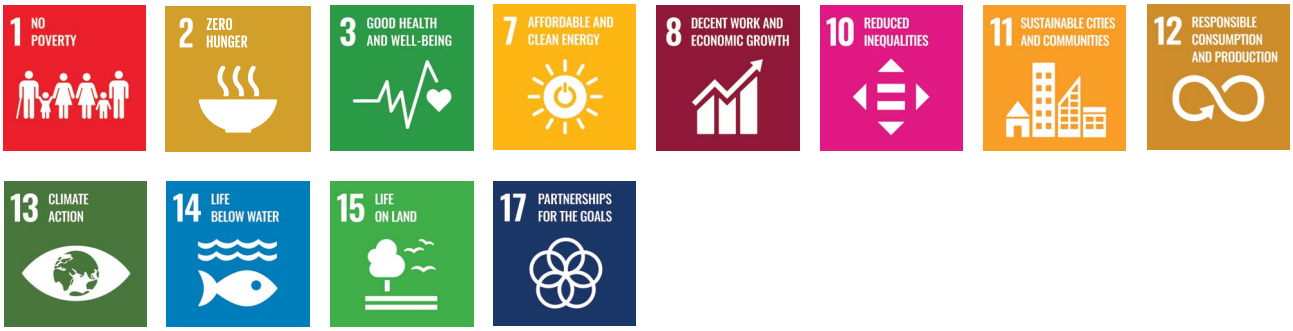
In addition to developing more sustainable materials, the embracing of reduction, reuse, repair, recycling and sharing activities across all economic activities will be a component of transition pathways towards sustainability.

Decarbonisation pathways will encompass the concepts of circular and sharing economies across all sectors, involving technological, process and social changes. The circular economy principles of designing out waste and pollution, keeping products and materials in use, and regenerating biological resources will be integral to decarbonisation pathway transitions.

Interdisciplinary research can allow socially inclusive decarbonisation pathways and options to be developed for different sectors, allowing for a just transition, which considers future generations' needs.

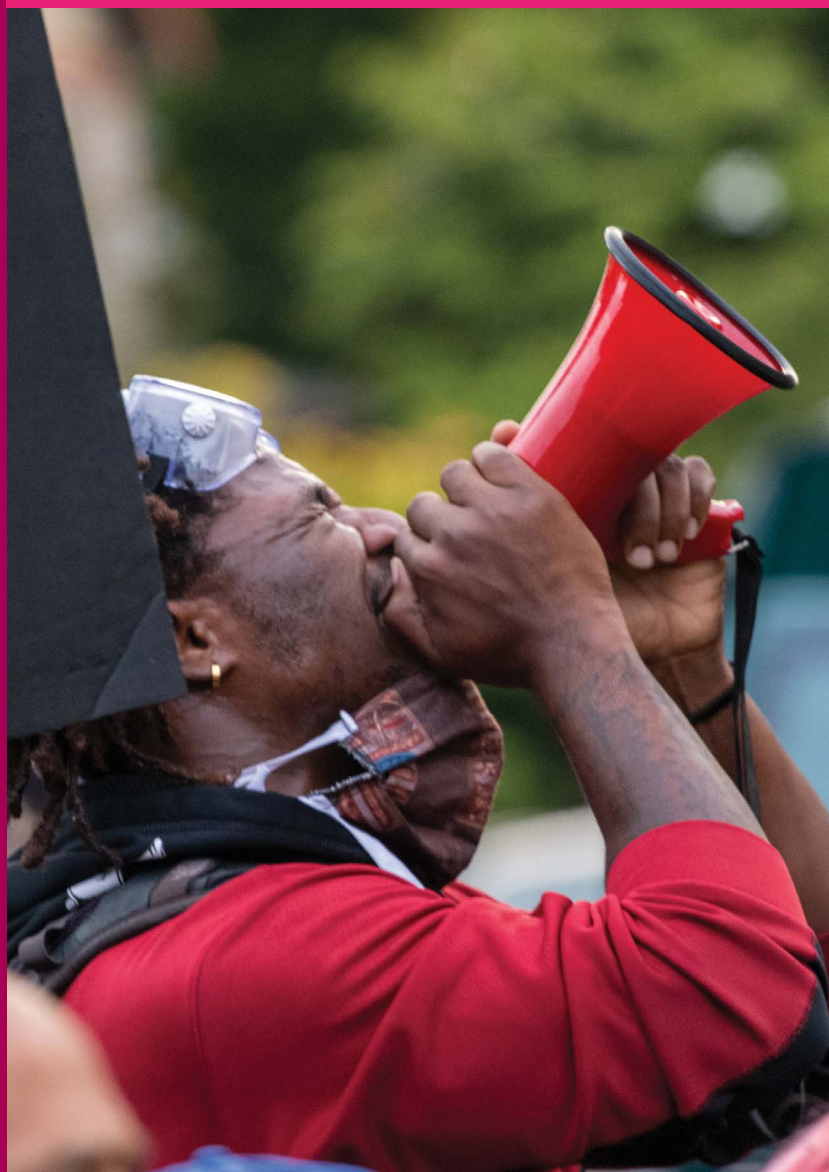
Our university has expertise across disciplines in developing and piloting decarbonisation approaches and in scaling innovations.

There are multiple pathways under development by University of Galway with partners nationally and globally for decarbonisation of our energy supply systems, transport systems, industrial systems, built environment and agrifood systems.



Democracy

A world in question



Democracy

As we look to the future, new forms of thinking and cultural practices will be required to safeguard democratic and inclusive societies. New ways of fostering democratic resilience and diversity will need to be developed, underpinned by the fundamental principles of diversity, inclusion, and accessibility.

This global challenge addresses the fundamental importance of democracy and democratisation in devising sustainable futures in Ireland, Europe and beyond, with the greater good of global relations - and with this planetary sustainability - at its core.

Diversity is a key commitment in this context - including diversity in the realms of democratic institutions, culture, demography, education, the economy, health, agriculture and biodiversity.

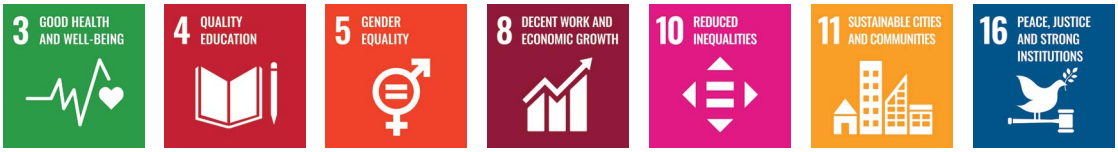
The underlying democratic values shaping contemporary Europe are the product of a particular cultural setting, and they have been developed, challenged, and re-configured within the creative imagination over centuries. We need to understand the roots of these core structures and acknowledge their need to flex and adapt to a world marked by migration, cultural exchange, and competing political ideologies.

The cultural heritage associated with democracy as a vital resource-on a par with natural resources-requires protection and enhancement and highlights the need for critical interrogation and stress-testing against future global needs.

Such critical interrogation aligns with resilience and sustainability studies, which sit right across the disciplines in our university. We also have significant research expertise in addressing major threats to the sustainability of social and political life. Our work has focused on racism, migration and the hostility that it provokes, gender-based violence, authoritarianism - and many more related areas.

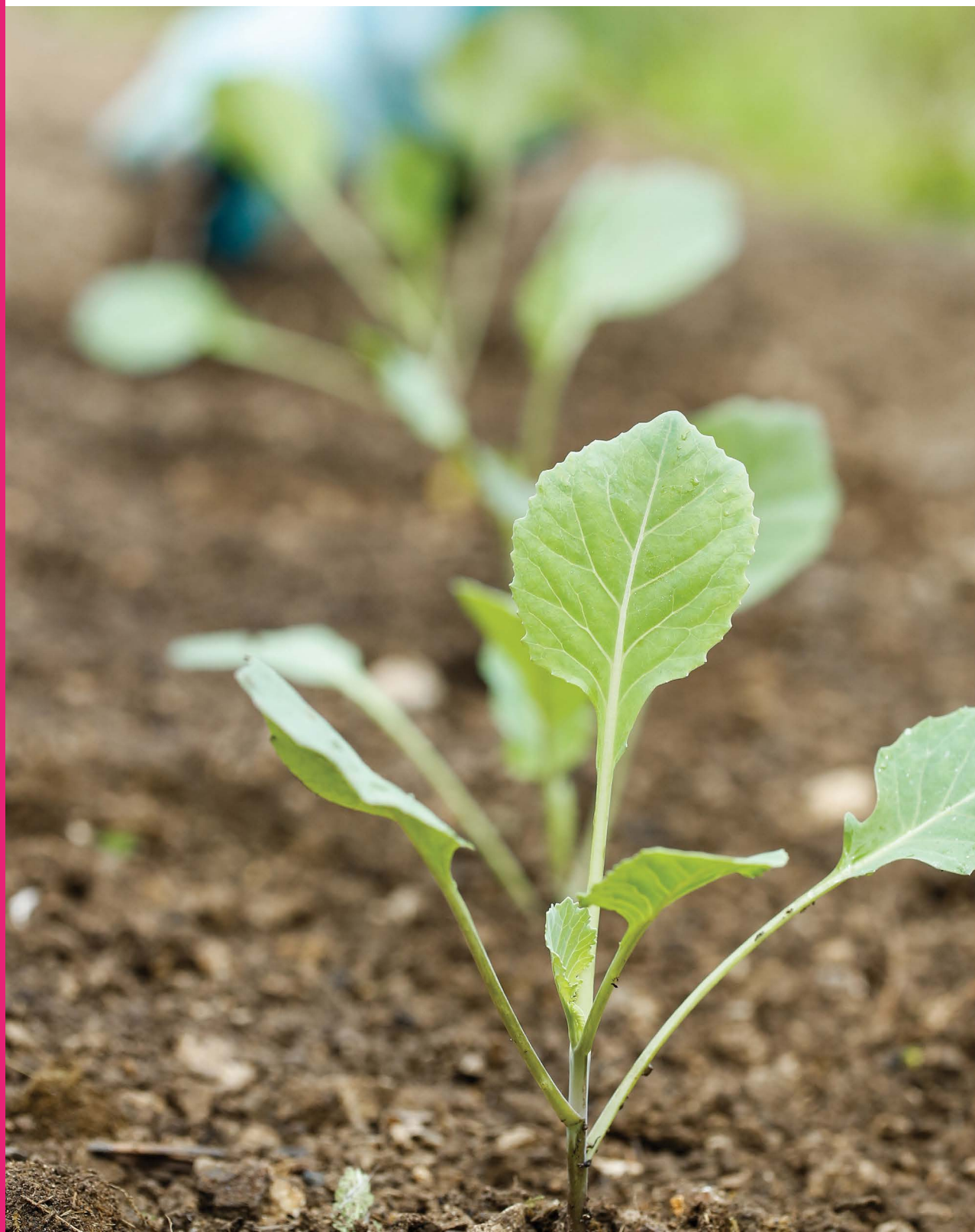
As experience in Ireland demonstrates, a productive role was played in achieving social change through historical research, journalism, drama, film, poetry, art, fiction and narrative generally. This has impacted areas including same-sex marriage legislation, abortion legislation, the peace process, the decade of centenaries, historical institutional abuse, feminism and sexual consent.

Ireland has the potential here to formulate models for the greater global good, drawing on and developing its particular social and cultural capital.



Food Security

Transitions towards just, inclusive and resilient societies



Food Security

Food security requires that all people at all times have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. The sustainable development and food security challenges facing humanity are multiple and growing.

Almost one billion people now experience undernutrition due to lack of food or nutrients, with an additional two billion suffering from overnutrition due to unhealthy diets and lifestyles.

In the face of unsustainable consumption patterns, climate change, disease burdens, biodiversity crises, and other existential threats that can aggravate inequalities, societies need to transition to resilient but also just and inclusive rights-based systems which will allow them to thrive.

Resilient systems can recover swiftly from perturbations or shocks, the COVID pandemic being a recent example. Sustainable development transition pathways for communities, regions and countries need to strengthen the resilience of our social, economic, environmental and agri-food systems to external shocks.

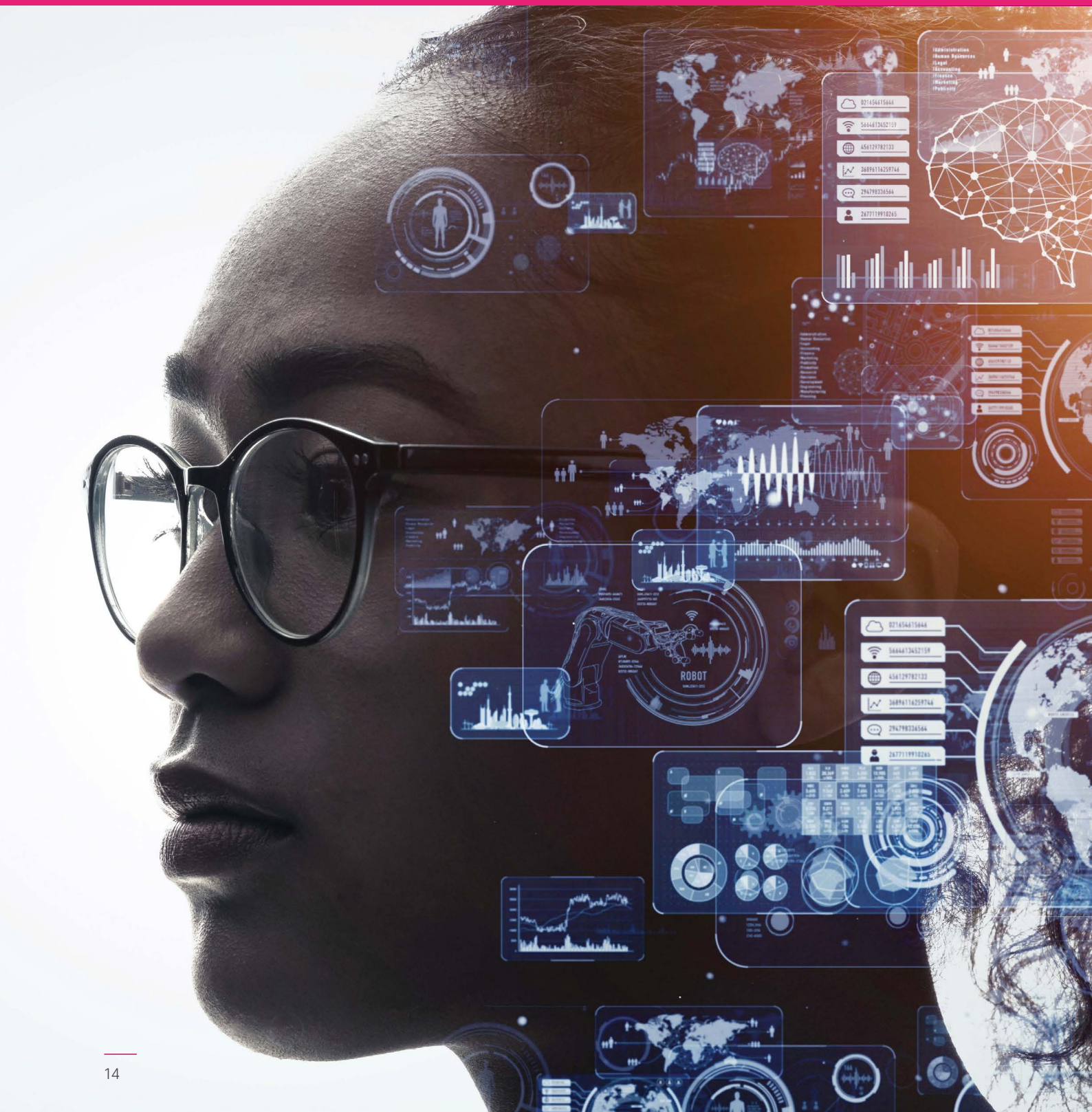
Socially inclusive development outcomes can only be achieved if accompanied by a simultaneous effort to address equality and inclusivity challenges facing all societies—from gender and ethnicity-based discrimination to economic and age-based inequalities.

Similarly, a rights-based approach to sustainable development and food security incorporates the structural causes of poverty and marginalisation and the potential capacities that people may have to respond to crises when they arise. Education is also critical to ensuring food security—including empathy education to foster mutual respect and understanding.

Our university has particular research expertise in inclusive societies, children, families and human rights, and sustainable economic development. We also have strengths in climate action and sustainable bioeconomies and geography, place, and politics.

Human-Centred Data

Digital transformations and the public realm



Human-Centred Data

Many if not all of society's major challenges, ranging from climate change and pandemics to inequality and sustainable economic growth, centre around data on which to establish evidence, insight, and policy. However, data science is too often technology-driven and does not take the human into account, which has been shown to be problematic on many levels.

A particular challenge is to ensure that a digital world can incorporate human-level factors. There is a need for digital rights, data justice and equality to ensure fair and accurate scientific, societal and healthcare solutions.

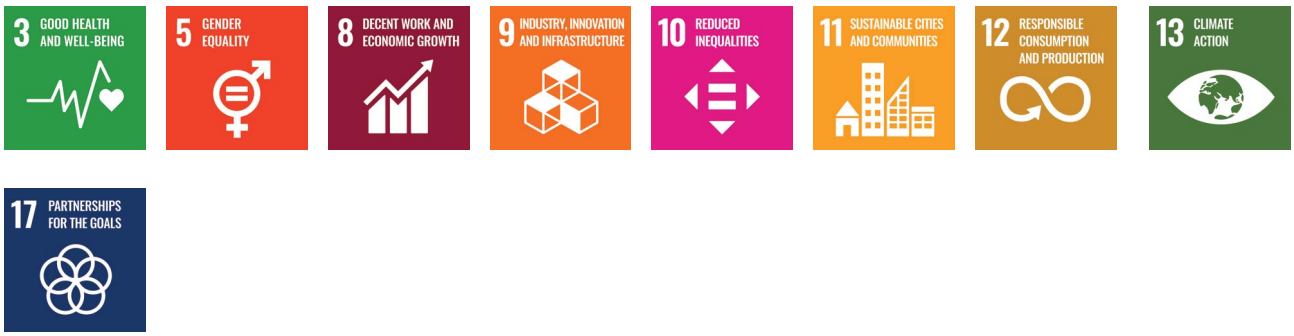
Defining the way in which we acquire, process, interpret and exploit data, is increasingly central to all of our scientific, technological, societal and even cultural developments.

In the health domain, for example, data science can significantly advance health research by analysing and interpreting large datasets and advancing understanding of specific diseases, identifying appropriate treatments, and informing decision-making. Similar impacts can be made in the domain of climate change policy development and environmental insights.

Expertise at our university covers a wide spectrum of data science fields and related areas such as genomics and bioinformatics, digital health and healthcare transformation, health data research and analytics and digital misinformation. We also have extensive capabilities in ocean and coastal data analytics, AI-enabled remote sensing for measuring climate change, equality, diversity and inclusion in AI, digital humanities, and environment and climate informatics.

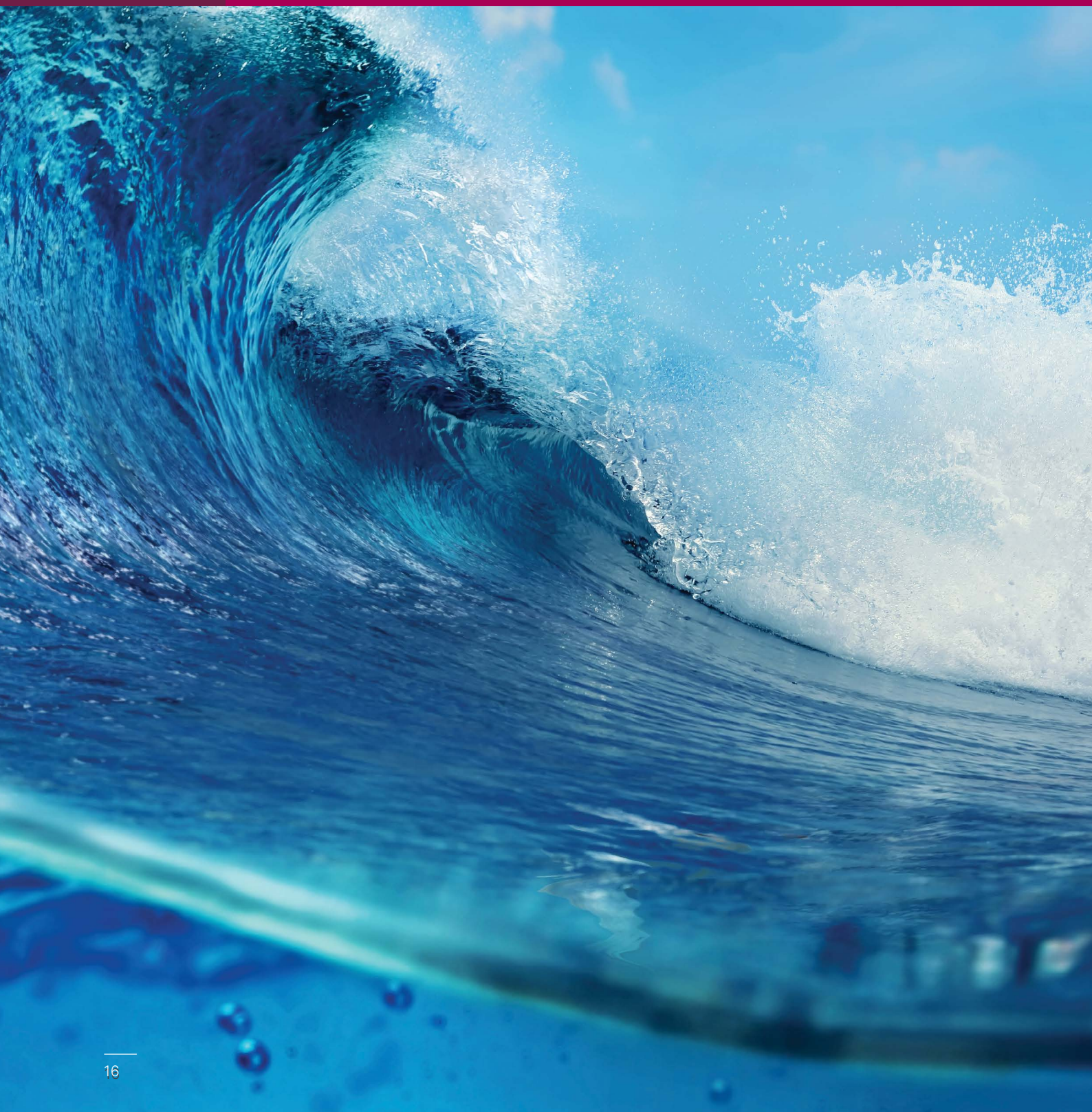
Our university and Galway is rooted in a vibrant tech sector, and through our research we have contributed significantly to the development of standards and practices used across the internet.

As the world now tries to navigate the data explosion and turn data into recognisable, usable and structured infrastructure for society, we can connect into other areas for which our place is known - social justice, development, and human rights.



Ocean & Coastal Health

Marine Resilience



Ocean & Coastal Health

The health of our oceans and coastlines is under threat on many fronts—rising global temperatures, pollution, ocean acidification, deteriorating ecosystems and biodiversity. These threats to our oceans impact our coastlines, rainwater, drinking water, weather, climate, food supplies and even the air we breathe.

The UN has stressed the need for careful management of ocean and coastal health as key to a sustainable future. This is a complex challenge, and at its core will be understanding the unknown - with more than 80% of our ocean as yet unmapped, unobserved, and unexplored.

Achieving climate mitigation targets will require consideration of the key 'blue carbon' role that oceans play as carbon reservoirs and sinks. It will also involve eliminating the pollution of our oceans with plastics, carbon dioxide, heavy metals, persistent organic pollutants and excess nutrients.

The transition to coastal and marine resilience requires interdisciplinary research and collaborations to measure, model and monitor the physical, ecological, social and economic impacts of nature-based solutions.

Forming collaborations across industry and citizen science will be critical to advancing change.

Expertise at our university lies in marine biodiversity, sustainability, blue bioeconomy, data analytics, bioresources, climate change and ocean pollution. Our investigators lead many ocean-going expeditions on the National Research Vessels to generate valuable data, our coastal scientists obtain data using drones, satellites and sensors, while our social scientists generate data with and for society. Our people have also played a significant role in documenting and understanding marine biodiversity and host a world-renowned global reference database for seaweeds: AlgaeBase.

Here in Galway and all along the west coast of Ireland, the ocean shapes our climate, weather, landscape, economy and culture. University of Galway hosts the foremost marine economic analysis centre in Ireland which supports policy-makers, decision-makers and stakeholders in the marine and coastal sectors with a variety of social and economic analyses.

We will deepen our engagement with local authorities and research organisations, cross-border agencies, stakeholders such as fisheries and tourism, and international partners through this challenge. There is potential to significantly contribute to the bioeconomy of Ireland and support local communities by providing new opportunities in the marine sector from the development of derived products for human or animal food, cosmetics and new chemical entities for the pharmaceutical industry.

Thank You

University of Galway would like to acknowledge and thank all who have contributed to this process to date.

Please contact the University of Galway Global Challenges initiative on the email below.

We thank you for your continued interest in working with us to help address these global challenges.

Office of the Vice-President for
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