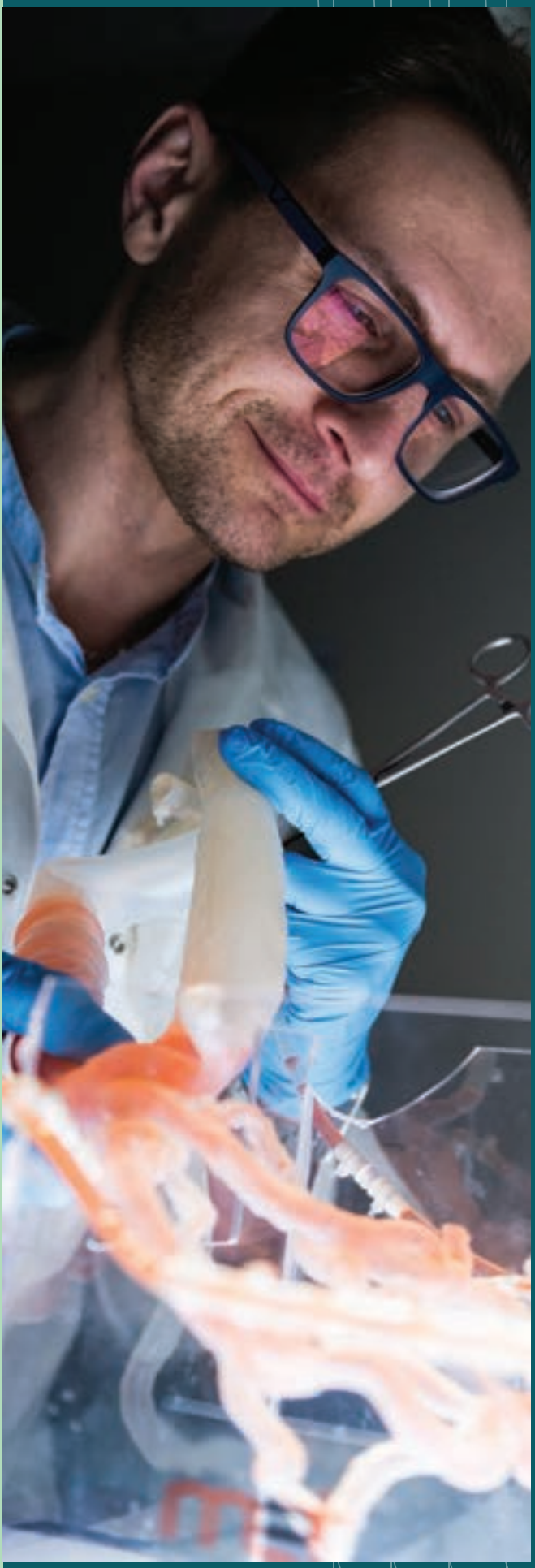
# From Research to Regional Enterprise

RISE@ATU
Postgraduate Research Training Programme Showcase

Radisson Blu Hotel, Sligo.
22nd & 23rd October 2026.



Ollscoil Teicneolaíochta an Atlantaigh

Atlantic Technological University




RISE@ATU is co-funded by the Government of Ireland and the European Union
through the ERDF Northern & Western Regional Programme 2021-2027



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Cover photography by Conor Doherty, featuring Wojciech Gorszczak a RISE@ATU PhD researcher.

# Introduction



**Atlantic Technological University (ATU) stands at the forefront of a transformative period for research, innovation and regional development. As a multi-campus university serving the North and West of Ireland, ATU is uniquely positioned to connect knowledge generation with societal and economic impact.**

**This conference - From Research to Regional Enterprise - reflects this commitment and showcases the breadth, quality and ambition of research being undertaken through the RISE@ATU Postgraduate Research Training Programmes.**

Research has the power not only to advance knowledge, but also to shape the future of communities, industries and public services. Across the West and Northwest of Ireland, significant opportunities and challenges are emerging in areas such as sustainability, digital transformation, enterprise development, health, and social resilience. The research presented within this book of abstracts demonstrates how ATU researchers are responding to these opportunities through innovative, interdisciplinary and solutions-focused approaches that support regional priorities and contribute to long-term sustainable development.

The abstracts contained in this volume represent more than individual research projects. Collectively, they reflect a growing ecosystem of collaboration between researchers, industry partners, policymakers and communities. Aligned with the region's Smart Specialisation priorities, these contributions highlight the essential role that postgraduate research plays in strengthening enterprise, informing policy, fostering innovation and delivering meaningful societal impact.

This conference provides an opportunity to celebrate the next generation of researchers while strengthening the connections that enable research to move beyond the laboratory, field site or academic publication and into practical application. Through dialogue, partnership and knowledge exchange, From Research to Regional Enterprise demonstrates how research can act as a catalyst for economic growth, environmental stewardship and community wellbeing across our region.

Every abstract in this collection reflects the dedication of researchers, supervisors and collaborators who are contributing to a culture of engaged research at ATU. Together, they showcase a university committed to creating impact through discovery, innovation and collaboration. As you explore the work presented in these pages, I invite you to consider not only the excellence of the research itself, but also its potential to shape a more resilient, prosperous and sustainable future for the West and Northwest of Ireland and beyond.

**Dr Orla Flynn**
**ATU President/Uachtarán**





# Foreword



**RISE@ATU represents a significant investment in growing and sustaining research and innovation activity across Atlantic Technological University.**

**Central to this are our researchers, who are generating new knowledge, developing expertise and contributing to an already vibrant research culture across our campuses.**

The From Research to Regional Enterprise conference brings together, for the first time, PhD researchers from across the RISE@ATU Postgraduate Research Training Programmes. It provides an opportunity to showcase the research underway, encourage exchange across our faculties and campuses, and strengthen the sense of a shared ATU research community.

The research captured in this Book of Abstracts has been organised across four broad thematic areas: Society & Enterprise, Environment & Sustainability, Technology & Innovation, and Health & Wellbeing. Collectively, these contributions demonstrate the breadth of activity supported through RISE@ATU, with strong alignment to the sectoral strengths and potential opportunities for the Northern and Western region, as identified in Ireland's Smart Specialisation Strategy (S3).

The conference also creates important links beyond the University. Through presentations, panel discussions, poster sessions, elevator pitches and networking, our researchers will engage with people from enterprise, industry, research funding, regional development and public policy. These interactions can identify shared interests and create possibilities for future collaboration. I am particularly grateful to the external panellists and judges for their contribution to the conference; their involvement will provide our PhD researchers with informed feedback on their work and valuable insights drawn from a range of professional and sectoral backgrounds.

To our postgraduate researchers, I hope this conference encourages you to look beyond the immediate requirements of your PhD work and consider who might benefit from its outputs, how you can communicate its relevance, and where it might ultimately make a difference.

Sustaining a strong university research culture requires investment in people as well as in infrastructure and professional supports. Through RISE@ATU, we are developing ATU's research capacity while strengthening relationships with the industry, community and public sector partners that are essential to achieving meaningful impact beyond academia.

I would like to acknowledge the work and commitment of all the researchers represented in this collection, together with their supervisors, collaborators and the wider RISE@ATU team who have supported them. I would also like to thank the team for their commitment, dedication and hard work in planning and organising the conference.

I hope this Book of Abstracts serves both as a record of the research showcased at this conference and as a starting point for new conversations and collaborations.

**Dr Brendan Jennings**
**Chief Officer for Research, Innovation and Engagement Atlantic Technological University (ATU)**

# Connecting Research across RISE@ATU

**The RISE@ATU Postgraduate Research Training Programmes (PRTPs) support a diverse portfolio of PhD research spanning departments, faculties and campuses across Atlantic Technological University.**

While researchers are based within individual training programmes and disciplinary contexts, the From Research to Regional Enterprise conference provides an opportunity to consider the RISE@ATU research collectively.

For the purposes of the conference and this Book of Abstracts, the research has been organised across four broad thematic areas: Health & Wellbeing, Society & Enterprise, Environment & Sustainability, and Technology & Innovation. These areas are intentionally broad and overlapping, providing a shared framework through which research addressing related challenges and opportunities can be considered together. Rather than defining disciplinary boundaries, the structure allows connections to emerge across programmes and areas of expertise.

The four thematic areas reflect the breadth of research represented across the RISE@ATU PRTPs, including the range of disciplines and faculties represented within them. Their development also considered the sectoral strengths and potential opportunities identified for the Northern and Western Region through Ireland's Smart Specialisation Strategy (S3). This provides an important regional context for a conference focused on the contribution of research and innovation to enterprise and regional development.

Organising the research in this way can also strengthen communication across programmes, disciplines and campuses. By making shared interests and complementary areas of expertise more visible, the thematic structure can help researchers engage with work beyond their immediate research context, while providing enterprise, policymakers, regional stakeholders and communities with a more accessible way of navigating the breadth and relevance of RISE@ATU PRTP research. In this way, the thematic areas support both exchange within the ATU research community and engagement beyond the University.






# **Day 1:** Thursday 22nd October 2026

| Time | Session | Details |
|---|---|---|
| **09:00 - 10:00** | **Registration & Welcome Refreshments** | |
| **10:00 - 10:30** | **Opening Address**<br>*Formal opening of the conference* | **Dr Orla Flynn** - President of ATU<br>**Dr Brendan Jennings** - Chief Officer Research, Innovation & Engagement, ATU<br>**Dr Deirdre Quinn** – Senior Manager, System Development & Performance Management, Higher Education Authority (HEA) |
| **10:30 - 11:00** | **Keynote Address** | **Claire McGee** - CEO of the Technological Universities Association |
| **11:00 - 12:00** | **Thematic Presentations 1:**<br>Society & Enterprise<br>*This session will explore research addressing societal and enterprise challenges, with a focus on its relevance to communities, organisations and regional development.* | **Sana Ullah** – Balancing Transparency and Privacy in Irish MedTech Cross-Border Regulatory Compliance using Blockchain<br>**Fakiha Bashir** – Advancing Women into Leadership in ICT and Innovation<br>**Farhan Ahmad** – From Regional Policy to Enterprise Action: Developing a Regional Development Matrix<br>**Kithmini Gamage** – Creating value with purposeful freight data sharing |
| **12:00 - 13:00** | **Networking Lunch & Poster Session** | |
| **13:00 - 14:00** | **Thematic Presentations 2:**<br>Environment & Sustainability<br>*This session will showcase research addressing environmental and sustainability challenges, including climate action and the transition towards a more sustainable West and North-West.* | **Mariam Elmofti** – Towards Regenerative Business in a Polycrisis World<br>**Madiha Rubeel** – From Influence to Impact: Communicating Sustainable Fashion to Young Consumers<br>**Catherine White** – Addressing Climate Action in the North-West, Small to Medium Hotels through Communities of Practice<br>**Morena Gaudino** – After the Storm: Investigating the impact of extreme weather events of microplastic distribution in intertidal sediments |
| **14:00 - 15:00** | **Thematic Presentations 3:**<br>Technology & Innovation<br>*Highlighting emerging research across AI, engineering and technology, and its potential applications for industry and regional innovation.* | **Nasim Shokri** – Development of a Stretchable Sensor for Enteral Feeding Systems<br>**Mostafa Mellizadeh** – Robotic Silicone dip coating for Medical Devices<br>**Ali Riaz** – Tetrahedral Lattice Heat Sinks for Advanced Electronics Cooling<br>**Obed Peprah** - Physics-Constrained Hybrid Modelling of Dairy Spray Drying for a Validated Digital Model and an Implementation Pathway Towards a Self-Updating Digital Twin |
| **15:00 - 15:30** | **Coffee break, Networking & Posters** | |
| **15:30 – 16:30** | **Thematic Presentations 4:**<br>Health & Wellbeing<br>*Exploring research addressing health and wellbeing challenges, including the development of new approaches, technologies and interventions.* | **Fnu Talha** – Generative AI for Non-invasive MRI Enhancement in Brain Tumour Diagnosis<br>**Audrey Fayne** – Can Machine Learning Better Predict Weight Loss in Obesity Interventions?<br>**Lauren Callaghan** – Smart Kids, Healthy Lives: Integrating Technology to combat Childhood Obesity in Ireland<br>**Vanessa Nobles** – Improving Pharmacogenomics testing implementation through multi-stakeholder involvement to reduce inappropriate prescribing in primary care |
| **16:30 - 17:15** | **Panel Discussion:**<br>From Research to Enterprise – Building Regional Innovation Partnerships<br>*This panel will bring together representatives from national and regional agencies to explore how stronger connections between research, enterprise and industry can support innovation and regional development.* | **Majella Maher** – Regional Manager, Enterprise Ireland<br>**Michelle Conaghan** – Regional Manager, IDA North West<br>**John Daly** – Senior Economist, Northern & Western Regional Assembly<br>**Dr Niall McDonough** – Director of Policy, Innovation & Research Support, Marine Institute |
| **19:30 – 21:30** | **Conference Dinner** | To be held in the Benbulben suite, Radisson Blu, Sligo. |



# **Day 2:** Friday 23rd October 2026

| Time | Session | Details |
|---|---|---|
| **08:00 - 09:00** | **Registration & Welcome Refreshments** | |
| **09:00 - 09:10** | **Opening Address** | |
| **09:10 - 10:00** | **Panel Discussion:** Multi-sectoral perspectives on regional development *This panel discussion will bring together leading voices of regional enterprise to highlight the challenges and opportunities facing the West and North west region.* | **Caroline Faulkner** – Executive Leadership Coach & Former Senior VP of Prudential Financial<br>**John Gaffney** – General Manager Europe, Avery Dennison Medical<br>**Barry Gallagher** – Head of Bank of Ireland Donegal, Sligo, Leitrim & Roscommon<br>**Finola Howe** – Head of Enterprise & External Engagement, ATU |
| **10:00 - 11:00** | **Coffee break, Networking & Poster Session** | |
| **11:00 – 11:30** | **ATU Research Communications & Impact** *The ATU Research Coordinator team will provide an overview of ongoing work to strengthen research communications, knowledge mobilisation and stakeholder engagement, supporting researchers to enhance the visibility, reach and impact of their work within and beyond academia.* | **Dr Shane Conway** – Research Coordinator, ATU |
| **11:30 – 13:00** | **Research elevator pitches: Connecting Research & Enterprise** *In this session, RISE@ATU PhD researchers will deliver three-minute elevator pitches, highlighting how their research can contribute to enterprise and regional innovation.* | **Muteeb Ahmad Sheikh** – Rainwater harvesting for water supply & stormwater storage<br>**Patricia Warren** – Anthelmintic Efficacy of Bioactive Compounds from Macroalgal Sources<br>**Giulia Maria Rossi** – "Make them shine": Fluorescence-in-situ-hybridisation for identifying mackerel (Scomber scombrus) eggs.<br>**Neil Farren** – Examining the demands and resources for managing hybrid teams<br>**Lea Sophie Stiehl** – Building Business Communities in the Gaeltacht Regions through Leveraging the Digital Ecosystem<br>**Hirushan Sajindra** – Mapping Ireland's Funded Research: Fields, Agencies, and Citation Impact (2024 to 2025)<br>**Rebecca Tarpey** – Nutritional knowledge, attitudes & practices for menstrual cycle symptom management among women on the island of Ireland<br>**Luke Canavan Dignam** – Using Artificial Intelligence to detect possible head impacts in male and female football<br>**Kashaf Arif** – Co-designing an e-coaching intervention to improve psychological well-being among third-level students<br>**Ali Al Abbas** – A Vision-Based Learning from Demonstration Framework for Personalized and Safe Robotic Rehabilitation<br>**Abdullah Haider Ali** – Automated Medical Guidewire Inspection Using Tactile and Vision Sensing<br>**Dipshikha Das** - Aligning Human Inspection Intent with Robot Behaviour via Neural Radiance Fields |
| **13:00 - 14:00** | **Networking Lunch & Poster Judging** | |
| **14:00 - 14:45** | **Awards & Closing address** | **Dr Brendan Jennings** – Chief Officer, Research, Innovation & Engagement, ATU |

Keynote Speaker:

# Claire McGee

## Technological Universities Association - CEO

**Claire McGee is the Chief Executive Officer of the Technological Universities Association (TUA), the representative body for Ireland's technological universities and institutes of technology. Appointed as the organisation's inaugural CEO in 2026, she is responsible for leading the strategic direction of the association, advocating for the technological university sector, and strengthening its contribution to education, research, innovation, skills development, and regional economic growth across Ireland.**

A respected leader in public policy, higher education, and enterprise engagement, Claire brings extensive experience in shaping national policy and fostering collaboration between education providers, industry, and government. Prior to joining TUA, she served as Head of Public Policy at the Law Society of Ireland, where she led policy development and stakeholder engagement on a range of issues affecting Ireland's legal, economic, and social landscape.

Before her role at the Law Society, Claire was Head of Education and Innovation Policy at Ibec, Ireland's largest business representative organisation. During her tenure, she played a significant role in advancing Ireland's skills agenda, promoting innovation, and strengthening links between academia and enterprise. Her work helped shape policy initiatives designed to ensure that Ireland's education system remained responsive to the evolving needs of industry and society.

Claire is also a board member of Cycle against Suicide, a registered charity which blends awareness about root causes of suicide such as mental health with robust prevention and intervention programmes targeted at all segments of society.

As CEO of TUA, Claire is a passionate advocate for the transformative role of technological universities in driving social mobility, regional development, and innovation. She is committed to ensuring the sector has a strong, unified voice and continues to play a central role in building.



**Claire McGee**
CEO of the Technological Universities Association





Conference Chair:

# Mary Coughlan

## Former Tánaiste, TD & Deputy leader of Fianna Fáil

**Mary Coughlan is a former Tánaiste and Government Minister with more than two decades of experience in national politics and public service. A native of County Donegal, she was first elected to Dáil Éireann in 1987 and represented Donegal South-West for 24 years.**

During her political career, Mary served across a number of senior Cabinet portfolios, including as Minister for Social and Family Affairs; Minister for Agriculture and Food and subsequently Agriculture, Fisheries and Food; Minister for Enterprise, Trade and Employment; and Minister for Education and Skills. She served as Tánaiste from 2008 to 2011.

Her experience across enterprise, agriculture, education and social policy provides a broad perspective on many of the themes underpinning the From Research to Regional Enterprise conference.

Since leaving national politics, Mary has remained actively involved in community and sporting life in her native Donegal. She was elected Chairperson of Donegal GAA in December 2023 and continues to serve in the role.

**Mary Coughlan**
Former Tánaiste, TD &
Deputy leader of Fianna Fáil



From Research to Enterprise –
Building Regional Innovation Partnerships:

# Panel Discussion

**This panel will bring together representatives from national and regional agencies to explore how research can connect more effectively with enterprise to support innovation and regional development.**

Drawing on perspectives from enterprise development, investment, research funding, regional policy and sectoral innovation, the discussion will consider how universities and public agencies can strengthen knowledge exchange and create clearer pathways for research expertise to deliver economic and societal impact across the West and North-West of Ireland.

**Mary Coughlan**
Conference Chair

**Majella Maher**
Regional Manager, Enterprise Ireland

**Michelle Conaghan**
Regional Manager, IDA North West

**John Daly**
Senior Economist, Northern & Western Regional Assembly

**Dr Niall McDonough**
Director of Policy, Innovation & Research Support, Marine Institute





# Majella Maher

## Regional Manager, Enterprise Ireland

**Majella Maher is the Regional Manager of the Enterprise Ireland West Regions Team. In this role she works collaboratively with colleagues across start-up and sectoral departments in Enterprise Ireland to deliver on the Enterprise Ireland Strategy 2025-2029-Start, Compete, Scale, Connect.**

This strategy is increasing start-ups numbers, supporting SMEs in productivity and competitiveness, enhancing linkages with the innovation ecosystem, leading to an increasing number of world -leading Irish companies. In 2025, 69% of jobs growth in Enterprise Ireland Client companies was in the regions.

Key to supporting the delivery of the strategy is building trusted relationships with regional stakeholders and working with them on a range of projects and initiatives particularly those funded through regional funds which support an enterprise focussed innovation ecosystem regionally. Sector Specific Innovation Hubs and associated wrap-around support programmes and clusters supported through regional funding have and continue to enable entrepreneurs and SME's on their start-up and scaling journeys. Majella and team she leads play a key role in managing and delivering regional funding in the regions.

Majella brings extensive experience having worked in applied research in the University of Galway along with her role in commercialisation of research in Enterprise Ireland to understanding and delivering for the regions.

Through her leadership at Enterprise Ireland, Majella plays an important role in supporting indigenous Irish companies, helping them achieve international success while contributing to prosperity, innovation, and job creation across Ireland's regions.

**Majella Maher**
Regional Manager,
Enterprise Ireland



# Michelle Conaghan

## Regional Manager, IDA North West

**Michelle Conaghan is a Regional Enterprise Development Manager with IDA Ireland, responsible for supporting foreign direct investment and economic development across the North West region, including Donegal, Sligo, and Leitrim.**

A native of Donegal, she is passionate about promoting the region as a world-class location for international business, investment, and innovation.

Michelle joined IDA Ireland in 2015 and has held a number of senior roles, including Head of Emerging Technologies and High Growth Companies for the UK, Vice President of Green Economy and New Forms of Investment. Working from London, she led investment initiatives across the UK, France, and the Benelux region, helping attract leading international companies to Ireland.

In her current role, Michelle works closely with investors, industry leaders, government agencies, and regional stakeholders to drive job creation and economic growth. She is a strong advocate for the North West's unique strengths, including its skilled workforce, quality of life, research capabilities, and growing innovation ecosystem.

She is widely recognised for her expertise in investment promotion, business development, emerging technologies, and regional enterprise development.



**Michelle Conaghan**
Regional Manager, IDA North West





# John Daly

## Senior Economist, Northern & Western Regional Assembly

**Over the past 11 years, John Daly has worked as an Economist in both the public and private sector. He is the Economist of the Northern and Western Regional Assembly (NWRA), where he supports evidence-based regional development and economic planning across Ireland's Northern and Western Region of Ireland.**

His work focuses on analysing economic trends, assessing regional performance, and providing strategic insights that help shape policies aimed at balanced regional growth, investment, innovation, and sustainable development.

During his time in the Regional Assemblies, John has played an important role in informing policy and decision-making through economic research, data analysis, and stakeholder engagement.

He works closely with elected representatives, local authorities, government departments, educational institutions, and industry partners to identify opportunities that enhance competitiveness, productivity, and quality of life throughout the region.

Prior to joining the NWRA, John held economist roles with the Regional Assemblies of Ireland, EY, and DKM Economic Consultants, gaining extensive experience in economic analysis, regional policy, and strategic planning.

John is recognised for his expertise in regional economics and his commitment to supporting sustainable, evidence-led development that strengthens communities, businesses, and public services across the Northern and Western Region.

**John Daly**
Senior Economist, Northern & Western Regional Assembly



# Niall McDonough

## Director of Policy, Innovation & Research Support, Marine Institute

**Dr Niall McDonough is Director of Policy, Innovation and Research Support Services at the Marine Institute, Ireland's national agency for marine research, technology development, and innovation.**

With more than 25 years of experience in marine science, policy, research management, and international collaboration, he is widely recognised as a leading voice in the sustainable development of Ireland's ocean economy.

A trained marine biologist, Niall's research interests include marine aquaculture, shellfish restoration, and marine resource management. Prior to joining the Marine Institute in 2017, he served as Executive Director of the European Marine Board in Belgium and previously led the Centre for Marine Resources and Mariculture at Queen's University Belfast.

In his current role, Niall oversees Ireland's competitive marine research programmes and supports the implementation of national marine research and innovation strategies. He has played a central role in developing Ireland's long-term vision for ocean knowledge, sustainability, and blue economy growth.

An active leader on the European stage, Niall has served as Chair of JPI Oceans, helping to coordinate international marine research efforts and strengthen collaboration between governments, research organisations, and industry to address global ocean challenges.



**Dr Niall McDonough**
Director of Policy, Innovation & Research Support, Marine Institute





## Multi-sectoral perspectives on regional development

# Panel Discussion

**This panel will bring together leaders from industry, financial services, higher education and executive leadership to explore the opportunities and challenges shaping regional development across the West and North-West of Ireland.**

Drawing on diverse sectoral perspectives, the discussion will consider key regional challenges alongside the factors that can enable regions to thrive, including talent attraction and retention, leadership, enterprise and investment, innovation, skills and infrastructure. The panel will explore how universities, businesses and other regional stakeholders can work together to address barriers to growth, harness regional strengths and research expertise, and support sustainable economic and societal development across the region.

**Mary Coughlan**
Conference Chair

**Caroline Faulkner**
Executive Leadership Coach & Former Senior VP of Prudential Financial

**John Gaffney**
General Manager Europe, Avery Dennison Medical

**Barry Gallagher**
Head of Bank of Ireland Donegal, Sligo, Leitrim and Roscommon

**Finola Howe**
Head of Enterprise & External Engagement, ATU

# Caroline Faulkner

## Executive Leadership Coach & Former Senior VP of Prudential Financial

**Caroline Faulkner is a highly accomplished business and technology leader with more than 35 years of experience across the financial services, technology, and pharmaceutical sectors.**

She is best known for her leadership at Pramerica Systems Ireland, where she played a pivotal role in transforming the Letterkenny-based operation from a small start-up into a major international technology and professional services organisation employing over 1,500 people. She joined the company in 2000 and progressed through a number of senior leadership positions, including Director of Information Systems, Chief Information Officer, Senior Vice President, and Senior Managing Director and Head of the Irish operation.

Throughout her career, Caroline has led large-scale business transformation, organisational growth, and innovation initiatives in both Ireland and the United States. Recognised for her strategic leadership and ability to build high-performing teams, she has been a strong advocate for talent development, industry collaboration, and technology-driven change.

Today, Caroline works as an executive coach, strategic advisor, and keynote speaker, supporting organisations and senior leaders in navigating complexity, strengthening resilience, and improving leadership effectiveness. She is widely recognised as one of Ireland's most respected business and technology leaders.



**Caroline Faulkner**
Executive Leadership Coach & Former Senior VP of Prudential Financial





# John Gaffney

## General Manager Europe, Avery Dennison Medical

**John Gaffney is General Manager Europe for Avery Dennison Medical, part of the company's Materials Group across Europe, the Middle East and North Africa (EMENA).**

An experienced business leader in the medical technology sector, he brings extensive expertise in commercial strategy, innovation, manufacturing, supply chain management, and operational excellence. Throughout his career, John has successfully led growth initiatives, business transformation programmes, and high-performing teams within global healthcare and medical device organisations.

A strong advocate for innovation and entrepreneurship, John is a former BioInnovate Fellow at the University of Galway, a programme affiliated with Stanford Biodesign that focuses on solving unmet healthcare challenges through innovation. He has significant experience in research and development, product commercialisation, and developing strategies that enhance competitiveness and customer value in rapidly evolving markets.

In addition to his executive responsibilities, John is an active mentor with Enterprise Ireland and EIT Health, supporting emerging life sciences and medical technology companies. His career reflects a sustained commitment to leadership, innovation, and continuous improvement in the global MedTech industry.

**John Gaffney**
General Manager Europe, Avery Dennison Medical



# Barry Gallagher

## Head of Bank of Ireland Donegal, Sligo, Leitrim and Roscommon

**Barry Gallagher is Head of Bank of Ireland for Donegal, Sligo, Leitrim and Roscommon, where he leads the bank's business and personal banking operations across the region while supporting economic growth, enterprise development, and community engagement.**

A native of Donegal, Barry has built his career around helping businesses, entrepreneurs, and individuals achieve their financial and growth ambitions.

With more than two decades of banking experience, Barry has held a variety of senior leadership roles within Bank of Ireland, including Senior Business Manager, Regional Business Development Manager, Commercial Branch Manager in Letterkenny, and Head of Bank of Ireland for County Donegal. His extensive knowledge of commercial banking, relationship management, and regional economic development has made him a trusted advisor to businesses across the North-West.

In his current role, Barry works closely with local enterprises, community organisations, public agencies, and business networks to promote investment, innovation, and sustainable economic growth throughout the region. He is a strong advocate for the North-West, exemplified by his role on the board of directors of the Donegal County Enterprise Fund, and is committed to supporting the development of thriving communities and resilient local businesses.

Through his leadership, Barry continues to strengthen relationships between the banking sector and the wider business community, helping drive prosperity and opportunity across the region.



**Barry Gallagher**
Head of Bank of Ireland Donegal, Sligo, Leitrim and Roscommon





# Finola Howe

## Head of Enterprise & External Engagement, ATU

**Finola Howe is Head of Enterprise and External Engagement at ATU, where she leads initiatives that strengthen collaboration between the university, industry, public sector organisations, and regional stakeholders.**

With more than 30 years of experience across industry, consultancy, and higher education, she is a recognised leader in enterprise engagement, innovation, and regional economic development.

Finola began her career as a mechanical engineer and went on to hold a range of senior executive leadership positions within multinational organisations in Ireland, Puerto Rico, and the United States. In 2012, she founded Danu Consulting, providing strategic planning, change management, organisational development, and leadership support to businesses, higher education institutions, and public sector organisations.

At ATU, Finola works across the West and North West region to build meaningful partnerships that connect research, innovation, and talent with industry needs. She is passionate about supporting entrepreneurship, fostering university-industry collaboration, and creating opportunities that deliver economic and societal impact. Her work focuses on helping businesses access expertise, research capabilities, and innovation supports while strengthening regional growth and competitiveness.

A respected facilitator, mentor, and strategist, Finola is widely recognised for her ability to bring together diverse stakeholders to drive innovation, collaboration, and sustainable regional development.

**Finola Howe**
Head of Enterprise & External Engagement, ATU






# Presentation Competition Judges

| Name | Organisation | Position |
|---|---|---|
| Dr John Bartlett | ATU | Head of Graduate Research |
| Una Moran | Enterprise Ireland | Research & Innovation Commercialisation Specialist |
| Niall McDonough | Marine Institute | Director of Policy, Innovation & Research Support |
| Michelle Conaghan | IDA Ireland | Northwest Regional Manager |

# Elevator Pitch Presentation Judges

| Name | Organisation | Position |
|---|---|---|
| Dr James Britton | ATU | Research Coordinator |
| Dr Shane Conway | ATU | Research Coordinator |
| Dr Alan Naughton | ATU | Research Coordinator |





# Poster Competition Judges

**Society & Enterprise**

| Name | Organisation | Position |
|---|---|---|
| Dr Chris O'Malley | ATU | Vice President for External Engagement |
| Dr Aisling Moroney | Western Development Commission | Policy Analyst |
| Briocán Bairéad | Údarás na Gaeltachta | An tAonad Forbartha Pobail |

**Environment & Sustainability**

| Name | Organisation | Position |
|---|---|---|
| Kevin Heanue | Teagasc | Senior Evaluator |
| David Gilligan | Eco Smart Insulation | Quality Assurance Manager |
| James Claffey | Irish Rural Link | Deputy CEO |

**Technology & Innovation**

| Name | Organisation | Position |
|---|---|---|
| Caroline Faulkner | Prudential Financial (Former) | Senior VP, Executive leadership coach & Strategic Advisor |
| Julie Dowling | AIM Centre | CEO |
| Kevin Sexton | Alpha Innovation | CEO |

**Health & Wellbeing**

| Name | Organisation | Position |
|---|---|---|
| John Gaffney | Avery Dennison Medical | General Manager Europe |
| Dr Suzanne Carney | Anatomy Physiotherapy | CEO |
| Dr Aine McNamara | HSE | West & North West Regional Director for Public Health |

# ATU Research Communications & Impact

Dr Shane Conway



**This session will provide an overview of ongoing work by the ATU Research Coordinator team to develop a researcher-centred institutional capacity for strategic research communications and impact, reflecting evolving expectations across the European research landscape around how research is communicated, mobilised and connected with wider society.**

Drawing on practical initiatives developed through RISE@ATU, the presentation will explore how researchers can build the visibility, reach and relevance of their work, engage more effectively with audiences and potential users within and beyond academia, and create pathways towards wider societal, policy, enterprise and regional impact.





## Saw Sandi Muang

**Innovation, Digitalisation, Enterprise And Society (IDEAS)**

Digitalisation of Social Enterprises



**Social enterprises (SEs) pursue social, societal, and environmental objectives while relying on ecosystems of cultural, institutional, and policy actors for critical resources such as funding, legitimacy, and expertise.**

This reliance creates resource dependence dynamics that can both enable and constrain organisational activity, yet existing research has focused primarily on mapping ecosystem components rather than examining how social enterprises experience, negotiate, or resist these dependencies. Digitalisation adds a further dimension to this dynamic, reshaping how social enterprises access resources, deliver services, and balance social and economic objectives.

However, current research remains largely outcome-oriented, emphasising attitudes, revenue benefits, innovation, and resilience, while overlooking why some social enterprises adopt digital technologies and others do not, how digitalisation affects dependence on ecosystem actors, and under what conditions digitalisation enhances or constrains organisational performance.

Addressing these gaps, this study examines digital technology adoption and non-adoption among social enterprises, drawing on resource dependence theory to explore how digitalisation reshapes resource dependence and organisational performance in social enterprises.

## Neil Farren

**Innovation, Digitalisation, Enterprise And Society (IDEAS)**

Examining the demands and resources for managing hybrid teams



**As hybrid working becomes a permanent feature of organisational life, managers are increasingly responsible for leading teams across remote and office-based environments.**

While much of the existing research has focused on employee experiences, little attention has been given to the realities faced by managers implementing and sustaining hybrid work practices. This study addresses that gap by exploring the experiences of managers leading hybrid teams in organisations across Ireland.

Guided by the Job Demands–Resources (JD-R) framework, the research examines the demands managers encounter, the resources that support hybrid team leadership, and the ways hybrid working influences leadership practices and team development. Semi-structured interviews were conducted with managers from a range of industry sectors, organisation sizes, and geographic regions. The study aims to identify common challenges, opportunities, and successful practices emerging from managers' experiences. The study presents practical insights for organisations seeking to optimise hybrid work arrangements.

Findings will help employers better understand management challenges, including communication, team cohesion, performance management, and employee development, while identifying resources, technologies, and leadership approaches that enable effective hybrid team management. The research aims to support organisations in developing sustainable hybrid work practices and strengthening leadership capability.

## Sophie Stiehl

### Innovation, Digitalisation, Enterprise And Society (IDEAS)

Building Business Communities in the Gaeltacht Regions through Leveraging the Digital Ecosystem



**SMEs do not have the time to deeply explore evolving digital technologies or to evaluate which ones are strategically relevant for the business (Herdon et al., 2012).**

This holds them back from taking full advantage of these digital opportunities. This research examines how SMEs operating in Ireland's Gaeltacht regions engage with digital business ecosystems and how such engagement contributes to SME performance, including SME's competitiveness, value creation, innovation, and overall business strategy. Working in collaboration with Údarás na Gaeltachta as the research gatekeeper, the study draws on the experiences of enterprises across a diverse range of sectors. The project explores the digital capabilities, network relationships, and ecosystem participation strategies employed by Gaeltacht-based firms. It identifies the opportunities and barriers SMEs encounter when leveraging digital platforms. The findings will provide practical recommendations for SMEs seeking to strengthen their digital ecosystem engagement and enhance competitiveness. The research will also generate evidence-based insights for enterprise support organisations, regional development agencies, and policymakers responsible for fostering sustainable economic development in rural and indigenous-language communities. By highlighting successful practices and areas for targeted support, the study aims to contribute to more inclusive and effective digital transformation strategies for regional enterprises.

## Bastien Fillieux

### Innovation, Digitalisation, Enterprise And Society (IDEAS)

The interplay between business clusters and entrepreneurial ecosystems: a stakeholder perspective



**The research aims to explore the co-existence between business clusters and entrepreneurial ecosystems through the stakeholder theory.**

This will address a gap in the research field, which has extensively studied entrepreneurial ecosystems and business clusters separately over the years. The objective now is to analyse the interaction between these two concepts.

This research highlights that their co-existence is not passive but actively shaped by stakeholders who drive the dynamics of both systems.





## Farhan Ahmad

### Innovation, Digitalisation, Enterprise And Society (IDEAS)

From Regional Policy to Enterprise Action: Developing a Regional Development Matrix



**Enterprises across Ireland's Northern and Western Region are expected to contribute to digital, green and sustainable development, yet regional policy priorities are dispersed across multiple strategies and are not always translated into a clear enterprise reference point.**

This research develops a Regional Development Matrix (RDM). It is a policy-grounded benchmarking and decision-support framework that consolidates regional priorities and shows where digital transformation and economic, environmental and social sustainability objectives are strongly linked, weakly linked or insufficiently operationalised. The RDM is constructed through systematic coding of national, regional and local policy commitments, followed by assessment of linkage explicitness, policy commitment and importance.

The resulting matrix distinguishes core priorities from gap areas and is designed to help enterprises map current or planned activities against regional development objectives. The intended value is practical. For instance, enterprises could use the RDM to identify relevant regional priorities, evidence their contribution, recognise underdeveloped areas, and support more informed digital and sustainability investment. For policymakers and enterprise-support organisations, it could provide a common basis for dialogue, targeting support and strengthening the translation of Smart Specialisation ambitions into enterprise action across the region.

## Hirushan Sajindra

### MedAgriTech AI eXcellence (MATX)

Mapping Ireland's Funded Research: Fields, Agencies, and Citation Impact (2024 to 2025)



**The world has become steadily data-driven, but research funding allocation still relies heavily on 20th century methods, namely qualitative peer review.**

The Coalition for Advancing Research Assessment (CoARA) allows for quantitative indicators to support qualitative peer review. Recalling that field weighted citations are approximately lognormally distributed, we perform Ireland's first census of researchers authoring papers in the tails of citation distributions.

These researchers exert the greatest influence on the research literature and have the greatest bearing on Ireland's international research reputation. We cross-correlate our ranking of researchers with Research Ireland and European Research Council finding that the typical awardee either does not appear in our census, or even if they do, they perform worse than the typical researcher in our census.

We demonstrate that one can construct cohorts of researchers using a single year's data that continue to exert influence in subsequent years, suggesting that research influence and reputation can be improved by incorporating 21st century data-driven methods.

## Kithmini Gamage

### Innovation, Digitalisation, Enterprise And Society (IDEAS)

Creating value with purposeful freight data sharing



**Freight transport is vital to the economic resilience of the North and West of Ireland, but the sector remains fragmented, with operational information spread across multiple actors.**

Building on an initial review of freight data-sharing practices, this research explores how better use and sharing of data could improve regional connectivity. It recognises that data sharing is valuable only when it serves a clear purpose, creates identifiable benefits, and operates under appropriate conditions for participation. The study examines two challenges of reducing empty vehicle movements and meeting increasing emissions-reporting requirements.

It investigates what information is needed for these purposes, what data operators already collect, and how factors such as trust, governance, technology, commercial sensitivity, and perceived value influence willingness to share. The study aims to provide evidence for operators, industry bodies, and policymakers. Expected outputs include a better understanding of existing data practices, identification of purpose-specific data requirements, and guidance on conditions for trusted and workable sharing arrangements. An industrial placement with Freight Transport Association Ireland will support industry engagement and help refine the research against real operational challenges. The study has the potential to strengthen regional connectivity and competitiveness while informing reporting and data-enabled collaboration for the freight sector.

## Fakiha Bashir

### Innovation, Digitalisation, Enterprise And Society (IDEAS)

Advancing Women into Leadership in ICT and Innovation



**Women continue to be underrepresented in leadership positions across ICT and innovation, creating challenges not only for gender equality but also for organisations seeking to attract, retain and fully utilise skilled talent.**

This research examines the factors shaping women's progression into leadership within the ICT and innovation sectors in the West and Northwest of Ireland. Drawing on perspectives from professionals working within the sector, the study explores practical workplace issues including organisational culture, access to career-development opportunities, mentoring and networks, flexible working, promotion practices, leadership expectations and organisational support.

The research is particularly relevant to enterprises seeking to understand why talented women may not progress at the same rate into senior and decision-making roles, and where organisational practices can make a meaningful difference. Rather than stopping at identifying barriers, the project aims to translate research evidence into practical recommendations for enterprises.

The findings will inform the development of an evidence-based toolkit to help organisations assess their current practices and identify opportunities to strengthen inclusive leadership and career progression. The presentation will share emerging insights from the research and highlight practical actions that enterprises can consider to improve talent development, retention and progression.





## Sana Ullah

### Innovation, Digitalisation, Enterprise And Society (IDEAS)

Balancing Transparency and Privacy in Irish MedTech Cross-Border Regulatory Compliance Using Blockchain



**Irish MedTech SMEs significantly contribute to the West and North-West economy, yet they face growing challenges while navigating complex cross-border regulatory requirements.**

Demonstrating compliance across international markets requires extensive documentation and repeated validation of overlapping evidence. MedTech enterprises must also protect commercially sensitive and privacy-relevant data while meeting data-protection obligations. This research addresses the challenge of balancing regulatory transparency and auditability with confidentiality and privacy. It develops a blockchain-enabled, privacy-preserving framework that enables MedTech manufacturers to share verifiable compliance evidence across jurisdictions in a more controlled, efficient and trustworthy manner.

For Irish MedTech SMEs, the potential benefits include reduced administrative burden, stronger protection of proprietary information, improved readiness for international market access, and greater confidence when engaging with overseas regulators. The work is particularly relevant to the region's significant MedTech cluster and aligns with regional priorities around digital innovation, advanced manufacturing and enterprise competitiveness. By supporting more efficient and privacy-aware regulatory processes, the research aims to strengthen the capacity of indigenous MedTech companies to compete internationally while remaining compliant with evolving regulatory and data-protection requirements.

# Charles Lucas Makio

## Coastal Connectivity (COAST)

Assessing the Fluxes of buried sedimentary carbon in estuarine, marine and coastal waters frequently disturbed by extreme weather events and bottom contact fishing operations



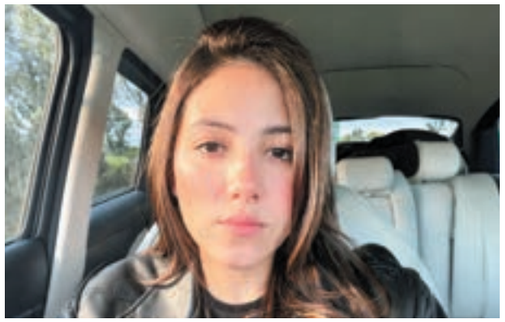
**Coastal sediments underpin fisheries, aquaculture, coastal protection and marine planning, yet their capacity to store and retain organic carbon is rarely considered in management decisions.**

As coastal industries and managers respond to climate regulation and sustainability commitments, recognising sediments as natural carbon assets is increasingly important for coastal resilience. This PhD investigates how sedimentary organic carbon is sourced, transformed and preserved in western and north-western Ireland's coastal and estuarine environments, with particular attention to Donegal's bays, estuaries and sea loughs. It examines how extreme storms, bottom-contact fishing and dredging can alter carbon storage, sediment stability and benthic ecosystem functioning. A Celtic Sea study assesses the combined influence of trawling and storms, while a Lough Swilly case study examines how invasive Pacific oyster (*Magallana gigas*) reefs may modify sediment properties, carbon retention and habitat-management trade-offs. The research combines sediment characterisation with bulk carbon and nutrient measurements, stable isotopes and lipid biomarkers to identify carbon sources and assess its preservation potential. The findings will support fisheries, aquaculture, coastal-management and marine-restoration organisations by identifying carbon-sensitive seabed areas, improving environmental monitoring and informing sustainable marine planning, restoration and climate-mitigation strategies.

# Mariam Elmofti

## Innovation in Digital Manufacturing and Design (IDMD)

Towards Regenerative Businesses in a Polycrisis World



**Businesses are being asked to deal with climate change, pressure on resources, social inequality, and economic uncertainty all at the same time.**

However, most traditional approaches to sustainability still start within the organisation itself: by reducing emissions, using fewer resources, and limiting harm. Such measures are important, but they might not be enough if the social and ecological systems that businesses are trying to sustain are already degraded. This study looks at what it would mean for businesses to move from being less harmful to becoming regenerative

Instead of seeing nature and society as external parties, a regenerative approach views organisations as part of dynamic social-ecological systems: businesses both shape these systems and depend on their health for their own long-term viability. The research concentrates on the challenging practical question of how such a transition can take place and investigates how practices like ecological restoration, coopetition, multi-stakeholder collaboration and continuous learning can become organisational capabilities that change the way firms perceive change, make decisions, and reorganise their resources. The goal is to create a practical framework that enables organisations to understand their context-specific characteristics, identify the capabilities they need to develop, and learn how to heal, thrive and co-evolve with their social-ecological systems.





# Muteeb Ahmad Sheikh

## Coastal Connectivity (COAST)

Rainwater harvesting for water supply & stormwater storage



**Climate change, increasing water demand and more intense rainfall are creating a dual challenge for communities: reducing reliance on treated mains water while also managing pressure on drainage systems.**

My PhD research investigates how rainwater harvesting can address both challenges by using stored rainfall for water supply and as temporary stormwater storage. Using high-resolution UKCP18 climate projections and long-term hydrological modelling, the research evaluates how rainwater harvesting systems perform under different rainfall conditions. It identifies locations where performance is mainly constrained by water availability, storage capacity, or a balance between the two, showing why a single design approach may not work everywhere.

The next stage compares conventional, passive and actively controlled systems to assess how storage can be used more effectively for both water conservation and runoff management. The research is relevant to water utilities, local authorities, engineering consultants, developers and water-technology companies

It aims to support practical decisions on where rainwater harvesting is most suitable, how storage should be sized and when passive or active control may add value, contributing to more climate-resilient and sustainable water infrastructure.

# Manoj Kumar Chand

## Coastal Connectivity (COAST)

Do Irish Seafloor Biotopes Reflect Disturbed or Undisturbed Ecological Conditions?



**Marine biotopes are ecological habitats defined by the interaction of biological communities and their physical environment.**

They underpin essential ecosystem services, support biodiversity, and contribute significantly to sustainable marine industries. As benthic faunal communities respond sensitively to both natural and anthropogenic pressures, they provide valuable indicators of ecological condition and environmental change.

Consequently, biotope mapping has become an important tool for assessing habitat status and supporting ecosystem-based marine management. This research investigates whether Irish seafloor biotopes reflect disturbed or undisturbed ecological conditions by re-evaluating the current Joint Nature Conservation Committee (JNCC) biotope classification framework using historical benthic datasets (2005-2010) from Irish coastal waters. Individual station-based sediment and benthic records from 38 Special Areas of Conservation (SACs) were analysed in ArcGIS and PRIMERv7, with habitat condition assessed using the Infaunal Quality Index (IQI).

Healthy marine biotopes play a critical role in sustaining fisheries, aquaculture, tourism, offshore renewable energy, and marine infrastructure. The mapping tools and datasets developed through this work will contribute to sustainable marine planning, environmental protection, and the continued growth of Ireland's blue economy.

# Morena Gaudino

## Coastal Connectivity (COAST)

After the Storm: Investigating the impact of extreme weather events on microplastic distribution in intertidal sediments



**In recent years, the west coast of Ireland has experienced an increasing number of extreme weather events, including storms, strong winds and prolonged precipitation.**

Such events can mobilise and transport microplastics (MPs), with potential impacts on fisheries and aquaculture, tourism and waste management through species contamination, impacts on coastal amenities and increased plastic distribution. Despite these potential impacts, there are currently no specific national legal requirements to routinely monitor or limit MPs in drinking or surface waters.

Furthermore, most studies assess MP abundance at a single time point, despite concentrations varying over time and being influenced by tides, currents and MP morphology. This highlights the need to better understand the temporal dynamics of MP pollution to support environmental monitoring and coastal resource management. This study investigates the impact of extreme weather events on MP abundance and distribution in intertidal sediments. A baseline was established from spring and neap tidal cycles during a dry period in June 2025. High-frequency sampling was then conducted before and after three storm events at four sites in Galway Bay. The resulting data provides evidence of short-term MP mobilisation and distribution following extreme weather events, with potential to inform targeted monitoring, coastal pollution management and risk-based decision-making.

# Giulia Maria Rossi

## Coastal Connectivity (COAST)

“Make them shine”: Fluorescence-in-situ-hybridisation for identifying mackerel (Scomber scombrus) eggs.



**The Irish economy highly relies on fishing, with its EEZ being worth €382M yearly. Its fishing waters are part of the FAO Northeast Atlantic major fishing area 27 and constitute important spawning grounds for different economically relevant species, such as the blue whiting and cod.**

Among the species spawning in this region is the Atlantic mackerel (Scomber scombrus), a small fish that inhabits North Atlantic Ocean and Mediterranean Sea. Its commercial importance requires a constant monitoring to avoid the risk of overfishing or sensitiveness to climate change. As such, every three years, the international mackerel and horse mackerel egg survey takes place, which is coordinated by the WGMEGS of ICES. Eggs are collected and their identity is established by analysing morphological traits by microscopy, which is time-consuming and demands high taxonomic expertise.

In this context, the use of fluorescent probes that can bind to certain regions of target DNA can be used to speed up the identification and enumeration of mackerel eggs. This technique is called Fluorescent-in-situ-hybridisation (F.I.S.H.) and, when such probes bind to their intracellular targets, the egg emits a fluorescence signal that can be quickly observed by fluorescent microscopy analysis. Here, attempts at optimising a F.I.S.H. labelling protocol are documented to detect and identify eggs of mackerel. Desired output would be to streamline egg counting during fisheries surveys.





# Ramsha Shahid

## MedAgriTech AI eXcellence (MATX)

Low-Altitude Drone-based 3D Reconstructions for Precision Hedgerow Analysis and Biomass Estimation



**Hedgerows provide important benefits for biodiversity, carbon storage, ecological connectivity and sustainable land management.**

However, effective monitoring requires more than mapping their location; information on height, width, volume, density and structural condition is also needed. Current approaches, including field surveys, satellite imagery, LiDAR and photogrammetry, can be limited by cost, resolution, occlusion and challenging outdoor conditions.

This research investigates whether low-cost RGB imagery from drones and consumer cameras, combined with advanced 3D reconstruction methods such as NeRF and 3D Gaussian Splatting (3DGS), can provide a practical alternative. The research focuses specifically on real-world hedgerows, where wind, changing illumination, dense vegetation, occlusion and terrain variation make accurate 3D reconstruction challenging.

The goal is to develop a cost-effective and scalable camera-based framework for measuring and monitoring hedgerow structure. For enterprises working in agriculture, drone services, natural-capital assessment and environmental monitoring, this could support more accessible measurement of hedgerow condition, biodiversity and carbon while reducing reliance on expensive specialist surveying equipment.

# Kathy Bannigan

## Coastal Connectivity (COAST)

Coastal Resilience: Environmental Scenario Generation using Remote Sensing



**Coastal erosion poses significant challenges, such as damage to infrastructure, loss of farmland, and ecosystem degradation. This presents financial, operational, and environmental problems for coastal management organisations.**

Advancements in machine learning, numerical modelling, and remote sensing have improved coastal monitoring. However, these methods can struggle to generalise across heterogeneous coastal environments, capture complex spatiotemporal processes, and require extensive labelled data for reliable performance. This research introduces a conditional denoising diffusion probabilistic model that can generate realistic time-series data for multivariate coastal environments. This method can capture long-range temporal dependencies and spatial variability by integrating convolutional feature extraction, transect-based conditioning, and self-attention mechanisms.

This approach can synthetically generate evolving coastal scenarios and enhance downstream prediction tasks. Therefore, future coastal simulations and mitigation strategies can be created across various environmental scenarios. This research presents a framework for coastal monitoring, environmental scenario generation, and decision support. The diffusion-based generative learning method aims to improve prediction accuracy, model robustness, and interpretability of coastal change analysis. Furthermore, it supports coastal protection planning and monitoring to improve long-term coastal resilience.

# Muhammad Jawad Bashir

## MedAgriTech AI eXcellence (MATX)

Trustworthy AI, IoRT and Digital Twins for Sustainable Precision Farming



**Agriculture must produce food more efficiently while responding to climate variability, rising input costs and pressure on natural resources.**

Although sensors, robotics and AI can support precision farming, adoption is limited by fragmented systems, scarce labelled data and limited trust in black-box decisions. This research is developing a Digital Twin framework that combines the Internet of Robotic Things with explainable AI, generative modelling and self-supervised learning. It integrates environmental, operational and visual data to support transparent prediction, scenario exploration and farm decision-making.

The work includes an explainable time-series model for agricultural control, a Conditional Time-Transformer that generates context-aware synthetic sensor data, and a label-efficient vision pipeline for crop and weed monitoring. These components are integrated into a proof-of-concept dashboard for monitoring, prediction, explanation and what-if analysis. For growers and AgriTech providers, the framework could reduce dependence on costly labelled data, make AI recommendations easier to examine and allow strategies to be tested before deployment. The next stage is validation across more crops, farms, seasons and sensing systems with farmers, advisers and AgriTech companies. This could support pilot deployment and commercialisation of trustworthy, resource-aware farming technologies in Ireland's AgriFood and AgriTech sector.



# Randika Kalpa Makumbura

## Coastal Connectivity (COAST)

Benchmarking Deep Learning Architectures for Automated Nephrops norvegicus Burrow Detection in Underwater Television Survey Imagery



**Automated detection of Nephrops norvegicus burrow entrances from UWTV survey imagery remains an unresolved challenge in fisheries stock assessment. Manual burrow counting is labour-intensive and subject to inter-analyst variability, introducing uncertainty into stock estimates that inform management decisions.**

This study presents the first systematic multi-architecture benchmark for automated N. norvegicus burrow detection. Six deep learning object detection models across two architectural families were evaluated on a three-class manually annotated dataset of frames from a UWTV survey. These comprised single-stage YOLO variants (YOLOv8n, YOLOv11n, YOLOv12n, and YOLOv26n) and two-stage Faster R-CNN variants with ResNet-50 and ResNet-101 backbones, all trained under a unified protocol for fair comparison. YOLO-family models consistently outperformed Faster R-CNN across all metrics. YOLOv8n achieved the highest overall test mAP@0.5 of 0.877, while YOLOv11n produced the highest class-specific AP@0.5 of 0.976 for the Nephrops burrow category. All YOLO nano variants exceeded real-time throughput, with YOLOv26n reaching 60.70 FPS against 6.80 FPS for Faster R-CNN R101. These results indicate that lightweight single-stage YOLO architectures, particularly YOLOv8n and YOLOv11n, are well-suited for integration into semi-automated UWTV survey pipelines, offering a computationally efficient route to reducing analyst burden in ICES stock assessment workflows.



# Catherine White

## Innovation, Digitalisation, Enterprise And Society (IDEAS)

Addressing Climate Action in North-West, Small to Medium Hotels through Communities of Practice



**Like all industries, the hotel industry has obligations to enact climate action practices, throughout their supply chain. A key challenge that has been highlighted in both academic studies and reports, with regards to implementing climate action practices, is managing the information effectively.**

There is no current blueprint for the industry in their decarbonisation efforts, with a myriad of available information. This challenge is amplified for small to medium hotels that often lack resources in comparison to larger hotel groups. The North-West of Ireland is predominantly made up of small to medium hotels (250 employees or less). This research wants to address this challenge through a knowledge management system – absorptive capacity (ACAP) model. ACAP explores how an organisation acquires external knowledge (decarbonisation information) and then transforms that information into a valuable output.

This research will use an active community of practice within an Irish hotel group to uncover what are the barriers and enablers of transferring the knowledge (decarbonisation information) within a hotel community of practice (a group of people who interact with each other because of a common interest in a particular field and collaborate to learn and support one another, create, spread, and use knowledge relevant to the organisation. This research aims to then develop a decarbonisation framework for the Irish hotel industry, informed by research done within an Irish hotel group.

# Madiha Rubeel

## Innovation, Digitalisation, Enterprise And Society (IDEAS)

From Influence to Impact: Communicating Sustainable Fashion to Young Consumers



**Sustainability is increasingly important to consumers, but communicating sustainable fashion in ways that translate awareness into meaningful action remains a challenge for businesses and organisations.**

Businesses and organisations increasingly use social media influencers to promote sustainability, yet high visibility does not always translate into meaningful consumer behaviour. My PhD explores how influencer communication can be designed to engage young consumers more effectively and support sustainable fashion choices. Drawing on a systematic literature review and a bibliometric analysis of the emerging research landscape, I examine how influencer characteristics, including authenticity, credibility and trust, interact with communication strategies such as storytelling, transparency and message framing.

The research highlights that successful sustainability communication depends not only on who delivers the message, but also on how young consumers process and respond to it. The project has practical relevance for fashion and retail businesses, SMEs, circular economy organisations and youth-focused initiatives across the West and North West. By translating research evidence into actionable insights for influencer partnerships and digital sustainability campaigns, it aims to help organisations develop more credible, engaging and behaviour-oriented communication while strengthening collaboration between research, enterprise and regional sustainability initiatives.

# Patricia Warren

## Coastal Connectivity (COAST)

Anthelmintic Efficacy of Bioactive Compounds from Macroalgal Sources



**This project investigates macroalgal applications in veterinary and equine health within a One Health framework.**

Macroalgal supplements for equines are currently widely commercially available. The literature review identified major gaps in equine-specific evidence, including limited information concerning macroalgal extract standardisation, effective concentrations, safety, bioavailability and the performance of seaweed-derived compounds against defined equine parasite species. Bioactive fractions from Fucus vesiculosus were isolated and tested on exploratory in-vitro studies using nematode larvae recovered from equine faeces.

Preliminary experiments produced reductions in larval motility following exposure to crude and purified seaweed-derived materials. The next phase of the project will therefore prioritise reproducible extraction and chemical characterisation, confirmation of target organisms, replicated concentration-response experiments with appropriate controls, and optimisation of larval maintenance.

If effective, seaweed has the potential to significantly contribute to the battle with anthelmintic resistance under the One Health strategy. This would create business opportunities in the pharmaceutical, nutraceutical, and macroalgal harvesting sectors, while bolstering equine industry profits through reduced stock loss and improved animal welfare.





# Nasim Shokri

## Innovation in Digital Manufacturing and Design (IDMD)

Development of a Stretchable Sensor for Enteral Feeding Systems



**Enteral feeding systems provide essential nutritional support to patients who are unable to consume food orally.**

However, current technologies provide limited real-time information about system operation. Improved sensing could support more reliable monitoring and contribute to safer and more responsive medical devices.

This research focuses on developing a flexible stretch sensor for integration into an innovative enteral feeding delivery system. The sensor detects stretching and deformation during operation. Different materials and manufacturing approaches are being investigated. Sensor sensitivity, repeatability, stability, and durability are evaluated under realistic operating conditions.

This has relevance in enteral feeding systems, medical tubing, flexible sensors, and smart medical devices. Real-time monitoring could improve device functionality, support earlier detection of operational changes, and contribute to connected, data-driven healthcare technologies.

# Mostafa Mellizadeh

## Innovation in Digital Manufacturing and Design (IDMD)

Robotic Silicone dip coating for Medical Devices



**Silicone dip coating is used in medical-device and advanced manufacturing applications to produce thin functional coatings on mandrels and components.**

However, controlling coating thickness is challenging because the process is affected by repeated dipping, evaporation, drainage, dwell time, curing, and part geometry. Poor thickness control can increase inspection, rework, waste, and development time.

This project investigates a robotically controlled silicone dispersion dip-coating process using a UR5e collaborative robot. More than 200 coated samples were produced under controlled conditions to study how dipping cycles, evaporation time, withdrawal speed, dwell time, and mandrel geometry influence coating thickness. Measurements were taken at multiple axial locations to assess build-up and spatial variation.

The work combines experimental design, RSM, ANOVA, and machine-learning modelling to identify key process drivers and predict thickness. Dipping cycles, evaporation time, and dwell time were the dominant parameters, while withdrawal speed was less influential within the tested range. The best machine-learning model achieved a repeated cross-validation $R^2$ of 97.04%; external validation on unseen data achieved an $R^2$ of 92.8% with an RMSE of 0.0222 mm. For industry, this research supports a shift from trial-and-error development toward repeatable, data-driven process control, helping improve coating consistency, reduce development time, and strengthen quality control.

## Kesara Wimal

**Innovation in Digital Manufacturing and Design (IDMD)**

Securing Manufacturing Quality Assurance: Hardware-Based Device Identity, Post-Quantum Cryptography, and Blockchain



**Industry 4.0 is seeing manufacturers increasingly digitising Quality Assurance (QA) through sensors and IoT devices, but a critical gap remains: conventional record-keeping systems cannot prove a QA measurement truly came from a specific physical machine, or guarantee it stayed unaltered from the factory floor to long-term storage.**

This weakens audit trails and creates compliance risk, especially in regulated, safety-critical, or high-value production settings. The rise of quantum computing adds a further threat, putting the long-term security of today's cryptographic protections in question. This research proposes an end-to-end, hardware-rooted trust architecture that closes this gap.

Each sensor reading is bound to a unique, unclonable hardware identity and carried through to immutable blockchain storage, so every QA record can be proven to come from its original device and shown to be untampered throughout its retention. The design also builds in post-quantum cryptography, keeping record integrity secure even as quantum computing advances, and is built to work through untrusted intermediary infrastructure, so manufacturers don't need to trust third-party servers or databases along the way. This results in a practical foundation for QA records that are verifiably authentic, tamper-evident, and future-proof, strengthening auditability, compliance, and trust across increasingly distributed manufacturing supply chains.

## Ali Al Abbas

**MedAgriTech AI eXcellence (MATX)**

A Vision-Based Learning from Demonstration Framework for Personalized and Safe Robotic Rehabilitation



**Driven by an aging population, the demand for physical rehabilitation is rapidly outpacing clinical capacity, resulting in severe physiotherapist shortages and surging patient waiting lists.**

While robotic-assisted therapy offers a promising solution, they remain reliant on on-site manual programming by specialists. To address the scalability problem, we introduce See, Learn, Assist, an end-to-end, vision-based Learning from Demonstration (LfD) framework deployed on collaborative robots (cobots). The system enables clinicians to remotely record therapeutic exercises via video demonstration.

Machine learning is used to encode and learn the exercise relative to body-centric frames to scale trajectories dynamically across diverse patient body sizes without manual recalibration. Our system scales across three exercise modes depending on the needs and conditions of the patient: Passive, and Active-Assissted, and Active-Resistive. The system utilizes a hybrid control scheme to bias the patient effort along the exercise trajectory. It also learns a probabilistic model of the normal interaction force between the robot and the patient, and executes a gentle motion reversal whenever the patient feels discomfort.

## Obed Adjei Peprah

**MedAgriTech AI eXcellence (MATX)**

Physics-Constrained Hybrid Modelling of Dairy Spray Drying for a Validated Digital Model and an Implementation Pathway Towards a Self-Updating Digital Twin



**Dairy powder quality in Ireland is currently confirmed after production through laboratory testing.**

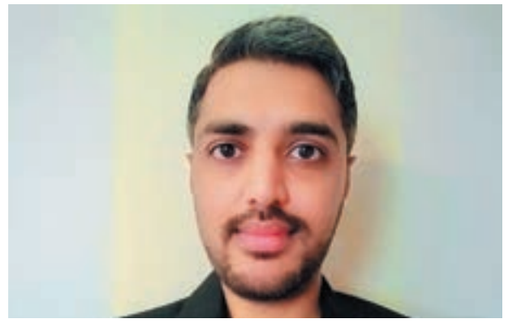
This means that when moisture, water activity or particle size is found to be outside specification, the affected powder has already been produced. This research addresses this problem by developing a Digital Model that predicts these quality attributes directly from process conditions recorded during spray drying. The model combines physical process relationships, CFD simulation and experimentally calibrated data-driven models. It is designed to work even where industrial production data and detailed dryer specifications are limited. A particular focus is placed on particle size, which is linked to the atomisation conditions at the nozzle.

The main industrial benefit is earlier visibility of powder quality during production. Instead of relying only on delayed laboratory results, the model provides a route to estimating quality while the dryer is operating. This could support faster identification of deviations, reduce trial-and-error when introducing products or changing feed conditions, and help optimise the balance between quality, throughput and energy consumption. The validated Digital Model also provides the foundation for future development towards a self-updating Digital Twin, in which production data continuously improves the model and differences between predicted and measured behaviour can indicate changes in the process or equipment.

## Ali Riaz

**Innovation in Digital Manufacturing and Design (IDMD)**

Tetrahedral Lattice Heat Sinks for Advanced Electronics Cooling



**The increasing power density of electronic and computing systems is creating significant challenges for thermal management, particularly in applications such as high-performance computing, data centres, and advanced electronics.**

Conventional cooling technologies can face limitations in achieving efficient heat removal while maintaining acceptable pressure losses and system complexity. This research investigates the use of highly porous, 3D-printable tetrahedral lattice structures as compact heat sinks for liquid and air cooling.

The study uses computational modelling to evaluate how the thermal conductivity of the lattice and end-wall materials, together with the choice of coolant, influences heat transfer and hydraulic performance under laminar flow conditions. The results demonstrate the potential of lattice-based heat sinks to provide enhanced thermal performance while offering flexibility in material selection and geometric design.

The findings provide useful design insights for developing compact, additively manufactured cooling solutions for next-generation electronics and high-performance computing. The research has potential for collaboration with companies developing advanced cooling, semiconductor, data-centre, and additive-manufacturing technologies.

# Abdullah Haider Ali

## MedAgriTech AI eXcellence (MATX)

Automated Medical Guidewire Inspection Using Tactile and Vision Sensing



**Medical-device manufacturing requires highly reliable inspection, particularly for small components where surface defects can affect product quality and performance.**

This research investigates how robotics, high-resolution tactile sensing, machine vision and artificial intelligence can support more consistent and automated inspection of complex medical-device surfaces.

Medical guidewires are used as a representative case study because their small diameter, curved reflective surface and sub-millimetre defects make inspection challenging. A robotic inspection platform has been developed using a GelSight tactile sensor, a precision robot and microscopic vision system. A dedicated dataset was collected from 40 physical guidewires, including clean and defective samples with defects of approximately 0.27–0.78 mm.

Deep-learning models achieved strong defect-classification performance using both tactile and visual data. The work also evaluates robustness under degraded sensing conditions, such as changes in illumination, image quality, contact conditions and sensor noise. Combining tactile and visual sensing improved resilience when one sensing stream became unreliable. The long-term aim is an integrated robotic inspection system that improves consistency, repeatability and traceability while reducing reliance on subjective manual inspection in safety-critical manufacturing.

# Wojciech Gorszczak

## Innovation in Digital Manufacturing and Design (IDMD)

Soft robotics in design of biomimicking vascular simulator



**To battle the limitations and ethical concerns of animal testing scientific, regulatory bodies urge the use of In Silico and In Vitro testing as alternative.**

This project addresses that through the development of smart vascular simulator capable of reproducing clinically relevant motion with soft robotic actuation while matching real tissue biomechanical properties. A principal application will be the evaluation of endovascular devices within anatomically accurate vascular model under controlled mechanical and haemodynamic loading. The system will support assessments of device deployment, vessel to device interactions, flow disturbances.

Its modular architecture will enable adaptation for testing of wide variety minimally invasive vascular technologies. For medical device manufacturers, healthcare providers, and research organisations, the simulator offers a repeatable testing environment that may reduce development time, enable earlier design optimisation, and decrease dependence on animal models. Additionally, programmable patient specific conditions could also facilitate clinician training and procedural planning. The project presents opportunities for co-development, licensing, and commercialisation with endovascular device companies, clinical centres and research organisations. The intended outcome is a scalable platform that bridges laboratory research and clinical application while accelerating the development of safer and more effective endovascular devices.





# Gopika Sasankan Deepa

## Innovation in Digital Manufacturing and Design (IDMD)

3D Printing of Smart Polymer-Based Filaments for Personalised Drug-Delivery Implants.



**Fused deposition modelling enables the layer-by-layer production of customised implants, allowing digital adjustment of shape, size, internal structure and drug content.**

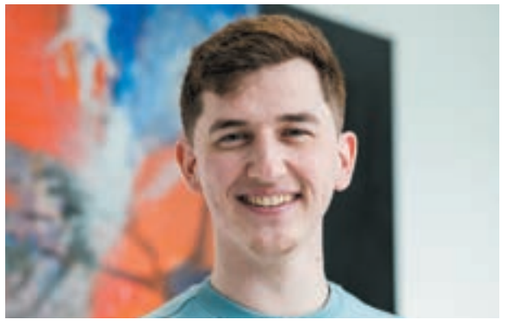
Incorporating smart polymers could enable drug release in response to local pH conditions, allowing more precise and targeted therapies in environments where pH changes occur due to infection or inflammation. Chitosan is a natural polymer with excellent biocompatibility and intrinsic pH-dependent swelling behaviour. In drug-delivery systems, increased swelling can facilitate faster drug release.

However, chitosan has poor thermal processability and cannot readily be converted into filaments for fused deposition modelling. Therefore, preliminary study focused on developing PLA–10% chitosan filaments and evaluating swelling behaviour. PLA–10% chitosan samples and pure PLA controls were tested in triplicate in acidic and basic media. After 24 hours, the composite exhibited 4.52 ± 0.92% swelling in the acidic medium and 3.07 ± 0.58% in the basic medium, whereas pure PLA showed minimal change. These findings demonstrate the role of chitosan in water uptake and suggest increased swelling under acidic conditions. However, pH responsiveness was not statistically confirmed and further studies are needed. Future research will optimise filament-extrusion and 3D-printing parameters, explore methods to enhance the material's pH-dependent behaviour, and evaluate drug release and antimicrobial performance

# Gordon Hegarty

## Innovation in Digital Manufacturing and Design (IDMD)

AI-Powered Testing for Cyber-Physical Systems



**Cyber-physical systems utilise sensors, software, and actuators to interact with their environment. Testing these devices requires significant time and effort, increasing costs and making automation a priority.**

Test generation is the most time-consuming phase of the testing process, as ensuring device functionality at various levels is essential. Unit testing ensures code functionality, while system testing ensures overall alignment to device specifications.

Current system testing methods require manual effort for test case generation from natural-language requirements, slowing the development process. Additionally, test cases are utilised to develop rigid test scripts that can fail due to unforeseen events during testing and create significant manual overhead when migrating tests to similar devices. A growing area in industry and academia is the use of Large Language Models (LLMs) for software testing; however, this work mainly focuses on the unit test level and uses source code for test generation.

The natural language understanding and generation abilities of LLMs make them well-suited for test case generation from system requirement analysis. Furthermore, their code generation and interactive capabilities may enable more robust and flexible test execution. This research would streamline cyber-physical system testing, reduce development time and costs while maintaining high standards, and ensure local companies can compete in global markets.

# Mohammad El-Iraky

## MedAgriTech AI eXcellence (MATX)

Towards Automated Pruning in Apple Orchards



**Apple production still depends heavily on skilled seasonal labour, with dormant pruning remaining one of the most demanding orchard operations.**

Pruning influences how many flower buds are retained on a tree and therefore affects crop load, fruit quality, yield consistency and market value. This research explores how artificial intelligence and robotics could support more consistent and adaptable pruning decisions. The project represents each apple tree as a digital branching structure and develops an AI-based decision system that selects a sequence of cuts to meet a chosen flower-bud target. Rather than following a single fixed pruning prescription, the aim is for the system to adapt its decisions to different tree structures and production targets.

A part of the research is moving these decisions from idealised tree models towards reliable field operation. This includes understanding how sensing and reconstruction errors may affect the selected pruning actions, and whether decisions can be adapted when the available tree information is uncertain. The work will also investigate whether robotic constraints, such as reachability, collision risk and changing access as branches are removed, can be incorporated into the pruning decision itself. The longer term goal is an automated system that balances horticultural objectives with practical robotic execution in real orchard conditions.

# Mahbloos Khan

## Innovation in Digital Manufacturing and Design (IDMD)

Node-Centric Antenna Design for Reliable Connectivity of Heterogeneous 6G-Enabled IIoT Networks



**Industry 5.0 is creating heterogeneous Industrial Internet of Things (IIoT) environments where sensors, wearable devices, robots, gateways and access points have different communication requirements.**

Antennas for these devices are often developed by focusing on individual parameters such as size, gain, bandwidth and efficiency, with less consideration of the device's communication role and operating environment. This can limit connectivity in industrial settings affected by energy constraints, mobility, metallic structures and non-line-of-sight propagation. My research investigates a node-centric antenna design approach, where antenna characteristics are selected according to the communication requirements of different industrial devices.

Compact and efficient multiband antennas are being developed for distributed sensor and wearable nodes, while high-gain broadband and mmWave antennas are investigated for fixed gateways and access points requiring greater coverage and communication capacity. The research combines electromagnetic simulation and optimisation with prototype fabrication and experimental measurement. The aim is to translate industrial communication requirements into practical antenna solutions that improve connectivity, energy efficiency and communication performance, supporting scalable wireless connectivity for future Industry 5.0 applications.





# Joyce Mathew

## MedAgriTech AI eXcellence (MATX)

AI Driven Multimodal Wearable Sensor for Muscle Fatigue Monitoring in the Upper Limb



**Muscle fatigue in the distal upper limb is a significant challenge in post-stroke rehabilitation, potentially limiting recovery of fine motor functions required for daily activities.**

Current wearable monitoring systems often rely on single-modality sensors, such as surface electromyography (sEMG), which can be affected by signal variability, environmental noise and limited physiological representation. These limitations may reduce the reliability of fatigue detection, particularly in smaller muscles of the hand, wrist and fingers. This research proposes a multimodal wearable sensor system integrating strain, temperature and sEMG sensing to provide a more comprehensive assessment of muscle fatigue. Strain sensors capture mechanical deformation associated with movement, sEMG measures neuromuscular activation, and temperature sensing provides complementary physiological information during exertion.

Artificial intelligence-based data fusion will be investigated to combine these signals and improve the robustness of real-time fatigue detection. The current research phase focuses on sensor design, fabrication and validation under controlled laboratory conditions using non-identifiable or simulated data. The proposed system has the potential to support future development of personalised and safer rehabilitation technologies for distal upper-limb fatigue monitoring and functional recovery. Future human studies will require ethical approval and informed consent.

# Iqra Naz

## MedAgriTech AI eXcellence (MATX)

Algebraic Cellular Automata for Biological Modelling



**This research focuses on algebraic cellular automata, focusing on the analysis of algebraic structures, equivariant mappings, action of the groups, and group rings.**

Traditionally, differential equations have been used to model biological systems and are analyzed through statistical and computational approaches. As CA are discrete and rule-based, they can provide an alternative framework that represents evolving local interactions and global behaviour of the system.

CA are particularly useful for analysing dynamic processes where interactions between different components influence the system's overall behaviour. The aim of this work is to provide a framework that is computationally flexible and theoretically accurate while also supporting the mathematical modelling of complex biological systems.

The ultimate goal of the project is to create a link between abstract algebra and modelling of biological processes by exploring the algebraic structures of cellular automata. This may lead to potential applications of algebraic cellular automata in veterinary and biological systems.

# Dipshikha Das

## Innovation in Digital Manufacturing and Design (IDMD)

Aligning Human Inspection Intent with Robot Behaviour via Neural Radiance Fields



**Visual inspection remains one of the least automated stages in precision manufacturing, particularly for small, high-value components such as medical device parts, where subtle, geometry-dependent defects on reflective or metallic surfaces are difficult to detect reliably.**

Manual inspection continues to dominate quality assurance despite documented error rates of 20–30%, driven by operator fatigue, attention variability, and inconsistent judgement. Conventional automated inspection systems struggle to adapt to new parts or inspection criteria without extensive reprogramming and calibration, limiting their practical value on production floors where flexibility and minimal downtime are critical. This research develops a vision-based robotic inspection framework that learns directly from observing human inspection demonstrations, removing the need for manual programming or teleoperation.

By combining 3D scene reconstruction, and attention-based robot learning, the system captures not just how a human inspector moves, but which viewpoints and regions they prioritize, enabling a robot to replicate expert inspection strategies across different part geometries with minimal retraining. The research aims to support precision engineering manufacturers, validated against real production components and to support faster, more consistent quality assurance while preserving the adaptive, judgement-based strengths from human inspection.

# Zayed Nasser

## Innovation in Digital Manufacturing and Design (IDMD)

Passive 5G antennas and wall surfaces for indoor factory positioning



**Modern factories depend on knowing where people, products and vehicles are on the shop floor. Reliable positioning supports autonomous transport, real-time inventory and worker safety.**

However, satellite positioning does not work indoors, while Bluetooth, RFID and Wi-Fi systems can struggle in industrial environments where metal machinery creates strong reflections, moving equipment blocks signals and factory layouts change frequently. This research develops radio hardware to improve positioning in these conditions.

The first element is a compact dual-band 5G antenna that steers its beam simply by changing frequency, avoiding the costly phase shifters and control electronics used in conventional steerable antennas. Circular polarisation also improves tolerance to reflections and unpredictable tag orientations.

The second element is a passive patterned wall surface that redirects radio waves toward obstructed or weak-coverage areas, creating useful propagation paths without active electronics, power supplies or control wiring. Together, the two technologies aim to provide more reliable and adaptable indoor positioning for smart factories using simpler and lower-cost infrastructure.





# Camillo Murgia

## MedAgriTech AI eXcellence (MATX)

Collaborative Robot Applications in Reconfigurable Industrial Tasks



**Collaborative robots promise flexible industrial automation, but deployment can require extensive engineering, especially for SMEs.**

This thesis asks whether advanced robotics methods can reduce the effort needed to deploy and reconfigure robot applications, and how their integrability can be measured. It focuses on adaptation, systems integration and evaluation under industrial constraints rather than on new algorithms. Matched case studies are used. Each begins with a conventional baseline, records its customisation and validation burden, and introduces research components.

The main case transfers perception, structured task representations, pre-validated motion primitives and modular execution to CNC machine tending. Screen-based state recognition provides an interface for legacy equipment without digital connectivity. A preliminary second case examines separation of mixed-material diabetes-monitoring devices. Evaluation combines task success and cycle time with setup effort, customisation, reconfiguration, human intervention, recovery and safety validation. The contribution is a framework showing when conventional automation remains suitable, when advanced methods add value, and when autonomy creates unjustified complexity. The work may support an open-source, 3D-printed benchmark for comparing robot-system integration.

## Gavin Rackard

### Translational Health Research, Innovation, preVention & Equity (THRIVE)

A cross-sectional survey showing comparable poor sleep in elite athletes and support staff in Ireland



**An Investigation into the Sleep Behaviours of Elite Athletes and Support Staff in Ireland. Sleep is essential for recovery and performance in elite sport, yet disturbances are reported among both elite athletes and support staff. Little research has directly compared sleep quality between these groups.**

This study investigated the prevalence and characteristics of sleep problems in both groups in Ireland. A cross-sectional online survey was completed by 118 participants (79 elite athletes; 39 support staff). Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI) and the Athlete Sleep Screening Questionnaire (ASSQ). Poor sleep (PSQI global score ≥ 5) was prevalent in both elite athletes (75.9%) and support staff (76.9%). No significant differences were observed between groups in PSQI global scores (p = 0.488) or ASSQ Sleep Difficulty Scores (p = 0.171).

Support staff reported a significantly shorter sleep duration (6.96 ± 0.97 h) than athletes (7.39 ± 0.85 h; p = 0.02). Support staff reported a significantly earlier time to get up in the morning (06.44 ± 72 mins) than athletes (07.22 ± 71 mins; p = 0.01). Suboptimal sleep existed in both groups and was comparable between athletes and support staff. Staff may be particularly vulnerable to reduced sleep duration due to extended working hours. Interventions to specifically address sleep latency, satisfaction and duration are warranted across all roles in high-performance sport.

## Hannah Linney

### Translational Health Research, Innovation, preVention & Equity (THRIVE)

Digital Health literacy and engagement with online health information of Adolescents in Ireland



**Adolescence is a critical developmental period when health behaviours are frequently initiated that track into adulthood, influencing health outcomes.**

Currently, the internet has a significant influence on adolescents. Evidence suggests that adolescents are frequently exposed to and actively seek health information from digital sources such as on social media platforms and generative AI chatbots. Access to online health information offers opportunities for empowerment, however the widespread misinformation circulating widely online poses significant risks.

Therefore, the ability to interact safely and effectively with online health information, referred to as digital health literacy, is of increasing importance. However, limited research is available on the digital health literacy of adolescents. This PhD project seeks to address this, by conducting a scoping review to systematically map all the available evidence on the digital health literacy of adolescents, and a nationally representative, cross-sectional study to investigate the digital health literacy and engagement with online health information of adolescents in Ireland, incorporating patient and public involvement (PPI) with adolescents throughout. The findings will inform education policy and practise in Ireland, contribute to the understanding of adolescent digital health literacy internationally and to the literature on methodological approaches to PPI with adolescents.

## Rebecca Tarpey

### Translational Health Research, Innovation, preVention & Equity (THRIVE)

Nutritional knowledge, attitudes & practices for menstrual cycle symptom management among women on the island of Ireland



**Background: Menstrual cycle symptoms can affect daily functioning, work, education & wellbeing, yet limited evidence describes how women use nutrition to manage these symptoms in everyday life.**

This study addresses that gap by examining knowledge, attitudes & practices (KAP) related to nutrition-based menstrual symptom self-management among women living on the island of Ireland. Methods: This study is a cross-sectional online survey of KAP conducted using Qualtrics. Eligible individuals are biological females aged 18+, living in the Republic of Ireland or Northern Ireland, with menstrual cycles or associated symptoms in the last year, including those using hormonal contraceptives.

The survey includes validated questionnaires on menstrual status, symptoms, nutritional KAP, dietary treatment, habits, & perceived obstacles & enablers. Anticipated Outcomes & Impact: Data collection concluded with 402 responses, & analyses will characterise key knowledge gaps, nutritional awareness, attitudes, & practices, while examining variations among subgroups (e.g., age, symptom intensity, hormonal contraceptive usage). Findings are likely to uncover knowledge gaps, common self-management practices & unmet support needs, informing future menstrual health education, dietary interventions & service development on the island of Ireland.

## Audrey Fayne

### Translational Health Research, Innovation, preVention & Equity (THRIVE)

Can Machine Learning Better Predict Weight Loss in Obesity Interventions?



**Obesity is a major contributor to chronic disease, yet individuals respond differently to lifestyle-based weight-management programmes.**

This research investigates whether using machine learning on routinely collected clinical data can help predict which individuals are most likely to achieve clinically meaningful weight loss and identify those who may benefit from additional support. Using real-world data from a structured lifestyle intervention, the research compares traditional statistical and machine-learning approaches to identify accurate, robust and clinically useful prediction methods. It also examines how data preparation, analytical methods and software choices affect model performance and reproducibility, providing evidence relevant to the responsible use of predictive analytics and AI in healthcare.

The research has potential applications for healthcare providers, lifestyle-intervention services, digital health and MedTech companies, and developers of clinical decision-support systems. Findings could support more personalised care, earlier identification of individuals requiring additional support, improved use of healthcare resources and development of reliable data-driven tools for obesity and chronic disease management.

# Vanessa Nobles

## Translational Health Research, Innovation, preVention & Equity (THRIVE)

Improving Pharmacogenomics testing implementation through multi-stakeholder involvement to reduce inappropriate prescribing in primary care



**In a globally aging society, healthcare resources and healthcare professional burnout rates are increasing. Adverse drug-related hospital costs are a driving factor.**

Implementing pharmacogenomic testing into primary care can support routine medication reviews. Pharmacogenomic tests as personalised medicine relies on a patient's unique genomic profile to determine optimal medication and dosing to reduce the severity and occurrence of adverse drug reactions.

Adverse drug reactions often lead to expensive emergency visits and a decreased quality of life. Pharmacogenomic tests exist for most prescribed medications, yet a lack of prescriber knowledge of pharmacogenomics and test interpretation has lead to low adoption rates. This research seeks to determine the optimal pharmacogenomic testing implementation model that adapts to healthcare facility resource availability and prioritises continued education for healthcare professionals. Current deliverables include compiling global pharmacogenomic testing policies, surveying Irish healthcare professionals on perceptions of pharmacogenomics and recommendations for implementation methods, and financial forecasting of Irish prescribing trends against pharmacogenomics testing. Pharmacogenomics testing is cost-effective and solutions to sustained implementation are vital to the future of health.

# Kashaf Arif

## Translational Health Research, Innovation, preVention & Equity (THRIVE)

Co-designing an e-coaching intervention to improve psychological well-being among third-level students



**Background: University students face growing academic and digital stressors alongside difficulties accessing timely psychological support.**

E-coaching may offer accessible preventive support, but how it should be structured, what the coaching function should involve, and how it can fit within university services remain unclear.

Aim: This PhD aims to co-design an evidence-informed e-coaching intervention blueprint to support university student psychological well-being. Methodology: Guided by the Medical Research Council framework for complex interventions, the project began with a systematic review of 49 studies. Findings indicated potential benefits of e-coaching for psychological distress, while highlighting substantial variation in coaching delivery, guidance, accountability and engagement.

These findings now inform a student needs-assessment survey, stakeholder consultation and co-design with students, well-being practitioners and technical contributors. Expected Benefits: The project will translate a heterogeneous evidence base into a context-specific intervention blueprint and coach guide. By combining student priorities with service and technical perspectives, it aims to define feasible content, coaching functions, delivery features and pathways for integration with existing university supports, providing a foundation for future feasibility and effectiveness testing.

# Shanika Arachchi

## Translational Health Research, Innovation, preVention & Equity (THRIVE)

Sex Differences in Brain Structural Alterations Following Mild Traumatic Brain Injury



**Mild traumatic brain injury (mTBI) affects 42 million people globally each year. Standard clinical imaging frequently misses subtle neurostructural changes, leading to delayed recovery and non-specific treatment.**

Because biological sex influences brain biomechanics, hormonal baselines, and neurochemistry, sex-stratified diagnostics are vital for advancing personalized post-mTBI care. Using high-resolution T1-weighted structural MRI, we deployed a surface-based morphometry (SBM) workflow via the Computational Anatomy Toolbox. The automated pipeline segments grey matter (GM), white matter (WM), and cerebrospinal fluid (CSF), while quantifying artifact-resistant biomarkers, specifically cortical thickness and Local Gyrification Index (GI) mapped to the Desikan-Killiany atlas.

Males showed larger absolute total intracranial volume (TIV), but females demonstrated a higher proportion of GM relative to TIV (50% vs. 44.7%) and greater peak cortical thickness in superior frontal and parietal regions. Male subjects exhibited higher upper-bound GI values. Both sexes showed localized cortical thinning in inferior temporal regions, confirming shared biomechanical vulnerability. T1-weighted SBM delivers sub-clinical sensitivity, identifying micro-structural damage invisible to standard radiology. Incorporating biological sex into morphometric profiling provides tailored treatment interventions, optimizes clinical outcome, and accelerates targeted post-mTBI therapeutics.

# Fiona Burke

## Translational Health Research, Innovation, preVention & Equity (THRIVE)

Understanding the Connection Between Nature, Mindfulness and Wellbeing



**This research investigates how meaningful engagement with natural environments can support psychological wellbeing and how these benefits can be applied across organisations, communities, health services and environmental initiatives in Ireland.**

While existing research shows that time in nature can reduce stress, improve mental health, enhance cognition, and support recovery, less is understood about the mechanisms that make these experiences effective. The research focuses on the potential relationship between nature connectedness, mindfulness, and reduced self-focused thinking. It explores whether simply being physically present in nature is enough, or whether actively noticing and psychologically engaging with the environment produces greater wellbeing benefits.

This has practical relevance for organisations seeking to design effective nature-based wellbeing programmes, outdoor experiences and social prescribing initiatives. The research will develop an integrated understanding of how attention, present-moment awareness, connection to nature, and changes in self-perception may contribute to psychological flourishing.

By combining insights from psychology, neuroscience, mindfulness research, and wellbeing science, the project aims to move beyond demonstrating that nature is beneficial towards understanding how and why it benefits people.

# Beth Brown

## Coastal Connectivity (COAST)

Protecting Coastal Futures: Balancing Public Health, Livelihoods and Resilience in Irish Water-Based Communities



**Ireland's coastlines are increasingly contested spaces, with water recreationists, local residents, tourism operators, water-based businesses, and mounting environmental pressures having a role to play.**

Ireland is increasingly positioning itself as an adventure tourism destination in international markets, with surfing on the West coast at the forefront. Drawing together multiple perspectives on water pollution — anglers, water recreation communities, water-based businesses, and other relevant stakeholders — the research works alongside these groups to build the capacity of recreationists, like surfers and anglers, and water-based businesses to cope with pollution. Its enterprise relevance comes through case studies along the Wild Atlantic Way, including the nationally significant sites of Lahinch and Strandhill, hubs for water-based recreation, tourism and surf culture.

In highlighting the multiple benefits these communities gain from good water quality, the research pushes beyond purely economic valuations of blue spaces, making the case for safeguarding them for the economy and for the health and wellbeing of both people and the planet. Case studies build a multifaceted picture of these impacts — from the emotional toll of a fish kill on anglers, to water testing with recreationists to protect public health, to a survey of Wild Atlantic Way businesses this year capturing economic impacts; working to protect the sustainable futures of coastal communities.

# Fnu Talha

## MedAgriTech AI eXcellence (MATX)

Generative AI for Non-invasive MRI Enhancement in Brain Tumour Diagnosis



**Accurate tumour localisation is central to brain cancer care, and MRI is the imaging method of choice for its soft-tissue contrast.**

However, clearly visualising tumour boundaries typically requires gadolinium-based contrast agents, which add cost and scan time, and are contraindicated for patients with renal impairment or other health risks. We have developed and published a generative AI model, AA-ViT, that synthesises contrast-enhanced MRI directly from standard non-contrast scans (T1, T2, FLAIR), removing the need for a contrast agent.

Unlike prior generative approaches, which often blur fine anatomical detail, AA-ViT is explicitly guided to preserve tumour and tissue boundaries, which is critical for clinical trust. On the BraTS 2021 benchmark, our method outperformed state-of-the-art approaches on image-quality metrics. More importantly, it was clinically evaluated by three neuroradiologists and a neurosurgeon across random 19 real glioma cases, scoring 3.94/5, a level of direct clinician validation rarely reported in this field. For healthcare providers and imaging technology companies, this points to a practical path to lower scanning costs, shorter appointment times, and safer imaging for patients who cannot receive contrast agents, without new hardware or invasive procedures. We're keen to discuss integration into existing MRI workflows and opportunities for clinical validation at scale or commercial deployment.

# Luke Canavan Dignam

## Translational Health Research, Innovation, preVention & Equity (THRIVE)

Using Artificial Intelligence to detect possible head impacts in male and female football



**My research is at a cross road of Sport science and medicine, computer science with AI and computer vision with biomechanics.**

I am looking to detect possible head impact situations and possible concussion in contact sport using AI that is trained to automate the detection process from the current standard, having pitchside spotters who are trained to manually keep an eye on players.

The intent is to automate and streamline the process, remove ambiguity, identify "concussion thresholds" and increase player welfare by detecting these injuries in a more timely manner, bringing this technology democratically to all levels of play for both men and women.

# Eustes Kigongo

## Translational Health Research, Innovation, preVention & Equity (THRIVE)

Interventions to improve screening participation for breast, cervical and bowel cancer



**Participation in breast, cervical, and bowel cancer screening remains suboptimal and inequitable, and is increasingly challenged.**

This study synthesised global evidence on implementation interventions aimed at increasing screening participation and reducing disparities, to identify gaps that must be addressed to achieve screening targets. This review used standard frameworks to extract and synthesise barriers and facilitators, that affect success of cancer screening interventions.

One hundred ten studies were included and identified ten intervention categories: educational, reminders, self-sampling, outreach, peer education and counselling, quality improvement, promotional messages, patient navigation and tracking, mass media, and multicomponent interventions. Although most interventions demonstrated promising effectiveness, multi-pronged interventions showed the greatest impact.

However, most interventions were implemented in highly controlled settings, limiting their real-world applicability and scalability. Findings revealed important gaps in culturally responsiveness and real-world intervention approaches for cancer screening. Future research should prioritise pragmatic, culturally appropriate, and multiple component interventions, supported by sufficiently long follow-up periods to assess sustainability and real-world effectiveness.

# Chandler Tyrrell

## Translational Health Research, Innovation, preVention & Equity (THRIVE)

Health outcomes of socially excluded older adults in the age of digitalisation



**As healthcare increasingly adopts digital technologies, there is a risk that some older adults may experience poorer health outcomes if they are unable to access or benefit from digital services.**

While digital health offers opportunities to improve healthcare delivery, socially excluded older adults may face barriers related to digital literacy, affordability, social isolation and service accessibility. Understanding these challenges is essential to ensure that digital transformation does not widen existing health inequalities.

This doctoral research examines how digitalisation influences the health outcomes of socially excluded older adults in Ireland. Using a multi-phase qualitative design, the study combines a scoping review with semi-structured interviews and participatory World Café discussions to explore how digital health is experienced within everyday life. The findings will inform the development of more inclusive digital health services and provide evidence to support policy, healthcare practice and community initiatives aimed at reducing digital exclusion.

By centring the lived experiences of socially excluded older adults, the research seeks to generate practical recommendations for healthcare providers, policymakers and digital health developers, helping to ensure that future digital health systems are equitable, accessible and responsive to the needs of an ageing population.



# Lauren Callaghan

## Translational Health Research, Innovation, preVention & Equity (THRIVE)

Smart Kids, Healthy Lives: Integrating Technology to combat Childhood Obesity in Ireland



**Childhood obesity is a growing public health and economic challenge in Ireland and globally, creating an urgent need for scalable and effective approaches to prevention and early intervention.**

Physical activity is a key modifiable factor, but a child's ability and confidence to be active is closely linked to physical literacy. Physical literacy encompasses the motivation, competence, confidence, knowledge and understanding required to engage in physical activity throughout life.

Current approaches to assessing physical literacy can be time consuming, costly and dependent on specialist expertise, which limits their use at scale. The aim of this research is to develop a technology enabled solution that makes physical literacy assessment more objective, accessible and scalable.

The project will establish stronger links between physical literacy and childhood obesity, develop and validate new assessment technology in real world environments, and evaluate its clinical and cost effectiveness through intervention studies. The long term opportunity is to enable earlier identification of children who may benefit from support and to provide actionable data for targeted interventions. The technology could support schools, healthcare providers, community programmes and policymakers by enabling scalable population assessment, preventative healthcare and evidence based decision making.



# Lucas Eleoterio Kupczik

## Translational Health Research, Innovation, preVention & Equity (THRIVE)

Bringing the Outdoors Indoors: AI-driven companionship in Virtual Reality for older adults



**This research explores the creation of an AI-driven conversational companion within an immersive virtual reality (VR) environment.**

Using VR and generative AI (genAI) technologies, this project aims to provide older individuals with the opportunity to interact with a virtual companion in a more natural and engaging manner. The study is divided into the challenge identification, development, evaluation phases. The first phase includes direct contact with target individuals to understand their needs, challenges, and preferences. The second phase evaluates the safety of a locally hosted large language model when responding to sensitive and emotional scenarios.

The AI-generated responses are systematically evaluated to ensure safety of the responses, identify potential risks, and inform the development of appropriate adjustments for the AI-driven companion targeting an older population. The following phase evaluates the technical feasibility of integrating the genAI into a virtual companion within a VR environment, including real-time voice-based conversations and avatar integration. This system is tested with adult participants to identify challenges relating to usability, interaction quality, accessibility, and technical performance. The main goal of this study is to provide older individuals affected by loneliness, a virtual companion that to chat. It will establish practical guidelines for safe, ethical and effective integration of AI-driven agents into immersive environments.

# ATU Research Coordinator Team Supports & Initiatives








# RISE@ATU Postgraduate Research Training Programmes (PRTPs) Overview

**RISE@ATU is Atlantic Technological University's implementation of the Technological University – Research & Innovation Supporting Industry (TU RISE) project.**

Co-funded by the Government of Ireland and the European Union through the ERDF Northern & Western Regional Programme 2021–2027, RISE@ATU represents a significant investment in building research and innovation capacity across ATU's nine campuses. ATU PRTPs implement best practice in cohort-based doctoral programmes. The programmes develop highly trained and skilled postgraduate researchers who are strongly networked within existing and emerging sectoral areas of strength and opportunity. identified for the region in Ireland's Smart Specialisation Strategy.

Through RISE@ATU, 60 PhD projects are supported across five Postgraduate Research Training Programmes (PRTPs).

The five PRTPs are:

**THRIVE** (**T**ranslational **H**ealth **R**esearch **I**nnovation, pre**V**ention & **E**quity)
Focusing on preventative strategies in health, THRIVE responds to priorities such as the Healthy Ireland Strategic Action Plan and the National Framework for Chronic Disease Management. By bridging academia and healthcare, THRIVE aims to shape university research agendas to encompass wellbeing research.

**IDEAS** (**I**nnovation, **D**igitalisation, **E**nterprise **A**nd **S**ociety)
IDEAS aims to become a centre of excellence for research in regional innovation systems, enterprise and digitalisation, contributing to the debate on the digital revolution's wider implications, and to stimulate innovation and cooperation between research and industry.

**COAST** (**Coast**al Connectivity)
The projects within this PRTP align with the overarching smart specialisation marine and blue economy, examining issues such as the sustainable management of marine resources, impacts and prevention of pollution, ecosystem health and coastal dynamics.

**IDMD** (**I**nnovation in **D**igital **M**anufacturing and **D**esign
The PRTP in Innovation in Digital Manufacturing and Design brings together leading multidisciplinary academic experts and industrialists in the fields of Industry 4.0, material science, advanced manufacturing & engineering, computer science business, process design and innovation management.

**MATX** (**M**ed**A**gri**T**ech AI e**X**cellence)
Each project in this innovative programme addresses an application of AI across three distinct, yet strategically significant Smart Specialisation Strategy (S3) priority areas: Agrifood/ AgriTech, MedTech, and Advanced Manufacturing & Engineering interconnected through the innovative implementation of ICT solutions.



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