QUEEN'S UNIVERSITY BELFAST | POSTDOC SOCIETY

Postdoc Showcase 2025

"Voices of the future: Postdocs Shaping Tomorrow"

Friday 26th September 2025

09:30 – 18:00

Canada Room and Council Chamber, Lanyon Building, QUB

go.qub.ac.uk/Showcase25

#LovePostdocs #NPAW2025

Welcome to the Postdoc Showcase!

It is with great pleasure that we welcome you to the Queen's University Belfast Postdoc Showcase, in celebration of National Postdoc Appreciation Week (NPAW) 2025.

This year we are delighted to have Professor Peter Robertson, Associate Pro-Vice-Chancellor (Equality, Diversity and Inclusion) to officially open the showcase, an update from the Postdoctoral Development Centre by Dr Lisa Douglas, and 6-minute flash talks by researchers from across the three Faculties at Queen's. We are also excited to have two panel discussions on the topic of "Life After Postdoc" from both an academic and non-academic perspectives.

The Postdoc Showcase is a celebration of the valuable contribution postdocs play in enhancing the University's research and reputation. As part of this, to raise the profile of postdocs and research staff across QUB, we will also be showcasing researcher profiles on the screens throughout the event.

On behalf of this year's organising committee, we hope you enjoy the programme and thank you attending the Postdoc Showcase 2025!

2025 Showcase Organising Committee.

With support from Lisa Douglas, Erin Davidson and Alice Dubois from the Postdoctoral Development Centre.

Contents

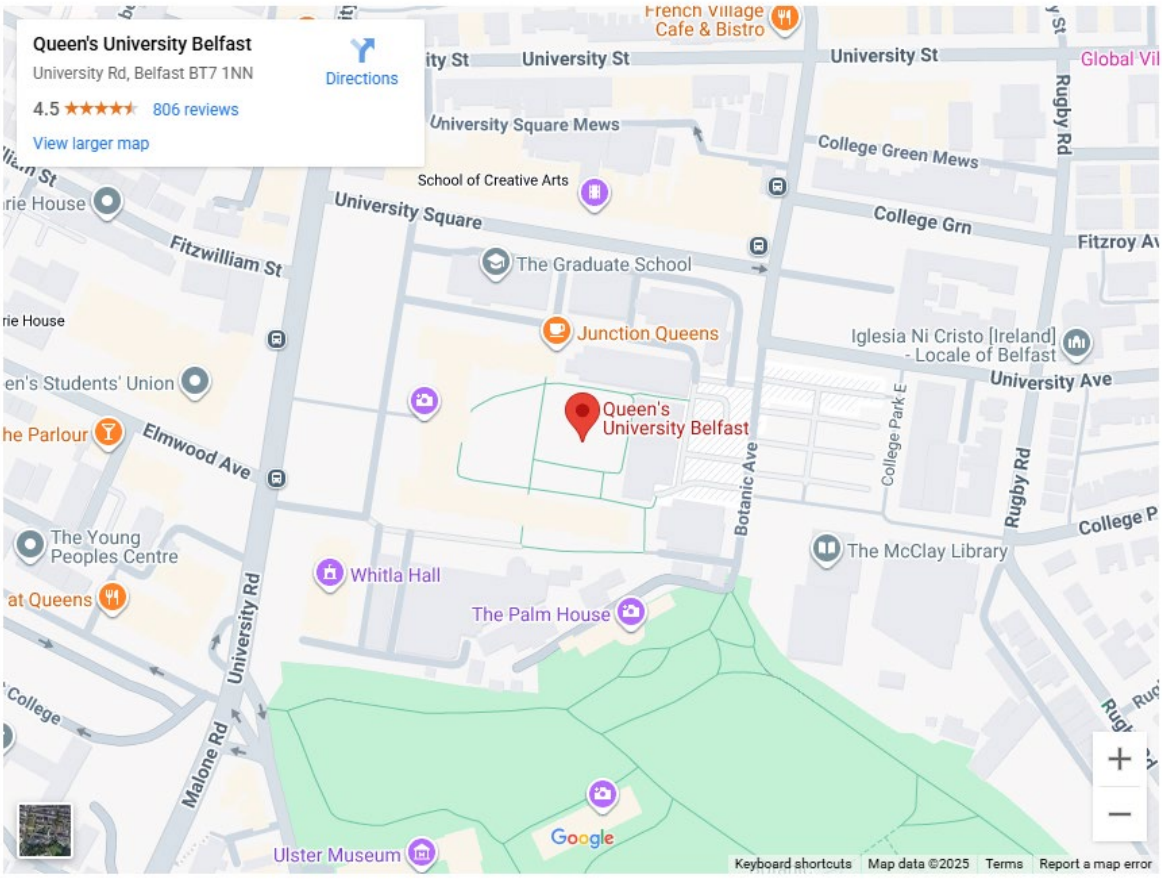
For sustainability reasons, please do not print this booklet or only print the pages you feel you need. The programme will be displayed at the venue, and QR codes to an electronic version of this booklet will also be available.

Practical information

Location

Canada Room and Council Chambers, Lanyon Building

(Please note that lunch including the poster session and postdoc drop-in session will take place in the Great Hall, Lanyon Building)



Food

Food has been ordered to include vegetarian and vegan options in order to offer options to as many guests as possible. When reported to us during online registration, other specific dietary options have been ordered to accommodate additional restrictions or allergies.

Programme

09:30 – 10:00	Registration With Tea, Coffee & Pastries
10:00 – 10:20	Welcome | Postdoc Society and Professor Peter Robertson (Pro-Vice-Chancellor Equality, Diversity and Inclusion)
10:20 – 10:30	Postdoctoral Development Centre Update | Dr Lisa Douglas
10:30 - 11:45	Session 1: Flash Talks Industry, Innovation and Infrastructure / Climate Action SDGs: 1. Mike Hardy: "A Nano Factory: From 3D Prints to Sensing Chips" 2. Mohamed Abdelilah Fadla: "Defect and Interface Properties of Ultra-Wide Bandgap Oxides for Next Generation Power Electronics" 3. Sadish Oumabady: "Redefining waste-derived carbon material for High-Impact Net-Zero Applications" 4. Iyyappa Rajan Panneerselvam: "Understanding Ultrafast Dynamics in Semiconductors via Ab Initio and Deep Neural Network Modelling" 5. Masoud Pedram: "Can Concrete's Green Message Be a Good Omen for Net-Zero Sustainable Construction?" 6. Chao Gu: "Data Informativity Analysis and Data-driven Supervisory Control of Discrete-event Systems" 7. Domhnall Carlin: "Building Tomorrow's Research Infrastructure: The Critical Role of Research Software Engineers" 8. Sean French: "Intangible Assets in Community Development in Belfast" *Chair: Dr Emma Cassinelli*
11:45– 12:00	Break
12:00 – 12:45	"Life After Postdoc" – Non-Academic Panel Discussion Short introductions by each panellist, followed by a moderated and open panel discussion • Dr Ruth Flanagan | Research Impact and Engagement Officer (AHSS), Queen's University Belfast • Dr William Crowe | Senior Implementation Manager, Public Health Agency

	• Dr Chris McCallum | Associate Sustainability Consultant, Tetra Tech *Chair: Dr Laura Cushley*
12:45 – 14:15	**Lunch, Posters & Postdoc Drop-in clinic (The Great Hall)** • Postdoctoral Development Centre • Research Development, including Fellowship applications • Impact and Engagement • Patient and Public Involvement (PPI) • Public Affairs (Policy Impact) • Wellbeing • Publishing/Open access • Research Spin-outs & Investments **Poster presenters to please be around their posters as follows:** • 13:10 to 13:40 for even poster numbers • 13:40 to 14:10 for odd poster numbers
14:15 – 15:00	**"Life After Postdoc" – Academic Panel Discussion** Short introductions by each panellist, followed by a moderated and open panel discussion • Dr Teresa McGrath | Lecturer, School of Mechanical and Aerospace Engineering, Queen's University Belfast • Professor Eneko Larrañeta | Professor, School of Pharmacy, Queen's University Belfast • Dr Miguel Ortiz | Lecturer, School of Arts, English and Languages, Queen's University Belfast *Chair: Dr Meg Wallace*
15:00 – 15:15	**Break (Afternoon Tea)**
15:15 – 16:15	**Session 2: Flash Talks** **Good Health and Wellbeing / Sustainable Cities and Communities SDGs:** 1. Michelle Naughton: "The Eye as a Window to Brain Inflammation in Multiple Sclerosis" 2. Nicola Ann Ward: "Estimating Dementia and MCI Prevalence in Northern Ireland: Findings from the NICOLA-HCAP Study" 3. Raheleh Amirkhah: "Deciphering intestinal zonation and its role in tumour initiation, evolution and progression in mouse models of colorectal cancer"

	4. **Emma Humphries:** "What is prescriptivism and what does it have to do with Ariana Grande?" 5. **Shay Mullineaux:** "GIS derived, AI generated, Greenspace Metrics and their Applicability to Public Health Outcomes" 6. **Lindsey West:** "Marine governance fragmentation as a barrier to the UK's floating wind ambitions" 7. **Bunty Sharma:** "Eco-Friendly Firefighting Foam: Boosting Foam Performance with Metallo-Ionic Liquid Innovations" *Chair: Dr Sarah Baxter*
16:15 – 16:30	PDC Postdoc Awards *Chair: Dr Lisa Douglas*
16:30 – 16:45	Showcase Prize-giving and Closing Remarks *Chair: Postdoc Society*
16:45 – 18:00	Drinks Reception

Invited Guests & Speakers

Professor Peter K.J. Robertson C.Eng FEI, FIChemE, C.Chem C.Sci FRSC, FICI SFHEA

Associate Pro-Vice-Chancellor (Equality, Diversity and Inclusion)

Professor Peter Robertson is Associate Pro-Vice Chancellor for Equality Diversity and Inclusion at Queen's University Belfast. As Associate Pro-Vice-Chancellor Equality, Diversity and Inclusion, Peter provides strategic, transformational leadership across the university, driving the implementation of EDI Action Plans and supporting the delivery of the university's Strategy 2030, supporting all protected characteristics within QUB's diverse staff and student community.

In addition to his APVC role Peter is also Professor of Energy and Environmental Engineering in the School of Chemistry and Chemical Engineering at QUB. His particular expertise is in the area of photocatalytic technology for both energy and water sustainability. This work has encompassed basic research on photocatalysis through to pilot processes development for water treatment and for solar energy conversion and storage.

Prior to joining QUB in 2015 Peter spent nearly 20 years at Robert Gordon University in Aberdeen initially as a lecturer then as Chair of Energy and Environmental Engineering and ultimately as Vice-Principal and Pro Vice-Chancellor (Research and Academic Support Services). Peter is a member of the UKRI Building a Green Futures Advisory Board and the Engineering and Physical Sciences Research Council (EPSRC) SUPERGEN High Level Group. He was a member of as well as EPSRC's Strategic Advisory Network

between 2021 and 2023 and the Scientific Advisory Committee on Energy between 2018 and 2022. Peter was also a member of sub Panel 8, Chemistry for REF2021 and is also serving as a panel member for the Chemistry panel in REF2029.

Professor Eneko Larrañeta

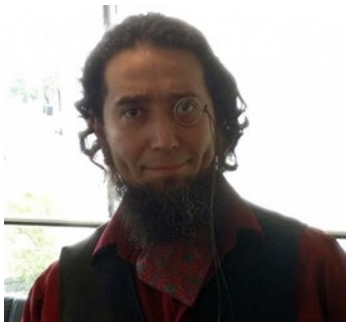
Eneko Larrañeta is a Professor at Queen's University Belfast, specialising in drug delivery systems and biomaterials. He holds a BSc in Chemistry and a PhD in Physical Chemistry from the University of Navarra, where his research focused on self-assembled hydrogels. After completing his PhD in 2012, Prof. Larrañeta worked as a research fellow in nanotechnology for drug delivery before moving to Belfast in 2013 to develop microneedle technology for transdermal drug delivery at Queen's University. Prof. Larrañeta's expertise includes hydrogels, nano/microparticles, and microneedle-based systems. Currently, he focuses on implantable systems for sustained drug release, using techniques such as melt processing and additive manufacturing. He has published over 100 papers in peer-reviewed journals, edited multiple books, and authored numerous book chapters. Prof. Larrañeta has secured funding from leading organisations and collaborated extensively with pharmaceutical and cosmetics companies. Since 2023, he has been included in the Clarivate Highly Cited Researcher list, and since 2019, he has been recognised as a top 2% scientist in his field by Stanford University's analysis using Scopus data. He is a Fellow of the UK Higher Education Academy and a member of the Royal Society of Chemistry and the Society for Applied Microbiology.

Webpage: https://pure.qub.ac.uk/en/persons/eneko-larra%C3%B1eta

ORCID: https://orcid.org/0000-0003-3710-0438

LinkedIn: https://www.linkedin.com/in/eneko-larrañeta-48846042/

Dr Miguel Ortiz, QUB



Miguel Ortiz is a Mexican composer, sound artist, and Lecturer of Design and Prototyping at Queen's University Belfast. His work focuses on the use of sensing technologies for creative applications, specifically Digital Instrument Design and its intersection with Composition and Improvisation. Dr Ortiz has performed using traditional acoustic instruments, laptop improvisations, bio-instruments and hyper-instruments.

Dr Teresa McGrath, QUB

Dr. Teresa McGrath is a Lecturer of Engineering, Environment and Sustainability in the School of Mechanical and Aerospace Engineering. Prior to this appointment, she worked as a Research Fellow in the Wright Technology and Research Centre on transport decarbonisation (2019-2023) and in Civil Engineering (2017-2019) on the development of low carbon concretes. She completed her PhD in 2017 in Civil Engineering part-time, whilst working as a Research Assistant (2011-2017) on energy efficiency and circular economy projects. Her research focuses on the implications of transport decarbonisation on energy systems, environmental emissions and cost.

Dr Chris McCallum

Chris McCallum is a sustainability consultant with a varied portfolio of clients including the governmental agencies and departments alongside private businesses throughout the UK and Ireland. His work takes in a sustainability including carbon capture and storage (CCS), fleet decarbonisation and blue/green infrastructure for water industry. Chris is currently an Associate Sustainability Consultant at Tetra Tech working within their Belfast office.

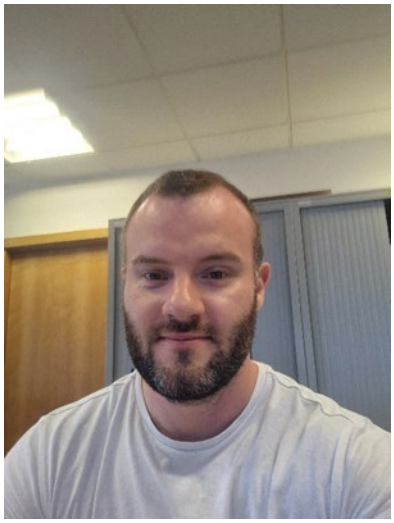
Chris completed his PhD in Chemical Engineering at Queen's University Belfast in 2019 under the supervision of Prof David Rooney and Dr Gary Sheldrake. During his PhD he worked with fellow PhD students to open Covet CLR looking to lower the environmental impact of a cup of coffee with reusable coffee cups with 10 stores within the scheme at its peak. While writing his PhD he worked in Centre for Advanced and Sustainable Energy (CASE NI) with Dr Kevin Morgan (QUB) to develop and test a novel catalytic convertor for dual fuel technologies. During this work he travelled to 10 countries, as part of Lean Launch Pad, to determine commercial interest in the technology. Chris then joined Letterkenny Institute of Technology (LyIT now ATU) as a postdoctoral research as part of the Bryden Centre.

Chris' first role outside of academia was the General Manager of Mushroom Producer Organisation. Within this role Chris worked with over £17 million in turnover and helped to manage the operational fund which enabled PO members to improve the quantity and quality of the mushrooms grown on site. After this he joined Tetra tech initially as a Principal Sustainability Consultant in 2022 before being promoted to Associate."

Dr Ruth Flanagan, QUB

Ruth is currently the Research Impact and Engagement Officer for Arts and Humanities at Queen's University Belfast. In this professional services role, she supports researchers in developing pathways to impact, building stakeholder relationships, and evidencing the societal value of academic work. Her work bridges research and practice, with a focus on creative evaluation methods, collaborative knowledge exchange, and REF 2029 impact case study development. Ruth holds a PhD in Sociology from QUB, where her research explored how religious and cultural upbringing shaped Northern Irish women's sexual experiences. She has a background in sexual health advocacy and public engagement, and is committed to supporting inclusive, socially engaged research within and beyond the academy.

Dr William Crowe



Dr William Crowe earned his BSc in Human Nutrition and PhD from Ulster University, where his doctoral research focused on the role of mercury exposure in autoimmune disease. He continued at Ulster as a postdoctoral researcher, investigating the effects of protein intake on satiety. He then joined Queen's University Belfast for as a Research Fellow, examining the impact of processed meat consumption on colorectal cancer risk. Following his academic research, Dr. Crowe transitioned to the Public Health Agency (PHA), where he worked as a Senior Epidemiological Scientist for three years, his work primarily focused on healthcare acquired infections, including COVID-19. In his current role as Senior Implementation Manager at the PHA, he is committed to advancing clinical research by fostering collaboration, improving research capacity, and driving innovation across the region.

Drop-in Clinic Members

Postdoctoral Development Centre


Jill Wright (pictured left, Research Careers and Employability Officer) and Dr Lisa Douglas (pictured right, Postdoctoral Development Centre Officer) will be at the drop-in clinic to discuss the support the Postdoctoral Development Centre (PDC) offers to research staff at Queen's.

The PDC is here to help postdocs and research staff advance their careers, both within and outside of academia, while ensuring a positive experience at Queen's. We do this by providing useful information, tailored resources, and fostering a supportive environment and culture.

We offer a range of workshops and learning opportunities to help researchers build new skills. Our career support includes career development workshops, career exploration events, one-on-one help with career planning and CV development, and mock interview sessions. We also work to improve policies that impact postdocs and make sure their contributions are recognised, including through the annual PDC Postdoc Awards and National Postdoc Appreciation Week celebrations. Additionally, we represent postdocs on University committees and support postdoc-led societies and networks across the institution.

If you need any support, don't hesitate to contact us at pdc@qub.ac.uk or visit the Postdoctoral Development Centre website.

Research Impact & Engagement and Patient and Public Involvement - Support for Postdocs at Queen's




Your research has the power to make a difference. The Research Impact & Engagement Team is here to help you maximise the impact of your work - whether you're just getting started or ready to showcase real-world benefits.

We work with researchers across all career stages to:

✓ **Build Research Impact** We offer advice, resources, and training to help you plan, deliver, and evidence the impact of your research - from shaping policy to improving lives, influencing practice or driving innovation.

✓ **Support REF Impact Submissions** We help develop high-quality REF Impact Case Studies, working with researchers and faculties to ensure your research gets recognised in the Research Excellence Framework (REF).

✓ **Public & Patient Involvement (PPI) Network** We coordinate Queen's PPI network, connecting you with support to embed public and patient voices in your research. Through our partnership with the all-island PPI Ignite Network, you can access wider expertise, training, and peer connections.

If you're thinking about research impact, we're here to help - at any stage of your journey.

Meet Your Impact Support Team

Research Impact Manager

- Maelíosa McCrudden – m.mccrudden@qub.ac.uk

Faculty Contacts:

- Engineering & Physical Sciences (EPS): Natalia Plechkova – n.plechkova@qub.ac.uk
- Arts, Humanities & Social Sciences (AHSS - Social Sciences): Kathryn Kavanagh – k.kavanagh@qub.ac.uk
- Arts, Humanities & Social Sciences (AHSS - Arts & Humanities): Ruth Flanagan – r.flanagan@qub.ac.uk
- Medicine, Health & Life Sciences (MHLS): Claire Tonry – claire.tonry@qub.ac.uk

Want to know more? Check out our SharePoint for impact resources, training videos, and guidance - or drop us an email for a chat.

Engagement

The **Faculty Engagement Hub** in the Faculty of Medicine, Health & Life Sciences at Queen's University Belfast is a central point for connecting research, teaching, and expertise with wider society. We support staff across the Schools and Research Centres to design and deliver meaningful public engagement, schools outreach, and community partnerships, widen participation, and enhance the societal impact of our research. Through training, funding support, and collaboration, the Hub strengthens Queen's civic role, raises the visibility of health and life sciences, and provides colleagues with real-world skills in science communication, teamwork, and inclusive engagement.
Email: d.rogers@qub.ac.uk

Open Access team

The Open Research team in the Library provides support and training on open access, research data management, e-theses and ORCID.

You can get in touch by emailing us:

- For open access enquires: openaccess@qub.ac.uk

- For research data management enquiries: rdm@qub.ac.uk
- For e-theses enquiries: e-thesis@qub.ac.uk

Research Development

Dr Samantha Bull, Research Development Manager – Medicine, Health and Life Sciences

Dr Kevin Tracey, Research Development Manager – EU/Global (Interdisciplinary/Arts, Humanities and Social Sciences)

The Research Development team supports researchers at all career stages. Whether you already have a project in mind or are at the early stages of shaping an idea, we offer tailored guidance to help refine your idea, identify appropriate funding opportunities, and strengthen your proposal.

We can help you:

- Identify and target suitable funding opportunities
- Develop and refine research proposals
- Understand funder expectations
- Access relevant training and resources
- Coordinate internal peer review

If you're considering a fellowship, a grant, or just want to explore what's possible, come and speak to us. **Contact:** researchdevelopment@qub.ac.uk

Wellbeing

Staff Wellbeing at Queen's University Belfast is a dedicated team aimed at supporting the physical, mental and emotional health of employees through a wide range of programmes and services.

What we do.

The Staff Wellbeing team focuses on four key themes:

- **Healthy Mind**: Promotes mental wellbeing through open conversations, resilience training, mindfulness, counselling, and mental health workshops and programmes.
- **Physical Health**: In partnership with Queen's Sport, Staff Wellbeing encourages physical activity via Active Campus, gym memberships, health screenings, menopause support, cycle to work schemes, campus runs, and special events like the Queen's 5K.
- **Home Life**: Provides flexible working options, family leave, parenting and carer networks, and financial wellbeing workshops and clinics.
- **Connection & Community**: Builds staff engagement through social events, staff networks, wellbeing groups, and activities to strengthen community ties.

What we offer.

- **Employee Assistance Programme (EAP)**: Free, confidential 24/7 support through Inspire covering stress, relationships, finance, legal advice, trauma, and more — accessible via helpline, online chat, or self-help hub.
- **Mindfulness & Mood Matters**: Regular sessions with AWARE NI, alongside on-site holistic therapies such as on campus massages.
- **Fitness & Physical Activity**: Discounted gym access, structured lunchtime/after-work classes (e.g. Yoga, Pilates, Zumba), Active Campus programmes, and annual events including the Pedometer Challenge and 5K runs.

- **Work-Life Support**: Flexible working arrangements, enhanced leave for parents and carers, Carer Passport for individual accommodations, and the Queen's Parents Network.
- **Financial Wellbeing**: Sessions from banking partners and one-on-one clinics to support budgeting, mortgages, debt management, plus access to exclusive staff discounts.

How to Get Involved.

- Wellbeing Calendar: Lists all upcoming events and activities.
- Staff Round-Up newsletter: Weekly updates with booking info.
- Open feedback: Staff are encouraged to share ideas or successes via staffwellbeing@qub.ac.uk.

Staff Wellbeing at Queen's provides a holistic support framework—from mental health services and fitness programmes to flexible working and community building—to help staff thrive personally and professionally.

Research Spinouts and Investments

Contact Info: Rob Blenkinsopp (Spinout Manager) – rob@qubis.co.uk

QUBIS Ltd, established in 1984 by Queen's University Belfast, is the university's commercialization arm and is focused on transforming research into successful spin-out companies. The spin-out and investment team collaborates with academic entrepreneurs, investors, and industry experts to create market-driven ventures. They identify and evaluate commercially viable research, secure intellectual property, and provide hands-on support, including business planning, funding introductions and strategic guidance from IP protection to exit or sustainable growth.

Session 1: Flash Talk Abstracts

1. Mike Hardy: "A Nano Factory: From 3D Prints to Sensing Chips"

Sustainable Development Goals:

3: Good Health and Wellbeing, 9: Industry, Innovation and Infrastructure, 15: Life on Land.

Rapid prototyping of nanoscale sensing devices is of paramount importance to many emerging application-spaces which require portable analysis, in the field, factory, or away from the clinic. However, full-chain for chip manufacture – those comprising nano- and microscale lithography, chip dicing, robotics for accurate picking-and-placing, device packaging, as well as the sensor test measurements – are often confined to industry settings rather than research environments thus hampering the ability to iterate novel designs. Within our newly established Smart Nano NI laboratory in Queen's Physics Department, we have established processes towards the fabrication, manipulation and testing of nanostructured sensing chips for surface enhanced Raman spectroscopy (SERS) sensing – chips that use the Raman effect, a highly selective analytical spectroscopy commonly described as a 'molecular fingerprint' that can be enhanced to single-molecule level by large electric fields generated by collective electron oscillations near certain metals. In the current study we demonstrate the reduction of chip areas to 2mm×2mm via dicing saw, and their accurate placement and packaging via precise robotics and 3D printed parts. Further, quality control through machine vision and AI techniques has been investigated where small inter-chip imperfections may be identified at a user-defined matching threshold. Final chip designs demonstrated a confinement of applied solution (micropipette) of a target molecule for optimum pre-concentration, and thus analytical sensitivity, especially important where solution-substrate interaction is hydrophilic. Signal enhancement of 106× and uniformity (relative standard deviation) of 10% have been recorded. The study thus paves the way for the rapid development of highly sensitive and reproducible sensors, of relevance to application areas where portable spectroscopy is required.

2. Mohamed Abdelilah Fadla: “Defect and Interface Properties of Ultra-Wide Bandgap Oxides for Next Generation Power Electronics”

Sustainable Development Goals:

9: Industry, Innovation and Infrastructure.

Ga_2O_3 as an ultra-wide bandgap (~4.8 eV) semiconductor is a promising material for high-power electronics. This material can handle higher voltages and temperatures and offers potential performance far beyond that of traditional silicon. We use first-principles modelling to study atomic-level defect and interface properties that affect electrical and thermal performance. This approach reveals atomic-scale insights to optimise Ga_2O_3 for high-voltage devices like transistors and diodes, which are inaccessible by experiments alone. We provide a detailed picture of band alignment and defect energetics of Ga_2O_3 and its alloys, which is crucial for device integration.

3. Sadish Oumabady: “Redefining waste-derived carbon material for High-Impact Net-Zero Applications”

Sustainable Development Goals:

9: Industry, Innovation and Infrastructure, 11: Sustainable Cities and Communities, 13: Climate Action.

Conventional waste management practices have become ineffective with the current global demands and adversely impact ecosystem health. Circular approaches to revalorise waste biomass from agriculture and food production sectors hold significant promise in multidisciplinary environmental applications. In Northern Ireland (NI), renewable energy generation through AD (Anaerobic Digestion) have gained widespread adaptation to facilitate net-zero contribution from the sector. However, the resultant slurry (Digestate) management issues have caused inevitable environmental impacts (Eutrophication of Lough Neagh in 2022), calling up for inexpensive techniques to further stop these nutrient mass flows and store them for a better use in the future. One such approach is producing biochar from digestate and designing char-based concrete products to decarbonise the construction sector. The construction sector accounts for about 8% global CO2 emissions and up to 900 kt CO2e in NI, annually. Channelling the biochar into concrete production could not only reduce the material demand but also increases the embodied carbon of concrete facilitating further emissions reduction. As the NI’s economy is primarily agriculture based, biochar based concrete products helps to decentralise the agricultural waste management, handling and processing, and serves as an effective resource consumption tool through cross-sectoral collaboration. We have currently optimised the proportion of char in concrete for non-structural precast mixes, such as roof tiles, paving stones, facades, curbing, barriers, etc. The resultant low-carbon concrete products have comparable benefits in terms of aesthetic quality, durability, faster curing, and facilitate industrial mass production due to the supplementary cementitious properties of the biochar. Several factory trials have been completed to produce roof tiles which achieved up

to 20% reduction in carbon emissions. Further scaling up and technological improvements are ongoing in order to help UK achieve its net-zero targets by 2050.

4. Iyyappa Rajan Panneerselvam: “Understanding Ultrafast Dynamics in Semiconductors via Ab Initio and Deep Neural Network Modelling”

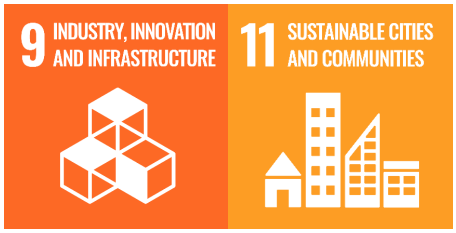
Sustainable Development Goals:

7: Affordable and Clean Energy, 9: Industry, Innovation and Infrastructure, 13: Climate Action.

Abstract not disclosed due to confidentiality issues.

5. Masoud Pedram: “Can Concrete’s Green Message Be a Good Omen for Net-Zero Sustainable Construction?”

Sustainable Development Goals:



9: Industry, Innovation and Infrastructure, 11: Sustainable Cities and Communities.

The urgency to decarbonise the built environment and enable sustainable cities has placed Net-Zero construction at the forefront of industry priorities. Developers are actively trialling innovative low-energy (green) concretes to meet these goals. This presentation shares insights from full-scale implementation of structural health monitoring (SHM) by Queen’s University Belfast at a live building site in Canary Wharf, London, alongside rigorous laboratory testing of three emerging Net Zero mixes: Ecocem, Biochar, and Graphene-enhanced concretes. This full-scale project presents a highly unique opportunity to take research in both SHM and low-energy concretes beyond the lab and into a major real-world building initiative, with long-term monitoring planned. It holds the potential to inform and accelerate carbon reduction across future construction and retrofit projects in the UK and globally, through collaboration with leading consortium partners including Arup, Ramboll, Robert Bird, BG&E, Walsh, and Thornton Tomasetti. Aiming toward industrial adoption, this study evaluates not only the intrinsic material properties but also the in-situ performance of these concretes under actual site conditions. Mechanical strength (compressive and tensile) was measured at 1, 7, 28, and 56 days. Durability was assessed using volume of permeable voids, electrical resistivity, and chloride migration coefficient, offering a robust indication of long-term environmental resistance. A key innovation is the use of fibre optic sensors embedded at an early age to monitor internal behaviour and strength development soon after pouring. Moreover, vision-based monitoring and load testing of full-scale slabs allowed evaluation of structural performance under simulated industrial demands. This research delivers vital empirical evidence and a holistic methodology to assess the readiness of net-zero concrete solutions at scale. Can we trust the signals green concrete is sending—and are we ready to act on them?

6. Chao Gu: “Data Informativity Analysis and Data-driven Supervisory Control of Discrete-event Systems”

Sustainable Development Goals:

8: Decent Work and Economic Growth, 9: Industry, Innovation and Infrastructure.

As production technologies and processes grow more complex, traditional modeling methods that rely on first principles or expert knowledge become difficult to use because they require precise mathematical models. For large-scale, highly connected systems, building such models is often infeasible, which limits model-based control methods. This challenge has led to the rise of data-driven control, which learns control strategies directly from data instead of relying on exact models. Discrete-event systems (DESs) are a class of event-driven models widely used in manufacturing, traffic control, communication networks, and logistics. They capture systems with discrete states and transitions that represent how events drive changes. Supervisory control theory for DESs focuses on designing supervisors (i.e., control agents) that guide the system to meet desired control specifications (e.g., completing a production task). However, most existing approaches depend on detailed system models, which are often unavailable in complex or changing environments. Data-driven control offers an alternative by designing control strategies directly from observed behavior. Our work explores data-driven supervisory control for DESs with unknown models. For fully observable DESs, we propose the concept of data informativity and establish criteria to determine when available data is informative enough to design supervisors that achieve the most permissive control possible using only that data. To extend beyond traditional supervisory control that only enables/disables events, an event-forcing mechanism is exploited to develop an optimal data-driven supervisory control within this extended framework. For partially observable DESs (i.e., not all events can be monitored in real time), we study data informativity under partial observation, propose existence conditions for supervisors and develop algorithms to construct them. This research aims to build a unified framework for data-driven supervisory control, providing tools for both fully and partially observable DESs and supporting more effective control of complex systems through data-driven approaches.

7. Domhnall Carlin: “Building Tomorrow's Research Infrastructure: The Critical Role of Research Software Engineers”

Sustainable Development Goals:

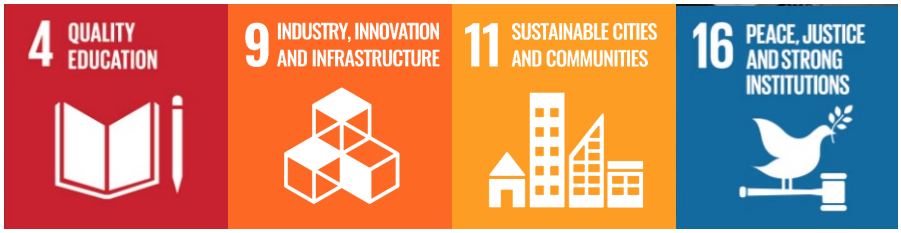
9: Industry, Innovation and Infrastructure, 13: Climate Action, 16: Peace, Justice and Strong Institutions.

In our increasingly digital world, research software has become the invisible backbone of scientific discovery, yet it remains undervalued and underappreciated across academic disciplines. From climate models predicting environmental changes to data analysis tools transforming healthcare outcomes, research software transcends disciplines. This presentation explores how Research Software Engineers (RSEs) are reshaping the research landscape by bridging the gap between cutting-edge research and robust, sustainable software solutions. Whether developing literature analysis tools, biomedical data platforms, or environmental monitoring systems, RSEs enable researchers to focus on discovery while ensuring their computational work is reproducible, shareable, and impactful. This drives sustainable and maintainable software, allowing incremental improvements and reuse. We explore how proper software engineering practices - including version control, testing, and documentation - transform research outputs from one-time scripts into lasting scientific infrastructure that benefits entire research communities. However, research software still struggles to gain recognition as first-order outputs of the research process, essential in any open science workflow. We examine the prevalence of research software in the repositories of universities across the world and in the UK’s Gateway to Research. The significance of this work extends beyond individual projects. When research software is properly developed and shared, it accelerates scientific progress by preventing duplicated effort, enabling collaboration across disciplines, and ensuring research findings can be verified and built upon. RSEs serve as catalysts for this transformation, making research more efficient, transparent, and ultimately more beneficial to society. As we face complex global challenges requiring interdisciplinary solutions, the role of RSEs becomes increasingly vital. By investing in research software engineering capabilities, we create sustainable

foundations for tomorrow's breakthrough discoveries while democratising access to powerful computational tools across all research domains.

8. Sean French: “Intangible Assets in Community Development in Belfast”

Sustainable Development Goals:



4: Quality Education, 9: Industry, Innovation and Infrastructure, 11: Sustainable Cities and Communities, 16: Peace, Justice and Strong Institutions.

In recent years, approaches in community development practice and research have moved away from a needs-based approach (structuring interventions around what communities lack) to an asset-based approach (structuring interventions around developing the resources that communities already have). The aim of this is to reduce communities’ dependency on external support, achieving a more sustainable model of community development in which they support themselves. Often this research has focused on tangible assets like identifying local businesses and local people with clear skills or education in relevant areas. In this presentation, I want to expand out this asset-based approach to think about less tangible but still important assets which exist in communities such as charisma, informal networks, and cultural predispositions toward activism. In Northern Ireland, the legacy of the conflict has obviously had negative effects and generally is understood through a deficit-based approach. However, in our research in Queen’s Communities and Place we are increasingly looking at ways in which the social structures and mental models which were a product of the conflict can be worked with in an asset-based approach. For example, marching bands have a long history on the island of Ireland and have been associated with sectarian tension since at least the early 1800s. They were often the spark for violence throughout the Troubles, before and after. However, in recent years, community workers in Derry-Londonderry have had success in using the grassroots structures of marching bands to reach so-called “hard-to-reach" kids who are disruptive in formal education settings and resistant to engaging in standard community work interventions. These band leaders have influence due to charisma forged from the legacy of conflict and specific local dynamics. This charisma and influence is an “intangible” asset for community development. This presentation will explore this and other similar “intangible assets” in Northern Ireland.

Session 2: Flash Talk Abstracts

1. Michelle Naughton: "The Eye as a Window to Brain Inflammation in Multiple Sclerosis"

Sustainable Development Goals:

3: Good Health and Wellbeing.

The aim of our project is to investigate how inflammation in the eye is connected to brain inflammation in Multiple Sclerosis (MS). MS is an incurable, disabling condition that strikes in young adulthood. Attacks target the insulating layer around nerves called myelin and can occur anywhere in the brain. Although there is no myelin in the eye, imaging of the retina (back of the eye) can show ongoing damage and this alone predicts greater disability for those patients. Recently, there have been major advances in high-resolution eye imaging. Although brain MRI is difficult to access and very costly, it remains the main means of diagnosing and monitoring MS. MRI cannot detect when inflammation is contained behind the blood-brain-barrier and it can only be observed in the brain tissue after the person has passed away. This type of brain inflammation is associated with severe disease and earlier death. Such high-risk patients need early, effective treatments to stave off permanent disability but we cannot predict risk well, so low-risk patients are exposed to substantial side-effects. If cells in the eye can tell us about brain inflammation, we may be able to use eye scans to identify high-risk patients. It could lead to easier, more frequent monitoring for patients and speed up clinical trials compared to MRI scans. To determine if the eye can serve as a window to brain inflammation in MS, we are studying a unique archive of rare tissue samples donated from people who had MS before modern treatments were available. By comparing the inflammation present in the eye and brain from the same donors using pathological grading and deep-cell profiling, we will determine if the eye can help predict the presence of brain inflammation in MS.

2. Nicola Ann Ward: “Estimating Dementia and MCI Prevalence in Northern Ireland: Findings from the NICOLA-HCAP Study”

Sustainable Development Goals:

3: Good Health and Wellbeing, 10: Reduced Inequalities.

Abstract not disclosed due to confidentiality issues.

3. Raheleh Amirkhah: “Deciphering intestinal zonation and its role in tumour initiation, evolution and progression in mouse models of colorectal cancer”

Sustainable Development Goals:

3: Good Health and Wellbeing.

The spatial regulation of Wnt signalling and stem cell dynamics across intestinal regions remains incompletely understood, particularly during the transition from normal homeostasis to tumour development. Prior studies, using single markers to assess pathway activation, suggested higher Wnt activity and stemness in the small intestine (SI) than in the colon. Here, we integrate bulk and single-cell RNA-seq with spatial transcriptomics to assess phenotypic changes along the intestine across normal, precancerous, and cancerous stages. We analysed a novel tissue cohort from 24 genetically engineered mouse models to investigate how genetic alterations shape intestinal biology and tumour evolution. The transcriptomics analysis of normal intestine indicated that, Wnt activity is lower in the SI compared to the colon. Furthermore, while bulk RNA-seq indicates higher Wnt activity in the left-sided colon, epithelial-enriched spatial transcriptomics reveals a more uniform distribution across colonic regions, resolving inconsistencies caused by stromal contamination in bulk analyses. Phenotypic interrogation of the tumour transcriptomic data reveals that the primary driver of biological variation is tumour location (SI vs. colon) rather than genotype, with further class discovery identifying three biologically distinct tumour subtypes within each location. By comparing the phenotypic signalling landscapes of these tumour subtypes to their corresponding normal intestinal regions, we can segregate tumours and genotypes into those that either enhance their native microenvironment or override it entirely, leading to divergent molecular profiles. To maximize translational impact, we developed a Shiny-based data portal under FAIR principles, bridging mouse models with human colorectal cancer. By integrating multi-omics data, we propose an updated model of Wnt signalling and stemness zonation, capturing longitudinal (SI to colon) gradients. Our findings suggest that SI and colon tumours develop through distinct regulatory mechanisms, with key tumour evolution pathways emerging from normal and

precancerous states. This approach provides new insights into targeted therapies beyond endpoint tumour analyses.

4. Emma Humphries: “What is prescriptivism and what does it have to do with Ariana Grande?”

Sustainable Development Goals:

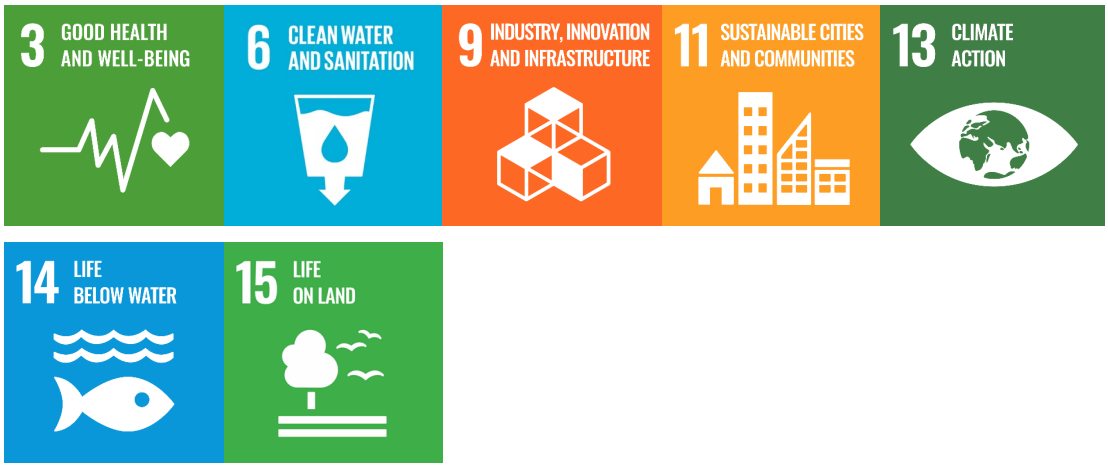
10: Reduced Inequalities, 11: Sustainable Cities and Communities.

Linguistic prescriptivism, an ideology which promotes and enforces “correct” and “incorrect” language use, is a feature of our everyday lives, whether we are conscious of it or not. Beyond traditional prescriptivist outputs (e.g. grammars and style guides), linguistic correction and associated judgements are found throughout popular culture: in the films and series we watch; the music and podcasts we listen to; and the fiction we read. Its presence in these artefacts raises critical questions about how prescriptivism is framed for and disseminated to “ordinary” language users (cf. Osthus 2018) and not just the more limited strata of society who explicitly access texts where prescriptivism is expected. Drawing on the initial findings of an innovative crowdsourced database, and using examples from a range of popular culture sources, I will show, first, that the formats in which prescriptivism manifests are broad, ranging from scripted, high-budget artefacts designed for and disseminated to a mass, global audience, to highly localised outputs, e.g. local radio shows; and, second, that the attention given to prescriptivism can vary from, at one end, a one-off linguistic correction (e.g. in Wicked) to, at the other, a full storyline (e.g. BBC series Industry) or important character trait (e.g. Ross from Friends). Given that linguistic prescriptivism has been linked to political conservatism and can be instrumentalised as a form of discrimination, it is important to understand how prescriptivist ideas appear and spread in popular culture in order to effectively challenge them. Ascertaining who is creating these outputs and the forms which they take contributes to this understanding.

Osthus, D. 2018. “À la recherche du « locuteur ordinaire » : vers une catégorisation des métadiscours.” *Les Carnets du Cediscor*, 14: 18-32.

5. Shay Mullineaux: "GIS derived, AI generated, Greenspace Metrics and their Applicability to Public Health Outcomes"

Sustainable Development Goals:



3: Good Health and Wellbeing, 6: Clean Water and Sanitation, 9: Industry, Innovation and Infrastructure, 11: Sustainable Cities and Communities, 13: Climate Action, 14: Life Below Water, 15: Life on Land.

Increasingly, AI permeates everything we do and is expanding into multiple areas of scientific research. The question remains can it assist in a global GIS context. Often in health studies we rely on locally created and curated environmental and GIS data to assist in our research. Though at the global level the resources available do not often compare. Therefore, can an AI model created specifically for identifying urban greenspace assist the creation of GIS greenspace metrics for scientific analysis. In this research, AI generated, GIS derived metrics are tested against well-studied mental and cognitive variables like WEMWBs and the Animal-Recall test from NICOLA cohort. To understand not only if these metrics show interesting results, but also if they perform, and produce results which could allow for their use in global comparative studies in the future.

6. Lindsey West: "Marine governance fragmentation as a barrier to the UK's floating wind ambitions"

Sustainable Development Goals:

3: Good Health and Wellbeing, 7: Affordable and Clean Energy, 11: Sustainable Cities and Communities, 13: Climate Action, 14: Life Below Water.

Offshore wind is a key component of the UK's net-zero strategy. Delivery of ambitious targets, including 5GW of floating wind by 2030, requires considerable coordination across a range of policy domains encompassing energy, security, climate, fisheries, and environment. As floating wind progresses and spatial constraints increase, there will also need to be inevitable trade-offs between sectors in the pursuit of socio-economic, climate, and environmental objectives. However, weak connectivity between governance actors who are spread across multiple government departments and public bodies hinders the development of an integrated and coordinated policy approach that can support the delivery of multiple marine policy objectives, including net-zero and nature recovery. Governance fragmentation is a symptom of underlying institutional design features, which are deeply embedded in existing interactions, practices, and power relations. With a focus on marine spatial planning, this paper explores the institutional dynamics that contribute to governance fragmentation and policy incoherence. Findings from 24 stakeholder interviews and a document analysis are presented, and using a diagnostic approach, specific institutional barriers are traced back to underlying institutional attributes. The implications for achieving ambitious floating wind targets and managing diverse needs and interests in marine space are considered.

7. Bunty Sharma: "Eco-Friendly Firefighting Foam: Boosting Foam Performance with Metallo-Ionic Liquid Innovations"

Sustainable Development Goals:

3: Good Health and Wellbeing, 6: Clean Water and Sanitation, 12: Responsible Consumption and Production, 13: Climate Action.

Traditional firefighting foams, especially those used to tackle fuel-based fires, often contain harmful fluorinated chemicals that persist in the environment and pose risks to health and ecosystems. In response, our research focuses on developing a greener alternative—fluorine-free firefighting foams—by using innovative metallo-ionic liquids (M-ILs). This M-IL showed better thermal stability, confirmed by Thermo gravimetric analysis (TGA) technique. This new M-IL combines a metal with a custom-made ionic liquid, and then blended it with common, safer surfactants, polymer in a fixed ratio to create an advanced foam formulation. This new foam showed improved surface properties, greater thermal stability, and significantly enhanced foam lifespan—key factors for effectively suppressing flammable liquid fires such as petrol and hexane. To understand how the new foam interacts with fuel fires under real-world conditions, we built a custom test column that mimics actual fire scenarios at different temperatures. Our results revealed that the M-IL-based foam formed a stronger, longer-lasting barrier over burning fuels compared to previous formulations. Most notably, this new foam extinguished fires up to 40% faster, reducing fuel fire suppression times from 20 seconds to just 11–12 seconds. The materials used are fluorine-free and designed with environmental safety in mind, aligning directly with UN Sustainable Development Goal SDG 3: Good Health and Well-being, SDG 6: Clean Water and Sanitation, 12: Responsible Consumption and Production, and Goal 13: Climate Action. By improving fire suppression while eliminating harmful fluorinated chemicals, this research contributes to safer, more sustainable firefighting technologies. These findings could pave the way for next-generation fire safety materials used in airports, the military, and industrial settings where fuel fires pose a major threat.

Posters list

Poster number	Name	Poster title
1	Laura Cushley	Can Widefield Retinal Imaging Replace B-Scan Ultrasound for Assessment and Monitoring of Choroidal Naevi?
2	Megan Philson	Connecting Through Creativity: A Qualitative Study Exploring the Experiences, Effectiveness, and Establishment of Arts-Based Research in the Artitude: Climate, Culture & Circularity Project
3	Rina Schiller	Ways how Postdocs Shape the Future
4	Sadish Oumabady	Redefining waste-derived carbon material for High-Impact Net-Zero Applications
5	Ben McAteer	Assessing barriers and enabling approaches to adaptive marine governance
6	Lesley Hamill	Exploring pupils' perceptions of school food provision and the canteen environment in Northern Ireland (NI): the CANTEEN study
7	Chinmaya Kotimoole	Spectronaut-nf: A Nextflow binding for Spectronaut search tool for parallel processing of DIA rawfiles in high-performance clusters
8	Sophie Jones	Preventing violence against Women and Girls in outdoor public spaces in Belfast: a participatory systems approach
9	Selin Akaraci	The Impact of Connswater Community Greenway on Maternal Mental Health: A Natural Experiment Evaluation in Belfast, Northern Ireland
10	Babak Jahanshahi	Exposure to Ambient Air Pollution and Onset of Parkinson's Disease in a Large Cohort Study
11	Precious Owuamalam	RNA localisation in endothelial cells: understanding the dynamics of RNA-protein interactions involving cytoskeletal remodelling proteins
12	Niall Byrne	Improving cancer treatment with radiation enhancing gold nanoparticles
13	Ruaraidh MacLennan	Composite injection overmoulding: A process for efficient manufacture of future high performance structures
14	Sarah Baxter	Impact of mental health conditions on breast cancer outcomes
15	Thomas Thompson	Cold Atmospheric Plasma Weakens Infections and Boosts Immune System
16	Swathi Sukumar	A cold inducible protein, RBM3 enhances the localization and stabilization of NP mRNA inside stress granules in influenza A virus infected cells

Poster Abstracts

1. Laura Cushley: "Can Widefield Retinal Imaging Replace B-Scan Ultrasound for Assessment and Monitoring of Choroidal Naevi?"

Sustainable Development Goals:

3: Good Health and Wellbeing, 4: Quality Education, 8: Decent Work and Economic Growth, 9: Industry, Innovation and Infrastructure, 10: Reduced Inequalities, 11: Sustainable Cities and Communities.

Purpose: Choroidal Naevi are 'freckles' in the back of the eye, which like freckles and moles on the skin, can turn cancerous. They are present in around 5-7% of the UK population and are usually asymptomatic. In Northern Ireland they are referred to hospital eye services for testing and monitoring including a B Ultrasound Scanning and face-to-face appointment. This study aimed to determine if ultrawidefield imaging could be used to accurately assess choroidal naevi. Methods: New patients with choroidal naevi were invited for assessment using the Optos Silverstone. All patients received widefield imaging and OCT and different scans were used dependent on lesion location. B Ultrasound scans were conducted on 70% of all patients for comparison. All retinal images were graded and lesions measured using the MOLES System for assessment and clinical assessment of naevi. A MOLE score of 0 meant it was a 'common naevus', 1 is low risk, 2 is high risk and 3 or more was a probable melanoma – these scores are determined using several risk factors on the lesion such as large size and mushroom shape. Results: Of the 43 patients, 74.3% (32) were confirmed to have a choroidal naevus present. The mean age of patients was 56 years (range of 22-82). The average area of the naevi was 28.4mm with a range of 0.56mm – 592mm. Over 75% (24) had an

overall MOLE score of 0, 7 had a MOLE score between 1-2 and 1 had a MOLE Score of 4. Only one was raised on b-scan and OCT and 4 others were minimally raised (below the MOLE threshold of 1.0mm) on OCT. Results showed 100% agreement in MOLE score between b-scan and OCT. Conclusions: Widefield OCT could be used as an effective, more cost efficient and less invasive method of assessing Choroidal Naevi.

2. Megan Philson: “Connecting Through Creativity: A Qualitative Study Exploring the Experiences, Effectiveness, and Establishment of Arts-Based Research in the Artitude: Climate, Culture & Circularity Project”

Sustainable Development Goals:

3: Good Health and Wellbeing, 4: Quality Education, 5: Gender Equality, 10: Reduced Inequalities, 16: Peace, Justice and Strong Institutions, 17: Partnerships for the Goals

This presentation shares insights from a qualitative study within Artitude: Climate, Culture & Circularity, a place-based, arts-led initiative that explores how creative practices can support community engagement with climate change and sustainability. Central to Artitude is the use of co-design and participatory methods, where artists-in-residence collaborate with local community groups to co-produce artworks responding to environmental concerns in their area. The research investigates the role and effectiveness of arts-based approaches in fostering climate literacy, influencing attitudes and behaviours, and generating new, community-led understandings of sustainability. Specifically, the study examines three dimensions: how creative practices support environmental learning; how communities experience and respond to arts-based engagement; and the practicalities of establishing and sustaining such interdisciplinary, collaborative work. The project also seeks to understand how arts-based methods can amplify underrepresented voices and foster inclusive dialogue around environmental issues. Using semi-structured interviews with both project professionals (artists, coordinators) and community participants, the study captures diverse experiences and reflections on the potential and limitations of arts-based research in this context. Early findings suggest that creative approaches can deepen engagement, open up hopeful narratives, and reframe sustainability in more accessible

and emotionally resonant ways. Participants describe increased confidence, connection to place, and a sense of agency through creative collaboration. This presentation will reflect on the value of creativity in climate communication, the conditions needed for effective co-design, and the implications for future research and practice at the intersection of art, community, and environmental change. This presentation will also reflect on the approach requires to ensure output of arts-based research can be effective.

3. Rina Schiller: “Ways how Postdocs Shape the Future”

Sustainable Development Goals:

3: Good Health and Wellbeing, 4: Quality Education, 5: Gender Equality10: Reduced Inequalities, 16: Peace, Justice and Strong Institutions, 17: Partnerships for the Goals.

It is often said that graduating with a PhD degree is a springboard to a bright future. The reason for this is not just the qualification that one gains, but the skills that one acquires while carrying out one's research project, and also the emergence of unexpected opportunities that open up 'on the side', which may provide the PhD student with visions how to take one's work into new directions after graduation. Given beneficial circumstances, one's vision and motivation may then combine with one's gained skills and knowledge to set up projects that can 'move mountains'. Anthropology is well known as a field of study for facilitating a wide range of options. By example of a small number of case studies my poster illustrates how carrying out their PhD research project has provided these students as Postdocs with opportunities to effect highly relevant improvements in their community and within society at large.

4. Sadish Oumabady: “Redefining waste-derived carbon material for High-Impact Net-Zero Applications”

Sustainable Development Goals:

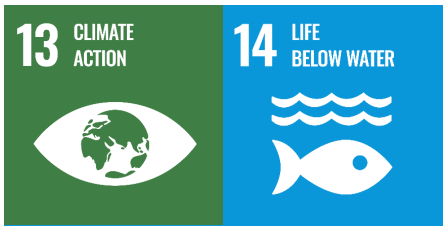
9: Industry, Innovation and Infrastructure, 11: Sustainable Cities and Communities, 13: Climate Action.

Conventional waste management practices have become ineffective with the current global demands and adversely impact ecosystem health. Circular approaches to revalorise waste biomass from agriculture and food production sectors hold significant promise in multidisciplinary environmental applications. In Northern Ireland (NI), renewable energy generation through AD (Anaerobic Digestion) have gained widespread adaptation to facilitate net-zero contribution from the sector. However, the resultant slurry (Digestate) management issues have caused inevitable environmental impacts (Eutrophication of Lough Neagh in 2022), calling up for inexpensive techniques to further stop these nutrient mass flows and store them for a better use in the future. One such approach is producing biochar from digestate and designing char-based concrete products to decarbonise the construction sector. The construction sector accounts for about 8% global CO2 emissions and up to 900 kt CO2e in NI, annually. Channelling the biochar into concrete production could not only reduce the material demand but also increases the embodied carbon of concrete facilitating further emissions reduction. As the NI’s economy is primarily agriculture based, biochar based concrete products helps to decentralise the agricultural waste management, handling and processing, and serves as an effective resource consumption tool through cross-sectoral collaboration. We have currently optimised the proportion of char in concrete for non-structural precast mixes, such as roof tiles, paving stones, facades, curbing, barriers, etc. The resultant low-carbon concrete products have comparable benefits in terms of aesthetic quality, durability, faster curing, and facilitate industrial mass production due to the supplementary cementitious properties of the biochar. Several factory trials have been completed to produce roof tiles which achieved up to 20%

reduction in carbon emissions. Further scaling up and technological improvements are ongoing in order to help UK achieve its net-zero targets by 2050.

5. Ben McAteer: “Assessing barriers and enabling approaches to adaptive marine governance”

Sustainable Development Goals:



13: Climate Action, 14: Life Below Water.

Sustainably managing marine resources is an urgent issue. Increased focus has been placed on transforming existing marine management regimes, so that issues of fragmented governance, power imbalances, transboundary integration and knowledge gaps can be addressed. Adaptive capacity, which relates to the ability of a system or individual to adjust to changing conditions or recover from the impacts of change, is key to these transformations. It reflects learning and an ability to experiment to foster innovative responses and solutions. Common adaptive capacity barriers and enablers across eight regional European marine governance regimes are reported in this paper. Resource constraints, lack of political will and hierarchical policy frameworks are major barriers to adaptation. Reactionary and incremental policy initiatives, as well as enhanced consultation, enable low-level adaptive governance. Although actions are progressive they may not facilitate governance transformation. Enablers of high-level adaptive governance include partnership working and co-management approaches. Acknowledging and addressing barriers, as well as designing and implementing enabling practices, must be conducted in tandem before governance regimes can be transformed into adaptive processes.

6. Lesley Hamill: "Exploring pupils' perceptions of school food provision and the canteen environment in Northern Ireland (NI): the CANTEEN study"

Sustainable Development Goals:

3: Good Health and Wellbeing

Background and objectives: Schools provide a convenient, accessible eating environment for pupils', which can facilitate healthier eating habits. Beyond nutritional benefits, school food may have a positive impact on wellbeing, learning, concentration and academic outcome. Despite benefits, encouraging uptake remains challenging. To understand the factors affecting uptake, views of pupils', in relation to school food must be explored. Methods: We assessed pupils' perceptions of school food provision and the canteen environment. Pupils (820 [12yo, n=428; 15yo, n=392], recruited from 17 secondary schools in NI, completed a survey which included statements about school food and the canteen environment. Responses were measured on a 5-point Likert scale. Data were analysed using descriptive statistics. Differences between males and females were analysed using a chi-square test. Results: Most pupils (90%) bought lunch from school, with generally positive perceptions. Socially, 92% agreed they could eat with friends. More girls (19%) than boys (8%) felt peers influenced food choices ($p<0.001$). Boys were more positive about taste (57% vs. 40%, $p<0.001$) and variety (61% vs. 45%, $p<0.01$). Over half (58%) felt dietary needs were met, and 76% found staff helpful. Many saw the canteen as clean (58%), happy (56%), and well-seated (82%). Fewer pupils agreed food was good value (41%), clearly priced (37%), or that menus were shared in advance (44%). While 69% queued under 10 minutes, some felt rushed when buying food. Many (60%) felt they had enough time to eat. Conclusions: Understanding these perceptions is important for informing school food policy and improving the delivery, acceptability and uptake of school food.

7. Chinmaya Kotimoole: “Spectronaut-nf: A Nextflow binding for Spectronaut search tool for parallel processing of DIA rawfiles in high-performance clusters”

Sustainable Development Goals:

3: Good Health and Wellbeing, 9: Industry, Innovation and Infrastructure, 17: Partnerships for the Goals.

We developed Spectronaut-nf, a scalable, Nextflow-based workflow designed to significantly accelerate library-free DIA proteomic searches using Spectronaut (v19.2) by leveraging parallel computation across multiple HPC nodes. Traditional single-node Spectronaut searches-commonly run on high-memory Windows workstations-can process small to moderate datasets efficiently but become increasingly time-consuming as data volumes grow. Spectronaut-nf addresses this limitation by parallelizing core computational steps, including raw file processing, spectral library generation, and peptide-centric DIA searches. The workflow processes diaPASEF raw files using Spectronaut’s Pulsar engine to generate intermediate psar archives, which are merged into a single spectral library (.kit) and then used for individual DIA searches, ultimately producing a unified SNE file. Benchmarking on 103 short-gradient diaPASEF raw files revealed that Spectronaut-nf on six compute nodes reduced processing time to 35.7 hours compared to 60 and 81 hours using Spectronaut in GUI (Windows) and CLI (single-node HPC) modes, respectively. A large-scale stress test with 1,034 raw files executed across eight nodes completed in 218 hours, underscoring the pipeline’s capacity for high-throughput processing. Beyond speed, Spectronaut-nf adds flexibility, offering features like random sampling of raw files for spectral library creation, batch library generation from multiple files, and the ability to exclude raw files from DIA searches based on name patterns. This integration of Nextflow with Spectronaut dramatically improves performance, scalability, and usability, making it a powerful solution for researchers tackling large-scale proteomic datasets.

8. Sophie Jones: “Preventing violence against Women and Girls in outdoor public spaces in Belfast: a participatory systems approach”

Sustainable Development Goals:

3: Good Health and Wellbeing, 5: Gender Equality, 10: Reduced Inequalities.

Violence against women and girls (VAWG) in outdoor public spaces (such as parks, streets, and public transport) is a pervasive public health issue, with direct negative impacts on women’s physical, mental, social and economic wellbeing. Involving key stakeholders and the public in the development of strategies and actions is crucial for shaping prevention efforts. Therefore, we co-created a shared understanding of the physical, social, cultural, economic, and political environments that shape VAWG in outdoor public spaces in Belfast, along with a set of key actions and priorities which could inform prevention efforts. In the first phase of this work, we conducted systems mapping workshops to co-develop a shared understanding of the multiple factors and environments that could potentially lead to prevention of VAWG in outdoor public spaces. The systems map highlights multiple physical, attitudinal, political, and educational factors which shape VAWG in outdoor public spaces. Using this systems map, stakeholders consequently identified key action areas that they felt were vital to address for preventing VAWG in outdoor public spaces, including education, design, and operationalisation of outdoor public spaces. In the second phase, we conducted a series of public deliberation workshops with the general public (women, young women, men, and young men) to sense check these emerging actions and to identify ideas and innovations for how the actions could be most effective. Throughout the workshops, participants refined and strengthened the action points, which will be used as a foundation to inform interventions and policies aimed at preventing VAWG in outdoor public spaces.

9. Selin Akaraci: "The Impact of Connswater Community Greenway on Maternal Mental Health: A Natural Experiment Evaluation in Belfast, Northern Ireland"

Sustainable Development Goal:

3: Good Health and Wellbeing, 13: Climate Action, 11: Sustainable Cities and Communities.

Urban green spaces are widely recognized for their physical and mental health benefits across the general population. However, comparatively fewer studies have focused on their impact on maternal mental health during pregnancy and the postpartum period, and causal evidence in this area remains limited. The development of the Connswater Community Greenway (CCG) in Belfast presents a unique natural experiment opportunity to assess the maternal mental health effects of green infrastructure. This study aims to assess the impact of the CCG on maternal mental health outcomes. Specifically, we will examine changes in: (1) antidepressant and anxiolytic prescription rates during pregnancy, and (2) self-reported depressive symptoms at the maternity booking appointment, by comparing periods before and after the intervention. We will also explore whether effects vary by maternal age, ethnicity, and residential distance to the greenway. Data will be sourced from the Northern Ireland Maternity System (NIMATS), the Enhanced Prescribing Database (EPD), and the Patient Administration System (PAS). The study population will include pregnant and postpartum women residing in the CCG intervention area and matched urban control areas between 2011 and 2023. We will employ a Difference in Differences (DiD) approach to estimate the causal impact of the CCG, comparing changes in mental health outcomes between the intervention and the control groups before and after the intervention. Statistical models will be adjusted for confounders identified using a directed acyclic graph (DAG), including socioeconomic status, maternal age, ethnicity, and season and year of birth. This study aims to provide timely and policy relevant evidence on how urban green infrastructure may influence maternal mental health, that may inform both public health interventions and urban planning strategies.

10. Babak Jahanshahi: “Exposure to Ambient Air Pollution and Onset of Parkinson’s Disease in a Large Cohort Study”

Sustainable Development Goals:

3: Good Health and Wellbeing.

The emerging literature studying the association between exposure to ambient air pollution and Parkinson’s Disease (PD) so far draws mixed conclusions. This study provides new evidence on this issue using data from a large and nationally representative cohort tracked over an extended period. We tracked a 28% representative sample of the Northern Ireland population between 2009 and 2016, with complete address records matched to annual average data on fine particulate matter (PM2.5) and nitrogen dioxide (NO2) concentrations at the 1km grid-square level, together with comprehensive information on PD medications dispensed over this period. We used these data to estimate associations between pollution exposure and PD onset as proxied by first receipt of PD medication, controlling extensively for potentially confounding factors at the neighbourhood, household and individual levels. Additionally, we estimated associations for sub-samples split by age and sex. There was no evidence of an association between medium-term PM2.5 or NO2 exposure and the risk of onset of PD in the overall cohort, nor among over-50s or samples split by sex. However, we found a positive association between early onset of PD (aged under 50 years as of 2011) and PM2.5 exposure, with more tentative evidence of an association with NO2 exposure. We discuss potential biological and non-biological explanations for this age-related contrast.

11. Precious Owuamalam: “RNA localisation in endothelial cells: understanding the dynamics of RNA-protein interactions involving cytoskeletal remodelling proteins”

Sustainable Development Goals:

3: Good Health and Wellbeing.

mRNA localisation is a key determinant of cell polarity and plays essential roles in diverse cellular functions. In endothelial cells, correct mRNA localisation is important for blood vessel formation, but the exact molecular mechanisms responsible for mRNA targeting are not yet fully understood. Using UV cross-linking followed by orthogonal organic phase separation and mass spectrometry, we discovered that protein members of the focal adhesion (FA) complex bind mRNAs. FAs are large, elongated structures wherein clustered integrins bind to extracellular matrix fibrils outside the cell and connect inside to contractile actomyosin stress fibres. Mediated by a network of approximately 200 proteins, FAs continuously respond to mechanical cues, playing vital roles in actin remodelling. To identify FA-bound mRNAs, we conducted UV-RIP-seq and found that some of the strongly enriched transcripts encode actin-binding proteins and modulators of cell-to-cell adhesion. We hypothesize that these cytoskeletal proteins distribute mRNAs during angiogenesis and endothelial barrier function. Our current work aims to determine the spatial distribution of these enriched transcripts and assess whether their distribution results from direct interactions with the FA proteins. Our results will reveal previously unappreciated roles of cytoskeletal remodelling proteins in RNA localisation and offer new insights into vessel morphology and tissue biology.

12. Niall Byrne: “Improving cancer treatment with radiation enhancing gold nanoparticles”

Sustainable Development Goals:

3: Good Health and Wellbeing.

Background: Radiotherapy is the primary treatment modality for several cancers including prostate cancer where approximately 50% of men are treated with a curative intent. However, around 20-30% of men (~3,500 per year in UK) with intermediate- to high-risk localised prostate cancer experience treatment failure. Additionally, radiotherapy can also result in damage to neighbouring healthy tissue and organs including the bladder and bowel, severely impacting patient quality of life. Technology: Gold nanoparticles act as potent ‘radiosensitisers’, making tumour cells more susceptible to the killing effects of radiotherapy. By enhancing the radiation dose in the local vicinity of the nanoparticle, they limit the potential for additional damage to the surrounding normal and healthy tissue. Novelty: We have developed an innovative gold nanoparticle termed AuX2R. This first-in-class targeted radiosensitising nanotherapeutic combines the physical effects of gold with propriety molecular targeting to enhance tumour cell sensitivity to radiotherapy. Using advance microscopy techniques, AuX2R was shown to be internalised in prostate cancer cells in vitro. In experimental models of prostate cancer, AuX2R was shown to be safe and effective. When combined with radiotherapy, AuX2R significantly inhibited tumour growth in comparison to radiotherapy alone. Conclusion: We have developed a biocompatible gold nanoparticle capable of enhancing tumour cells susceptibility to radiotherapy. Clinically, AuX2R could boost the radiation dose to tumours, while helping to spare healthy tissue from damage.

13. Ruaraidh MacLennan "Composite injection overmoulding: A process for efficient manufacture of future high performance structures"

Sustainable Development Goals:

9: Industry, Innovation and Infrastructure.

Composite injection overmoulding is a manufacturing process that combines the structural benefits of fibre-reinforced composites with the versatility of injection-moulded thermoplastics. This hybrid process enables the creation of lightweight, high-performance components with complex geometries and integrated features. These benefits make it useful for a wide array of applications which include automotive, aerospace, and consumer goods. The composite process involves placing a pre-formed composite, which is typically reinforced with continuous or woven fibres, inside an injection moulding machine. Molten polymer is then injected onto the preform which then bonds to form a unified part. This allows for the integration of mounting points, stiffeners, or functional surfaces without the need for secondary operations, reducing assembly time and cost. From a sustainability perspective, composite injection overmoulding offers several advantages. The use of lightweight materials contributes to energy efficiency in transport applications by lowering fuel consumption and emissions. Thermoplastics which are used in overmoulding can be reworked following heating which allows for repair or recycle at the end of life of a structure. This contrasts with the thermosetting (usually epoxy) binder that is typically used in high performance composite structures. Thermosetting polymers degrade upon heating and typically cannot be recovered and are not easily repaired. Thermosetting composites are usually bonded with adhesives which are often highly toxic as they cannot be welded. Thus, thermoplastic composites are a more sustainable alternative for applications that demand superior strength to weight performance. A challenge with the composite overmoulding process is that the bonding process is still relatively poorly understood. This means that there are not yet predictive tools available that are able to predict the part strength due to challenges in predicting the interface strength. This can result in several costly iterations to produce suitable tooling for a structure. To address this

problem, a numerical tool is currently in development that can predict the quality of a weld through simulation of the overmoulding process.

14. Sarah Baxter: “Impact of mental health conditions on breast cancer outcomes”

Sustainable Development Goals:

3: Good Health and Wellbeing, 10: Reduced Inequalities.

Mental health conditions may affect breast cancer outcomes as patients may struggle to engage with healthcare services or face barriers to following treatment plans. We examined whether women taking medications used to treat mental health conditions before breast cancer diagnosis had different outcomes in terms of cancer stage at diagnosis and survival compared to those not taking these medications. We studied 13,846 women newly diagnosed with breast cancer in Northern Ireland between 2011 and 2021, using data from the Northern Ireland Cancer Registry. We identified prescriptions for anxiolytics (to treat anxiety), antidepressants (to treat depression), and antipsychotics (to treat severe mental health conditions) dispensed in the year before breast cancer diagnosis through the Northern Ireland Enhanced Prescribing Database. Our primary outcome was time to breast cancer-specific mortality. We also examined stage at diagnosis as a secondary outcome. We used Cox regression models to calculate adjusted hazard ratios and confidence intervals for cancer-specific mortality, comparing patients who received mental health medications with those who did not. Our findings showed that 31.5% of women were dispensed antidepressants, 12.7% received anxiolytics, and 3.5% were prescribed antipsychotics in the year before diagnosis. Women taking medications used to treat mental health conditions had similar odds of late-stage disease presentation compared to those not taking these medications, though patients prescribed antipsychotics had higher odds of unknown stage classification. We found no significant difference in breast cancer-specific mortality for patients dispensed anxiolytics. However, we observed a small but significant increase in mortality risk for patients dispensed antidepressants and a moderate increase for those dispensed antipsychotics. These results indicate that while mental health medications do not affect cancer stage at diagnosis, individuals taking antidepressants and particularly those taking antipsychotics had increased risk of earlier breast cancer-specific death.

15. Thomas Thompson "Cold Atmospheric Plasma Weakens Infections and Boosts Immune System"

Sustainable Development Goals:

3: Good Health and Wellbeing, 6: Clean Water and Sanitation, 7: Affordable and Clean Energy, 14: Life Below Water, 17: Partnerships for the Goals.

Chronic infections remain one of the greatest challenges in healthcare, as bacterial biofilms can tolerate antibiotics and evade the immune system. This leads to poor outcomes for patients with persistent wounds or infected implants. My work explores cold atmospheric plasma (CAP)—a partially ionised gas rich in reactive oxygen and nitrogen species—as a new way to address this problem. Using biofilm models of Staphylococcus aureus and Pseudomonas aeruginosa, I showed that short CAP treatments (under two minutes) dramatically increased the ability of antibiotics to clear biofilms, reducing the drug concentrations needed by several hundred-fold. Advanced imaging and chemical profiling techniques confirmed that CAP disrupted the biofilm's protective matrix and made bacterial membranes more permeable, enabling antibiotics to penetrate more effectively. Importantly, CAP also had powerful effects on host tissue responses. In a mouse muscle injury model, CAP treatment promoted rapid recruitment of immune cells, activated antioxidant defences, and supported tissue regeneration. This contrasted with conventional surgical revision of infected implants, which often worsened inflammation and failed to reduce bacterial burden. Together, these findings suggest that CAP works through a dual mechanism: sensitising biofilms to treatment while simultaneously guiding the immune system toward effective repair. By combining microbiology, advanced imaging, lipidomics, and in vivo infection models, this work highlights the potential of CAP as a non-antibiotic, stewardship-aligned therapy for otherwise recalcitrant infections.

16. Swathi Sukumar “A cold inducible protein, RBM3 enhances the localization and stabilization of NP mRNA inside stress granules in influenza A virus infected cells”

Sustainable Development Goal:

3: Good Health and Wellbeing.

Temperature is a critical determinant of host–pathogen interactions in the respiratory tract, and influenza A virus (IAV) has adapted to the cooler environment of the upper respiratory tract (URT) to enable efficient replication and transmission. The cold-inducible RNA-binding protein RBM3 is highly expressed in nasopharyngeal tissue and is known to stabilise mRNAs under hypothermic conditions; however, its role during viral infection has not been defined. Here, we identify RBM3 as a key proviral host factor that facilitates IAV replication at sub-physiological temperatures. Here, we show the direct binding of RBM3 to viral nucleoprotein (NP) mRNA, via UV crosslinking and immunoprecipitation (iCLIP2) and a new technique “smiFISH RNA-proximity ligation assay”. Mechanistically, we identified that these interactions result in an enhanced half-life of the viral transcript and show for the first time that NP mRNA but not HA mRNA is re-localised to G3BP1 positive stress granules (SGs) that possess a liquid-like property. This effect was abolished in an RNA-binding-deficient RBM3 mutant, confirming the requirement for direct RBM3- NP mRNA interaction. Crucially, this positive regulation of NP mRNA was validated in well differentiated primary nasal epithelial cells, highlighting the physiological relevance of RBM3 in the human URT. These results reveal a temperature-sensitive host–virus interaction that promotes IAV replication in the cooler URT, a key site for viral shedding and transmission. By linking environmental temperature, host RNA-binding proteins, and viral mRNA stabilisation and re-localisation to SGs, this study uncovers a novel mechanism of respiratory virus adaptation and identifies RBM3 as a potential therapeutic target for limiting early-stage viral replication and transmission.