



**Northumbria
University**
NEWCASTLE

INTERDISCIPLINARY RESEARCH THEMES



CONTENTS

Foreword - PVC (Research and Knowledge Exchange)	2
Introduction to our Interdisciplinary Research Themes	4
What do Interdisciplinary Research Themes do?	6
BioFutures	8
Energy Futures	10
Extreme Environments	12
Global Development Futures	14
Integrated Health and Social Care	16
IC3: International Centre for Connected Construction	18
Space	20
Investment into Interdisciplinary Research Themes	22
Governance of Interdisciplinary Research Themes	23
How to get involved	24

This booklet contains QR codes to take you back to the related webpage which contains full details about the IDRT and its researchers.

FOREWORD



Thank you for wanting to learn more about our Interdisciplinary Research Themes (IDRTs), which are a vital part of our research landscape at Northumbria University. I hope that this booklet gives you an insight into what IDRTs are, what they do, how they work, and how they are funded.

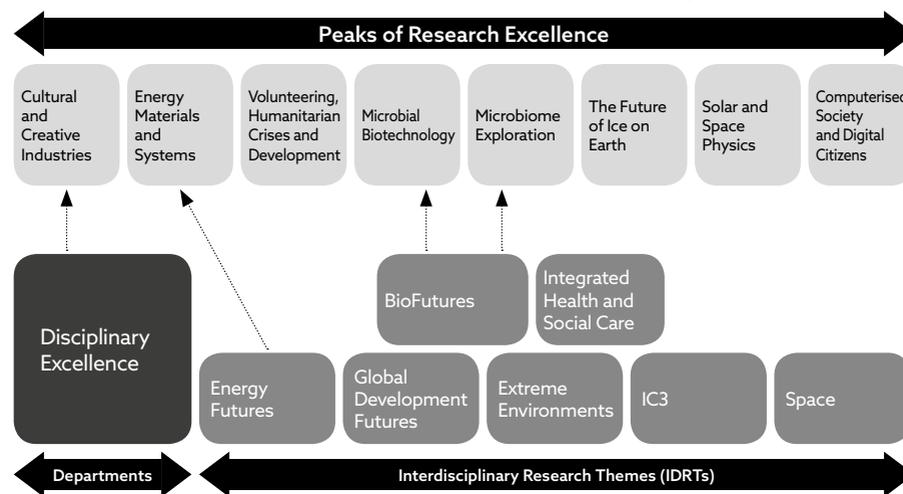
We have a huge amount of truly excellent research in our Departments, most of which is focused on individual disciplines. IDRTs are specifically designed to create communities of practice which work across disciplines, enabling rich, collaborative discussions about research from a range of diverse perspectives to generate high quality research.

Our intention is that the good work created by IDRTs becomes business as usual, particularly for challenge led research.

We are investing funding into the IDRTs to support these communities to get started and grow. At the same time we have evolved our internal funding mechanisms to make them more transparent and inclusive, purposefully supporting the full range of research being undertaken at Northumbria.

We have also mapped out the relationship between these communities of practice and our Peaks of Research Excellence and are hoping to grow more Peaks through initiation of new IDRTs.

Our Research Landscape



Our Peaks are more focused and cohesive areas of outstanding research, led by smaller groups who are leading research worldwide. Some have developed from IDRTs, others have grown from departmental research. The Peaks are areas that are organically emerging from the high quality research that we do, we may support these strategically but mostly they are funded by external income.

Hopefully, this gives further insight into the way we are thinking about our research landscape.

Professor Louise Bracken

Pro Vice-Chancellor (Research and Knowledge Exchange)
Northumbria University



View our Peaks
of Excellence



View our Interdisciplinary
Research Themes

INTRODUCTION TO OUR INTERDISCIPLINARY RESEARCH THEMES

Overview

Northumbria's Interdisciplinary Research Themes (IDRTs) are groups of researchers that bring together expertise from across the University to address pressing regional, societal and global challenges of this century and beyond. IDRTs operate at the intersections between departments and include more than one discipline to provide additionality to the high-quality research being undertaken in departments and research groups.

IDRT themes are aligned with the United Nations Sustainable Development Goals and provide a unique platform for collaboration between researchers from across departments and disciplines to deliver cutting-edge, impactful research.

IDRTs are central to the research landscape of Northumbria University and deliver a wide range of research activities and outcomes.

IDRTs facilitate and generate world leading research programmes and activities to tackle global issues, pulling together interdisciplinary research spanning the breadth of departments to develop new communities of research.

IDRTs will be funded for a maximum of six years. As IDRTs exit funding, competitions will be held to create new IDRTs.

WHAT DO IDRTS DO?

- Support, facilitate and generate world leading research programmes and activities to tackle global issues and turn interdisciplinary research into real-world solutions, often aligned to Sustainable Development Goals (SDGs).
- Provide additionality to research that is conducted routinely in departments.
- Raise the international, national and regional profile of these areas of research faster than would otherwise be possible, through the research environment of the IDRT, but also by working in collaboration with Marketing.
- Attract external income in support of research, including large research grants, and the work of the IDRT.
- Facilitate strategic partnerships with individuals and organisations outside the university at regional, national and international levels.
- Deliver career development opportunities for staff and postgraduate researchers in line with the mission of the IDRTs and the Concordat to Support the Career Development of Researchers.

BIOFUTURES

The challenge

Petroleum provides the majority of the world's energy and fuel requirements, accounting for approximately 90% of global transportation needs.

As a fossil fuel though, it is a finite resource and contributes to pollution and climate change. Cost-effective, viable alternatives are crucially needed to replace the use of petroleum on a large scale.

Transitioning away from a petroleum society requires the creation of a competitive, innovative and sustainable bio-based economy.

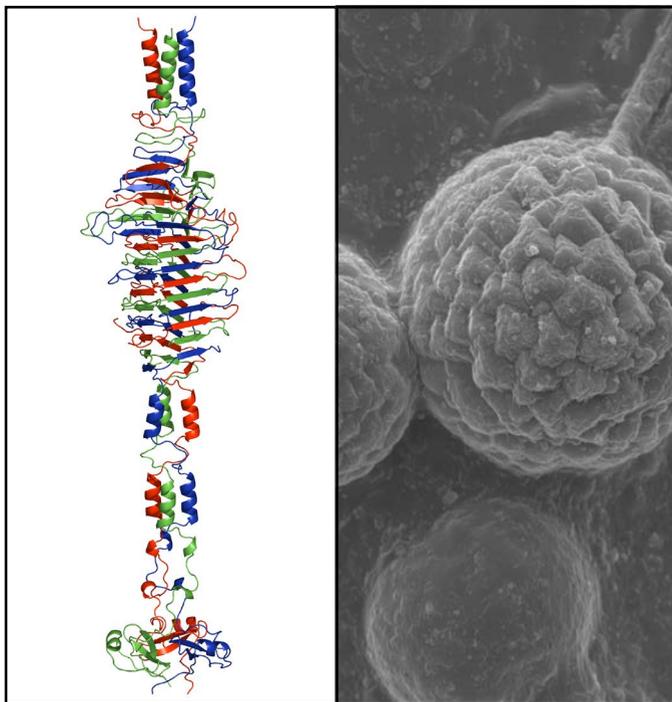


Image of the three-dimensional structure of a carbohydrate-active enzyme (Gary Black) and scanning electron microscope image of calcite crystals induced by bacterial cells (Meng Zhang), presented with permission.

What we do

The BioFutures IDRT explores and exploits biology to develop transformative solutions for a more economically and environmentally sustainable society. The research is challenge-led, incorporating design from initiation and developing solutions through biology-centred technology and engineering.

Currently we have strengths in

- Biocatalysis and Bioprocesses
- Smart Materials
- Novel Fabrication of Sustainable Materials
- Health Technology Innovation

and would like to expand into other interdisciplinary areas.

About us

The BioFutures IDRT works across departments to bring researchers from different faculties, particularly from the recently formed Peaks of Excellence, together to achieve truly interdisciplinary research and innovation. The BioFutures IDRT operates as a dynamic and fertile space to cultivate and test collaborations and ideas.

Find out more

northumbria.ac.uk/research/idrts/biofutures



The challenge

The world is facing an unprecedented energy challenge. While many countries around the world have committed to net-zero carbon emissions by 2050, the same year is also projected to see a doubling in global energy demand from today's requirements. In addition, the UK has set an ambitious target of a 68% reduction in greenhouse gas emissions by 2030. There is, therefore, an urgent need for sustainable solutions and technologies.

Achieving net zero emissions is a significant challenge that crosses traditional academic disciplines. It also requires innovation, policy and skills training. Energy Futures is a diverse and inclusive community of academic excellence focused on bringing these things together to create research impact.

What we do

The vision of Energy Futures is to help meet this need by driving forward innovative research-driven approaches to create a cleaner energy future for all. Energy Futures is a community of research excellence in renewable and sustainable energy at Northumbria University. It recognises that achieving clean growth is fundamentally a multidimensional challenge which transcends disciplines and requires research with impact.

Research excellence

Energy Futures encompasses high-quality research at Northumbria University spanning photovoltaics, thin film materials, batteries, materials characterisation, electrical power engineering, heat, sustainable design, bioenergy and the built environment.

Northumbria University has a significant portfolio of current UKRI research programmes in the energy domain that aligns with its growing reputation for research excellence. This includes the EPSRC Centre for Doctoral Training in Renewable Energy Northeast Universities (ReNU).

About us

Energy Futures is a diverse community of approximately 50 academics from across Departments and Faculties at Northumbria University.

Find out more

northumbria.ac.uk/research/idrts/energy-futures
renu.northumbria.ac.uk



EXTREME ENVIRONMENTS

The challenge

So far as we know, our planet is unique in the Solar System in that it has provided conditions that have supported life for billions of years, enabling the evolution of complex lifeforms including our own species.

While human adaptability has enabled us to inhabit most of the Earth's surface, environments have always existed in which our survival is inviable without technological aid. We think of those environments as extreme but must recognise that the definition is an anthropocentric one; even the environments considered most extreme from a human perspective host some life, while many organisms struggle to survive in conditions humans might regard as benign.

The challenge for all species, including our own, lies in their ability to adapt as conditions change, making once habitable environments extreme.

What we do

The key to sustaining the future habitability of our planet for all life rests on our ability to understand environmental change and how, where and when such change causes a transition to extreme conditions. To address that challenge requires a systematic study of environmental extremes and how they have evolved in the past, combined with the development of techniques and technologies that enable us to undertake that study, and to understand and quantify future changes.

The Extreme Environments IDRT brings together expertise from across research groups, departments and faculties to tackle all aspects of the problem including:

1. The processes that create and alter extreme conditions.
2. How those processes drive wider environmental change and extreme events.
3. How humans and other organisms cope with extremes and adapt to change.
4. How the technology that we depend on can be made to function in extreme conditions.

About us

We are a diverse collection of researchers, currently numbering around 90, drawn from across the University, working towards a varied range of science goals under the broad theme of environmental extremes and change. By working together across a wide range of disciplines, we are able to share ideas and expertise, gaining from the distinctive ways of thinking about and tackling common problems, and identifying and exploiting synergies that can enhance our research outcomes and open up new avenues of investigation.

Find out more

[northumbria.ac.uk/research/idrts/
extreme-environments](http://northumbria.ac.uk/research/idrts/extreme-environments)



GLOBAL DEVELOPMENT FUTURES

The challenge

Communities across the world, and the planet itself, are facing the intersecting challenges of inequality, poverty, conflict and the climate emergency.

There is an urgent need for a step change in the ways the world seeks to tackle these challenges in order to improve the lives and livelihoods of vulnerable communities and build more sustainable models of development.

Attempting to tackle these global challenges is not new. But historic inequalities have not been addressed, while social, economic, political and cultural ideas from the global North have dominated thinking about how to address inequality and promote sustainable development.

As a result, the knowledge, ideas and experiences of communities in the global South have often been relegated to the margins. The production of research and knowledge has not taken place outside these inequalities, and has often taken place in silos that limit the innovations and transformations needed to tackle the world's pressing global challenges.

What we do

The Global Development Futures IDRT focuses on enabling and promoting research, knowledge and learning that supports the lives, livelihoods, economies and environments of countries in the global South.

The IDRT has four interconnected priority areas which bring together Northumbria expertise from across faculties:

- Climate and sustainability
- Crises and disasters
- Mobilities and displacement
- Community action and innovation

To ensure Northumbria's Global Development research in these areas is ethical, relevant and has impact, the IDRT particularly supports and enables equitable partnerships with communities and stakeholders in the global South, bringing groups together to work together across disciplines and sectors.

About us

The Global Development Futures IDRT is an inclusive community of Northumbria academic and professional services staff, students and partners working collaboratively together to create high quality research, knowledge exchange and learning in global development.

We work closely with leading global actors to shape policy, including the United Nations and International Federation of Red Cross and Red Crescent, as well as with vulnerable communities, civil society organisations and governments in Latin America, South and South East Asia, Africa and the Middle East.

Find out more

northumbria.ac.uk/research/idrts/global-development-futures



Art on the walls of the Antonio Guterres Urban Refugee Centre in Kampala. Source: Matt Baillie Smith

INTEGRATED HEALTH AND SOCIAL CARE

The challenge

With an NHS under increasing pressure and more people living with long term conditions, it is vital we explore new, sustainable and effective ways of promoting health and wellbeing across all age groups and to support patients and their families.

The Marmot 10 year update, coupled with the COVID-19 pandemic, has shifted health and social care focus to place greater emphasis on health equity and the broader determinants of wellness. The Office for Health Improvement and Disparities initiatives are now addressing health inequalities exacerbated by the pandemic.

What we do

We aim to address the challenges of wellness, healthy ageing and health inequality, supporting every sector of the community by promoting health equity to achieve five extra healthy years of life while promoting higher quality of life.

We will achieve our vision by focusing on translational interdisciplinary research. Our Research Pillars foster synergies in three areas of existing Northumbria expertise and one emerging cross-cutting theme:

- Inequalities and engagement with marginalised groups.
- Management of prevention of long-term conditions via tech-enabled and non-tech interventions.
- Optimising social, physical and mental determinants of wellbeing across all life stages.
- Methodologies for co-creative design, implementation and (health economic) evaluation of real-world interventions (cross-cutting theme).

About us

We have over 140 members from a wide range of disciplines from across the University focussing on health and social care research. Our partners include NIHR, SPHR, Fuse, AHSN, GNCR, QCC, BMA, Family Justice Board, the EC, UK Research Councils, Ministry of Defence, Innovate UK, and Department of Health along with industrial and SME partners in Pharmaceuticals, Technology and Nutrition.

Find out more

[northumbria.ac.uk/research/idrts/
integrated-health-and-social-care](https://northumbria.ac.uk/research/idrts/integrated-health-and-social-care)



IC3: INTERNATIONAL CENTRE FOR CONNECTED CONSTRUCTION

The challenge

IC3 aims to address the central challenges recognised by the construction industry. These include:

- The need to embrace the transformative potential of new digital, connected and collaborative approaches, smarter ways of working to address low productivity and other critical performance challenges facing the industry.
- The optimisation of processes through which buildings are designed, built and operated to deliver a step-change in the quality, value, health, safety and performance of buildings for the benefit of occupants, stakeholders, society and the environment.
- The innovation required to integrate sustainability into core business functions and develop climate positive buildings and infrastructure, both new and existing, to address global warming and other environmental issues.
- The intelligent capture and use of data to inform smarter working practices including asset management.



IC3: Steps to Connected Construction



IC3
International Centre for
Connected Construction

What we do

Our mission is to develop, exploit and connect technology to address the persistent sector challenges, enabling the creation and adoption of smart and sustainable whole-life strategies across all aspects of the construction industry.

IC3 combines the power of the construction industry with the research power and expertise of the universities to deliver 'innovation in action'. A recognised centre of excellence driven by a vibrant cluster of over 40 partners from the construction industry, digital sector, academic and regional government, it is co-creating positive transformation in the global construction sector.

Our vision is for

- Progress towards a carbon positive sector.
- Smarter and more effective data, digital assurance and cybersecurity.
- Improved productivity through connected and digital technologies.
- Increased safety standards through 'Material Passports'.
- Future proofing and repurposing buildings and infrastructure.
- Addressing the 'Place' and 'Levelling Up' agendas for the North-East region through new knowledge and skills leading to economic growth and social prosperity.

About us

Founded on the North-East's international reputation for digital and connected construction and with collaboration at its heart, IC3 is delivering practical solutions to real challenges and accelerating their route to market to create effective, sustainable and safe buildings and infrastructure.

Find out more

northumbria.ac.uk/business-services/engage-with-us/international-centre-for-connected-construction



SPACE

The challenge

Few of us realise just how essential space is to every aspect of our modern daily life. Every time we use our smartphones to navigate, every time we take a flight, every time we check the weather forecast – we are using space.

Satellites orbiting the Earth only 160 kilometres above our heads keep us connected with our friends, families, and colleagues. They support our present and future security and prosperity, enabling us to navigate the oceans, monitor the climate and forecast the weather.

New technologies and cheaper access to space will let us further explore the Earth and the solar system, deliver new global services like space-enabled internet, and make new scientific discoveries in zero-gravity. Our immersion in space-related technology is changing how we think and govern.

Our challenge is to make the best use of space, from novel technologies, the services they provide, to how those impact society and our understanding of the Universe and ourselves.

What we do

Space is, by definition, an interdisciplinary field spanning both arts and sciences.

Northumbria has a diverse and excellent portfolio of research with applications to space. To develop novel technologies, both engineering and physical sciences are needed. Space technology is used for and by humans; our natural environment, human society, biology, economy, law, politics, and the arts all have space applications.

Recent University investments in the Northumbria Space Technology Laboratory have enabled collaboration with Lockheed Martin UK to develop the North East Space Skills and Technology centre, opening up diverse opportunities for space technology research.

There are already many examples of inter-disciplinary successes across the University including in communications technology, the Aerospace Medicine and Rehabilitation Laboratory, Space Law and the Solar and Space Physics Peak of Excellence.

About us

Space is a brand new IDRT open for interested researchers to join and find out about what we do.

Space brings together researchers with diverse interests in emerging space research areas, to stimulate new ideas, enhance excellence and drive innovation in the exploration and use of space for humankind.

We want to learn what you do in Space research. Please get in touch!

Find out more

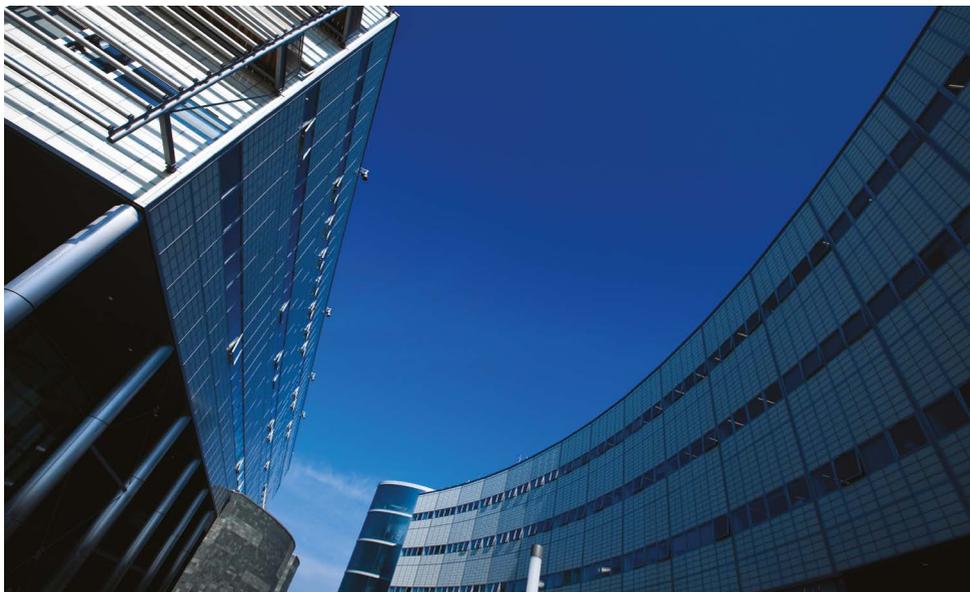
northumbria.ac.uk/research/idrts/space



IDRT INVESTMENT

The University enables IDRTs to achieve success by offering the following support:

- IDRTs will usually be funded for a period of 6 years subject to successful completion of Periodic Review.
- A PhD student from Research Development Fund (RDF) funding will usually be provided annually.
- A small annual budget is available to support research activities.
- Support from Research and Innovation Services (RIS) to organise events, manage spend, develop research grant applications and help deliver impact. Each IDRT will be supported by a nominated contact person in RIS.
- Support to publicise the research and activities undertaken within the IDRT.



IDRT GOVERNANCE

IDRTs have three-year strategies including their mission, goals and objectives, supported by an annual operational plan of activities.

Core Management principles

- The PVC(R) oversees IDRT performance.
- IDRT Leads receive a 0.2FTE recognition on their departmental administrative workload.
- An IDRT Management Group supports the IDRT Lead in delivering the Operational Plan and IDRT Strategy. This should have representation from each Faculty and ECRs.
- These offer strategic opportunities for staff to increase management experience and support career development.
- There are significant benefits to departments from having staff involved in IDRTs (e.g. income generation, developing new research collaborations, new opportunities for impact).

IDRTs are evaluated in two ways:

- a periodic review undertaken every three years.
- a light touch annual monitoring process.



GET INVOLVED

To express your interest in working with an IDRT, please contact the IDRT lead via the IDRT webpage.

If you are a researcher at Northumbria University and are interested in proposing a new IDRT, look out for information on the webpage below:

northumbria.ac.uk/research/idrts





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