

# ADAPT: Centre for Digital Content Technology

ADAPT is Ireland's global centre of excellence for digital content. Recently awarded €50 million in additional funding, it is a world-leading multi-institutional research centre. It combines the expertise of researchers at four universities with that of industry partners to produce ground-breaking innovation in digital content that is revolutionising the way people interact with content, systems and each other.



**Engaging Content  
Engaging People**



ADAPT's cutting-edge technologies enable businesses in all sectors to analyse, personalise and deliver content more effectively to drive engagement, reach and revenue.

## Research Areas

- › Analysing media, content and customer interactions
- › Enabling global reach through innovative machine translation
- › Transforming and delivering personalised content
- › Extracting actionable knowledge and information from digital content and user interactions
- › Empowering innovative customer engagement and interaction across media
- › Pushing the boundaries of human speech and gesture recognition to enhance human-machine communication

## Research programmes

Many of ADAPT's 200 researchers collaborate on research projects with industry partners. Current projects include:

- › Developing Linked Data publishing pipelines for Ireland's geospatial data service
- › Extracting actionable information from unstructured financial data
- › Delivering personalised content for targeted customer segments
- › Enhancing translation productivity
- › Detecting trends, patterns or offensive content in social media

## Facilities

- › Content-aware multilingual search and discovery technologies
- › State-of-the-art interactive information retrieval and meta-data semantics models
- › World-leading language technology systems
- › Personalisation and delivery applications for textual and multi-modal content

## Industry and commercialisation

By enabling deeper engagement for users, ADAPT enhances efficiencies and global reach for a range of industry partners in industries such as ICT, localisation, financial services, eCommerce, eHealth, media, entertainment and games, life sciences, digital culture and humanities, and eLearning/education.

Industry partners include:

- › Acrolinx
- › AOL
- › Brite:Bill
- › Cisco
- › Commetric
- › Deutsche Bank
- › eBay
- › eir
- › FBD
- › Huawei
- › IBM
- › Iconic
- › iFlyTek
- › Intel
- › KantanMT
- › Microsoft
- › Moravia
- › Novartis
- › OSi
- › PayPal
- › RTÉ
- › Sajan
- › Symantec
- › VistaTec
- › Welocalize
- › Xanadu Consultancy
- › Xcelerator Machine Translations

Education and Public Engagement:

ADAPT’s All Ireland Linguistics Olympiad (AILO) challenges secondary school students to develop their own strategies for solving problems in unfamiliar languages from around the globe.

They also collaborate with Science Foundation Ireland and the SFI Research Centres to support a wide range of education and public engagement initiatives.



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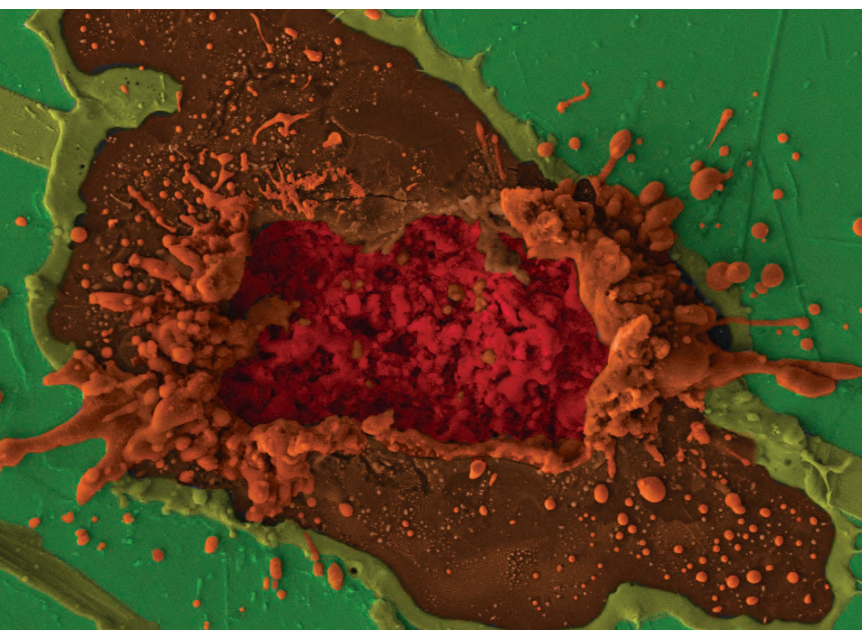
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# Advanced Materials and BioEngineering Research (AMBER)

AMBER provides a partnership between world-class materials science researchers and industry.

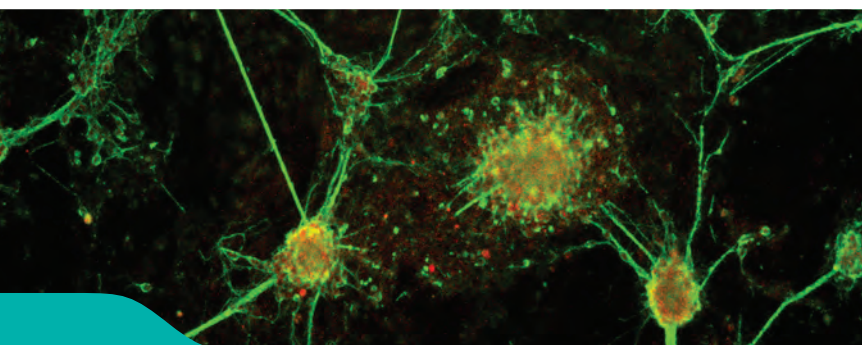
AMBER is at the forefront of translating leading science into new discoveries and devices for the ICT, medical devices, pharmaceutical and industrial technology sectors.



With €85 million in expected funding over six years from Science Foundation Ireland, industry and international sources, the centre combines fundamental and applied research activity within a vibrant culture of industrial engagement and commercialisation.

## Research Areas

- › 2D materials and composites
- › Biomaterials
- › Medical devices
- › Semiconductor and memory devices
- › Polymer nanocomposites and membranes



## Research programmes

AMBER's 120 researchers are tackling significant industrial challenges. Their work includes the development of:

- › Novel device architectures and magnetic memory applications
- › Thermoelectric and energy harvesting devices
- › Mechanically, electrically and optically enhanced polymers
- › Surface property modification using nanopatterns
- › Membranes and porous media
- › Food, pharmaceutical packaging and sensing applications
- › Advanced materials and device modelling
- › Drug encapsulation and delivery systems
- › Regenerative tissue engineering

## Facilities

- › Advanced microscopy and nanofabrication lab
- › Polymer development and characterisation lab
- › Photonics lab
- › Clean-room facilities
- › Metrology/spectroscopy
- › Additive manufacturing

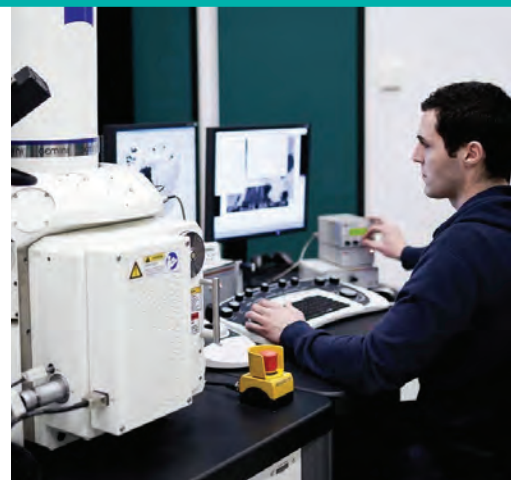
## Industry and commercialisation

Central to AMBER's research remit are the collaborative projects it carries out with diverse industry partners. AMBER is creating new knowledge and intellectual property. It is transferring that knowledge to industry through licensing agreements, industrial staff exchanges and spin-outs.



## Industry partners include:

- › Adama Innovations
- › Alcon
- › Amebis Ltd
- › Bioplastech
- › DePuy Synthes
- › Diageo
- › Eblana Photonics
- › Glanbia
- › Glantreo
- › Innalabs
- › Innovative Polymer Compounds (IPC) Ltd
- › Integra Lifesciences
- › Intel
- › Medtronic
- › Merck Millipore
- › Mergon Group
- › Nokia Bell Labs
- › SABmiller Plc
- › Sigmoid Pharma
- › Solvotrin Therapeutics
- › Western Digital



## Education and Public Engagement:

AMBER develops training and educational programmes which impact all levels of the formal education system from primary school to fourth level. As an interdisciplinary and inter-institutional centre, AMBER ensures the incorporation of interdisciplinary research programmes and training elements. In addition, AMBER ensures graduates and postgraduates have a combination of technical aptitude and a range of generic and transferable skills. AMBER is also committed to the development of novel outreach programmes which aim to stimulate discussion on the role of science in defining how we live our lives.

Examples of AMBER's schools' programme:

- › Exploring Materials, a Transition Year work experience programme
- › Magical Materials, a week-long continuous professional development (CPD) course for primary school teachers
- › NanoWOW, a resource pack for primary school teachers to introduce nanotechnology and materials science to 5<sup>th</sup> and 6<sup>th</sup> classes
- › Nano in my Life, a resource pack for Transition Year teachers to introduce nanoscience to their pupils

## Key Contacts

### Michael Morris

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*Professor Michael Morris is Professor of Surface and Interface Engineering at Trinity College Dublin. He is a founder of Glantreo, a SME spin out for Cork, and maintains links in developing novel stationary phase materials for chromatography applications. His work includes collaboration on the development of new technology for the manufacture of logic/memory circuitry. He also has several engagements with other companies based on his experience of surface engineering and materials science.*

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## APC Microbiome Institute

APC is a gastrointestinal health research institute exploring the role microbes (microbiome) play in health and disease. The microbiome is a target for treatment and prevention of disease, and a source of functional food ingredients, new drugs and disease biomarkers.



*Interfacing Food & Medicine*



One of the world's leading institutes in gut microbiome research, APC is receiving €70 million in SFI and industry funding across 2013-2019. It hosts a diverse group of clinicians and scientists working in teams and sharing ideas and resources.

### Research Areas

- › Discovery of molecules for therapeutics and functional foods
- › Designing functional ingredients/foods across the lifespan
- › Links between diet, microbes and mental health
- › Signalling, host immune-inflammatory responses
- › Phage as regulators of the microbiome in health and disease

### Research programmes

APC's 300+ researchers include global research leaders in food/pharma areas, such as gastroenterology, microbiology, immunology, neuroscience, nutrition, neonatology, gerontology, cardiovascular and metabolic health.

### Technology Platforms

- › Culture collection
- › Next generation sequencing
- › BioIT
- › Pre-clinical and germ-free
- › Human studies
- › Flow cytometry
- › Bio-processing

### Industry and commercialisation

The APC team has extensive experience collaborating with the food, agriculture, pharmaceutical, biotechnology and diagnostic sectors and welcomes new industry partnerships.

APC's industry partners can access technology platforms, extensive databases and biobanks, and the expertise of its investigators.

Now in its second decade, APC has developed several technology platforms that can be of significant benefit to industry clients in furthering their own R&D agendas.



**Mining the Microbiome for different life stages**

**Current industry partners include:**

- › AbbVie
- › Adare Pharma
- › Alimentary Health
- › Cremo SA
- › Danone
- › Friesland Campina
- › GE Healthcare
- › General Mills
- › Janssen Pharmaceuticals
- › Kerry Foods
- › Mead Johnson Nutrition
- › Nutricia Advanced Medical Nutrition
- › Second Genome
- › Sigmoid Pharma
- › Suntory Wellness
- › Trino Therapeutics
- › 4D Pharma



**Education and Public Engagement:**

APC's main ambition is to create economic and societal impact, and collaborations with innovative industry partners are key to this success. They design industry workshops to cater for the ongoing research and training requirements of the food, pharma and diagnostic sectors with a view to attracting new industry partners. APC in collaboration with Science Foundation Ireland, is involved in many local and national events, including Science Week, Smart Futures and the following unique programmes:

- › The Microbe Magic @ School programme for primary schools
- › Budding Biologists Programme for secondary schools
- › Science for All in which postgraduates present their research to the general public
- › Bringing Science to Society, a programme to engage the wider scientific community and stimulate public engagement

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*Fergus Shanahan is Professor and Chair of the Department of Medicine at University College Cork (UCC). He was previously Associate Professor of Medicine with tenure at University of California, Los Angeles (UCLA). He has published more than 500 peer-reviewed scientific articles and several books. He has particular research interests in mucosal immunology, inflammatory bowel disease and most things that influence the human experience. Science Foundation Ireland named him as 'SFI Researcher of the Year' in 2013.*

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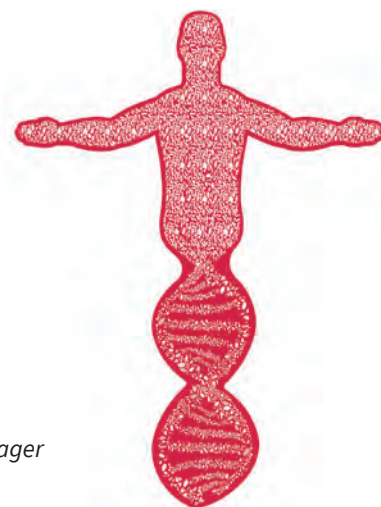
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# Centre for Future Networks and Communications (CONNECT)

**CONNECT is the Science Foundation Ireland Research Centre for Future Networks and Communications. Its mission is to research and develop innovative solutions for the communications challenges facing society today. The Internet of Things, 5G networks and new broadband architectures are the Centre's main areas of focus.**



Photo © jamesteohart/Shutterstock

Over 250 CONNECT researchers across 10 Higher Education Institutes are supported by €50 million of funding from the Science Foundation Ireland Research Centres Programme, the European Regional Development Fund and industry partners.

Current networks are proving a roadblock to solving some of the world's most pressing problems. We all want faster and richer data but networks are currently overwhelmed by this traffic. CONNECT is developing networks that automatically respond to the needs of the services that run on them.

## Research Areas

CONNECT researches future networks, Internet of Things, 5G and beyond from the following network perspectives:

- › Converged
- › Dense
- › Low Energy
- › Moving
- › Nano
- › Shared

CONNECT researchers have vast expertise in test and experimentation in these areas.

## Research programmes

CONNECT's 250 researchers tackle issues of particular interest to industry. Their work includes the development of:

- › Energy-efficient, ultra-low power smart sensors
- › Programmable network substrates for multi-stakeholder ecosystems
- › Extreme-sharing systems for Cloud-RAN architectures
- › Network-aware, reconfigurable, multiband/multimode transceiver architectures
- › Quality-of-experience management for sparse, bursty data networks

## Facilities

- › Pervasive Nation – Ireland's Internet of Things testbed using a Low Power Wide Area Network (LPWAN). See [www.pervasivenation.ie](http://www.pervasivenation.ie)
- › Ireland's largest public data centre at TSSG, based in Waterford
- › Indoor/outdoor wireless testbeds for cellular, Cloud-RAN and SDR
- › RadioSpace - a national facility for the development and testing of new radio technologies for the Internet of Things and 5G.

## Industry and Commercialisation

CONNECT works with a wide range of industry partners on targeted projects in the areas of Internet of Things, future cellular (5G and beyond), next-generation broadband, software-defined networks and cloud-based services. CONNECT's expert researchers are dedicated to delivering outstanding results at the pace and standard demanded by industry.

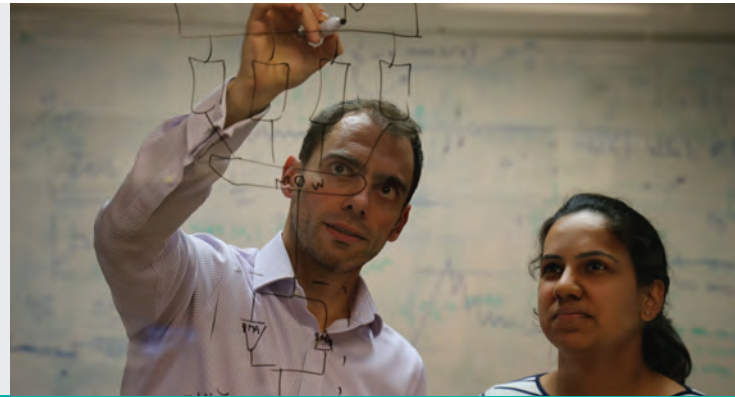


**Industry partners include:**

- › Aeronet Global
- › Ampleon
- › Analog Devices
- › Arris
- › Benetel
- › CISCO
- › Dublin City Council
- › EMC
- › Ericsson
- › ESB
- › Google
- › Huawei
- › IBM
- › Intel
- › Locatible
- › MA-COM
- › Nonlinear Systems
- › Nokia
- › ON Semiconductor
- › Rambus
- › Real Wireless
- › Rivada Networks
- › Rohde & Schwartz
- › S3
- › SensL
- › Simulity
- › Skyware
- › Synopsys
- › Taoglas
- › UTRC
- › VerX
- › Xilinx

**Education and Public Engagement:**

CONNECT has a strong commitment to education and public engagement. A key focus of this outreach is 'STEAM' - using the Arts and creative practices in the traditional formula of science, technology, engineering and mathematics. CONNECT researchers also engage with the public at events such as the National Ploughing Championships, Inspirefest, the BT Young Scientist and Technology Exhibition and also with visits to schools.



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*Professor Linda Doyle is the Director of CONNECT and Professor of Engineering and the Arts at Trinity College Dublin. Her expertise is in wireless communications, cognitive radio, reconfigurable networks, spectrum management and creative arts practices. She has published widely in these domains and is active in policy and outreach work, both in Ireland and internationally.*

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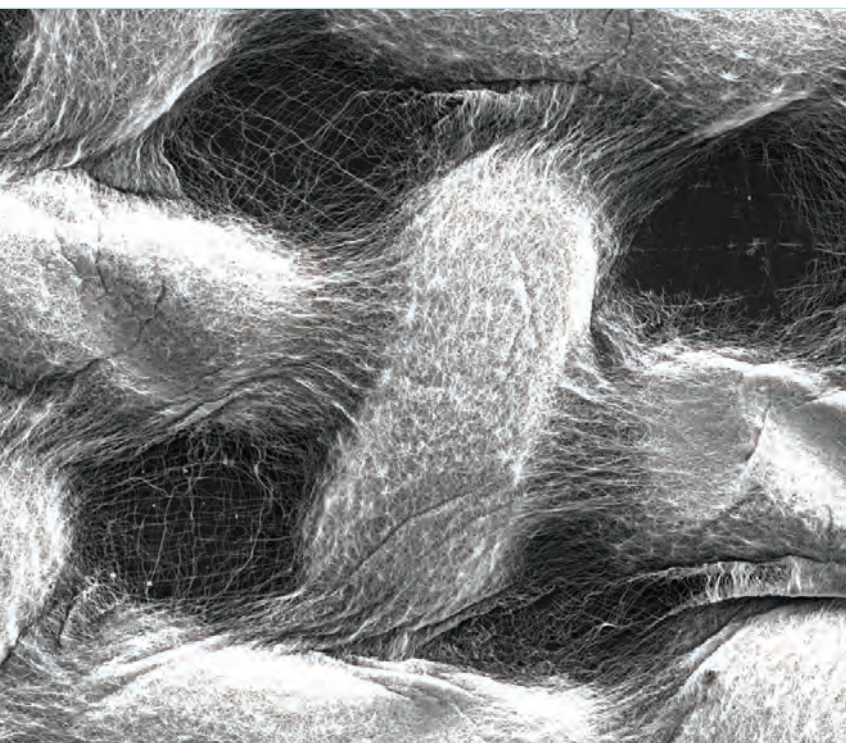
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# Centre for Research in Medical Devices (CÚRAM)

The centre aims to radically improve health outcomes for patients by developing 'smart' medical devices and implants. It develops these devices through collaborations with industry partners and hospital groups to enable their rapid translation to clinics.



## Research Programmes

Backed by €49.6m in SFI and industry funding, CÚRAM's 250+ researchers are designing and manufacturing implants to respond to the body's environment and delivering therapeutic agents exactly where they are needed. CÚRAM's outputs will particularly benefit patients with chronic ailments such as heart disease, wound healing, diabetes and musculoskeletal diseases.

## Facilities

- › Biomaterials manufacturing and processing from nanoscale to macroscale level
- › Extensive biomaterials and biological characterisation
- › Physicochemical drug analysis
- › Device design and testing
- › National Biophotonics Imaging Platform (NBIP) including pre-clinical imaging
- › Centre for Cell Manufacturing (CCMI)
- › Preclinical disease models
- › GMP manufacturing
- › Clinical research and trial infrastructure

## Industry and commercialisation

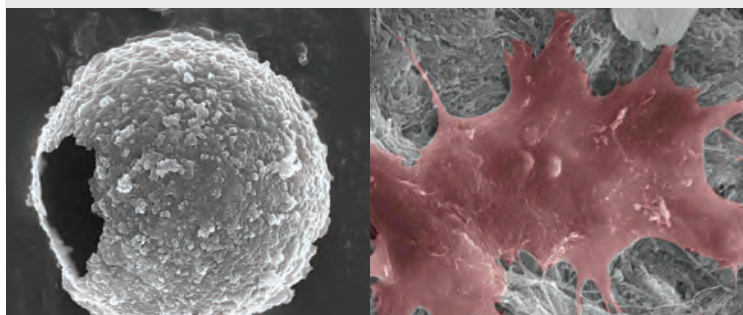
CÚRAM includes more than 24 industry partners, including Irish companies and multinationals. CÚRAM also supports product development and the creation of spin-out companies.

CÚRAM positions Ireland as the driver in developing medical device technologies that will provide affordable transformative solutions for chronic diseases. The centre strengthens Ireland's standing as a major global hub for medical device research and development.

CÚRAM's research programme focuses on innovative design, assessment and manufacture of medical devices and is driven by specialist researchers, clinicians and industry partners, ultimately translating research into clinical settings.

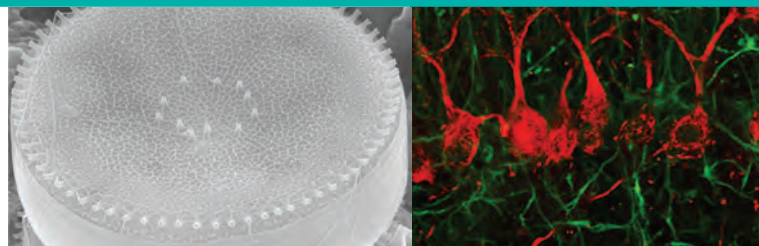
## Research Areas

- › Biomaterials
- › Drug Delivery
- › Tissue Engineering
- › Regenerative Medicine
- › Device Design
- › Glycoscience



## Industry Partners Include:

- › Aerogen
- › Arch Therapeutics
- › Acuitive
- › Boston Scientific
- › Cook Medical
- › Medtronic
- › Mylan Inc
- › Neuravi
- › Stryker



## Education and Public Engagement:

CÚRAM's Education and Public Engagement programme has been designed to support Science Foundation Ireland's Agenda 2020 objective of 'having the most scientifically informed and engaged public'. SFI-funded researchers at CÚRAM engage with the community through three core residency programmes, for artists, filmmakers and teachers.

- › The Artists in Residence programme supports interaction between the artistic, scientific and industry communities to develop outputs that can educate and inspire the public about the creativity and innovation involved in Irish R&D in the medical devices field.
- › The Filmmakers in Residence programme 'Science on Screen', aims to increase the level of scientific research incorporated into TV and film and develop a Science on Screen Festival.
- › The annual Teachers in Residence Programme runs from October to March and aims to develop a MedTech educational module designed for teachers by teachers, linking with both the primary and secondary school curricula.
- › Participation at national events allows CÚRAM researchers to engage with a wide national audience. Events include BT Young Scientist Exhibition, Famelab, TeenTech, Brain Awareness Week, The Galway International Arts Festival, The Ploughing Championships and the Galway Science and Technology Festival.

## Key Contacts

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*Abhay Pandit, PhD, Professor of Biomaterials at the National University of Ireland, Galway, is Scientific Director of the Centre for Research in Medical Devices (CÚRAM). Through CÚRAM he develops affordable, innovative and transformative device-based solutions to treat global chronic diseases. During his career in the medical device sector he secured regulatory clearance for a hydrophilic wound dressing, and secured IDE approval for a family of collagen vascular sealants for FDA submissions. In 2013, he was awarded the Academic/Emerging Medical Technology Company of the Year-Silver Award, he was the first Irish academic to be elected a Fellow of the Tissue Engineering and Regenerative International Society and was also inducted as an International Fellow in Biomaterials Science and Engineering by the International Union of Societies for Biomaterials Science and Engineering.*

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# Irish Centre for Research in Applied Geosciences (iCRAG)

The Irish Centre for Research in Applied Geosciences (iCRAG) brings together Ireland's leading geoscience experts to work on developing safe and secure groundwater supplies, discovering mineral and aggregate deposits, de-risking oil and gas exploration, safeguarding the geomarine environment and educating and informing the public on geoscience-related issues.



## Research Programmes

Forming an integrated team of internationally leading researchers and both large and small-scale industry partners, iCRAG conducts research which will help in the discovery and harnessing of Ireland's natural resources, such as its world-class Zn-Pb mineral deposits, untapped hydrocarbon resources in challenging NE Atlantic deep water environments, and important and environmentally sensitive seabed and groundwater resources.

## Facilities

- › A comprehensive suite of analytical and modelling resources
- › Platform facilities in geophysics, geochemistry and 3D modelling

## Industry and Commercialisation

The technology developed by iCRAG takes the form of soft-knowledge, data, methods, protocols, policy documents and software. This technology helps companies discover and develop natural resources for their mutual benefit, and the benefit of Ireland. As an SFI Research Centre, iCRAG encompasses the broad community of Irish geoscience researchers and engages with industry partners from diverse geoscience-related sectors, including hydrocarbons, marine, minerals and groundwater.



The Centre has €26 million in funding supporting 150 researchers.

## Research Areas

- › Raw materials – mineral/aggregate geoscience
- › Marine – marine geoscience
- › Groundwater – hydrogeology/hydrology
- › Hydrocarbons – petroleum geoscience
- › Geochemistry, geophysics, 3D geological modelling, public perception and understanding of geosciences



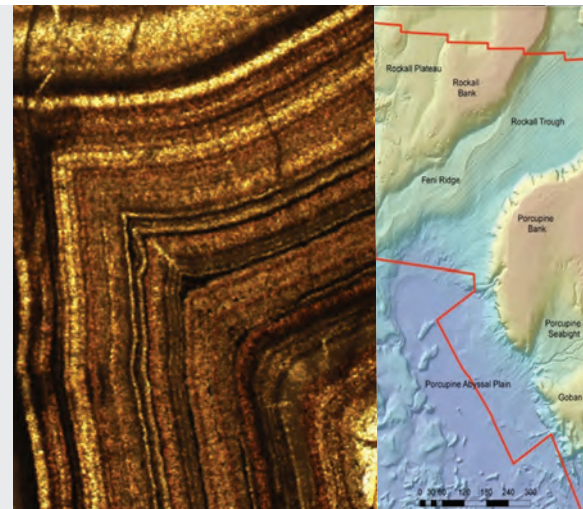
**Industry partners include:**

- > APEX Geoservices
- > AWN Consulting
- > Boliden
- > BP Exploration Operating Company Ltd
- > BRG
- > Byrne Looby
- > Cairn Energy Plc
- > Chevron North Sea Limited
- > Chrysaor E&P Ireland Ltd
- > Designer Group
- > ENI Ireland BV
- > Europa Oil and Gas (Holdings) Plc
- > ExxonMobil E&P Ireland (Offshore) Ltd
- > FLI Group
- > GDG
- > Geoscience Ireland
- > Geoserv
- > Group Eleven Mining & Exploration Ltd
- > Geological Survey of Ireland
- > Homebond
- > IE Consulting
- > IGSL
- > International Lithium Corp.
- > Intersocial Consulting
- > Irish Drilling
- > JB Barry & Partners
- > Kosmos Energy LLC
- > LTMS
- > Lundin Mining
- > Maersk Oil North Sea UK Ltd
- > Meehan Drilling
- > Murphy Surveys
- > Nexen Petroleum UK Ltd
- > Nicholas O'Dwyer
- > Pavement Management Services
- > Petroleum Affairs Division
- > PIPCo RSG
- > Priority Drilling
- > Providence Resources Plc
- > PW Mining
- > PW Nigeria
- > QME
- > Repsol Exploración SA
- > Rubicon Heritage
- > Serica Energy Plc
- > Shell E&P Ireland Ltd
- > SLR
- > Sorhill Advocates Pty Ltd
- > Sosina Exploration Ltd
- > SRK Consulting
- > Statoil (UK) Ltd
- > Teck Ireland
- > Tobin
- > Tobin Consulting
- > Transport Infrastructure Ireland
- > Trench Control
- > Trevali Mining Corp.
- > Tullow Oil Plc
- > Verde Environmental Group
- > Woodside Energy (Ireland) Pty Ltd

**Education and Public Engagement:**

Education and Public Engagement (EPE) is central to activities in iCRAG, and is informed by research on public perception and understanding of geoscience. The Centre's twin objectives are to foster an interest and understanding of applied geoscience in the general population and to enhance the ability of iCRAG researchers to effectively communicate their research to a non-specialist audience. Initiatives include:

- > Primary school visits with "Micro-Geo" and "Fossil Hunt" workshops
- > The "Science Apprentice – Energy and Resources" magazine for primary schools
- > Smart Futures geoscience career visits to post-primary schools and Transition Year placement programmes
- > Collaboration with the Thesis in 3 and FameLab science communication competitions
- > Geoscience Film and Q&A nights



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John Walsh is Professor of Structural Geology at UCD and co-director of the Fault Analysis Group in the School of Earth Sciences. He has published more than 140 papers in peer-reviewed journals, served on the editorial boards of several journals, including Geology and the Journal of Structural Geology, and acted as Distinguished Lecturer for several organisations including the European Association of Geoscientists and Engineers (EAGE) and the American Association of Petroleum Geologists (AAPG). In 2015 he became the first Irish Honorary Fellow of the Geological Society of London.

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# Irish Centre for Fetal and Neonatal Translational Research (INFANT)

INFANT is Ireland's first dedicated perinatal research centre. The centre's mission is to make pregnancy safer and to improve health outcomes for mothers and babies worldwide. The world-class, multi-disciplinary collaborative research and an array of industry partnerships make INFANT an international leader of discovery and innovation in perinatal healthcare.



## Research Areas

INFANT is committed to innovative, life-changing research and technology that will attract investment and reduce the impact of perinatal disease over the coming decades.

Across pregnancy, birth, infancy and childhood, INFANT is solving challenges through its key research themes.

- › Metabolomics: biomarkers for screening and diagnostics
- › Physiological monitoring
- › Perinatal clinical trials
- › Maternal and infant nutrition
- › Medical devices
- › Connected health
- › Epidemiology



## Research programmes

With active project grants worth €30 million, INFANT has approximately 100 staff working to address unmet worldwide clinical needs for pregnant women and newborn babies. They are working to develop screening tests for pre-eclampsia, preterm birth, fetal growth restrictions and conducting research on maternal and infant nutrition, hypoxic-ischaemic encephalopathy (HIE) and asphyxia at birth.

## Facilities

- › Uniquely located within Cork University Maternity Hospital, Europe's second busiest maternity unit, with state-of-the-art infrastructure
- › Biobank, the largest pregnancy/infant biobank in the world, with over 2 million aliquots of blood, serum, DNA and other tissue
- › Extensive databases, managed and curated to meet and surpass all international standards
- › Sample preparation facilities
- › Mass spectrometry facilities
- › Dedicated assessment rooms for neurodevelopmental and physical follow-up studies

## Industry and commercialisation

INFANT gives its industry partners access to world-first technologies, enabling them to deliver innovative solutions to global markets.

## Industry partners include:

- › Alere
- › Axxam
- › BioScreen Health
- › BrepCo Pharmaceutical
- › Crème Global
- › Danone Nutricia
- › Fresenius-Kabi
- › IBM
- › Incereb
- › Inspiration Healthcare
- › Kvikna
- › Laya Healthcare
- › Mead Johnson Nutrition
- › MedSciNet
- › Metabolomic Diagnostics
- › Newsweaver
- › Nihon Kohden
- › Waters Corporation

## Education and Public Engagement:

Through its programme of engagement activities INFANT is actively encouraging positive attitudes towards science, technology, engineering and mathematics (STEM). INFANT offers a wide variety of free activities for a range of audiences, including young children, online audiences, primary and post primary audiences, and general audiences at both non-science and STEM events. INFANT currently offers three hands-on workshops:

- › Bloody Detectives: hands on biobanking workshop
- › Electric Brains: EEG monitoring workshop
- › Speaking in Code: hands on coding workshop for very young children (3-6 years).



## Key Contacts

### Prof Louise Kenny

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*Louise Kenny is Professor of Obstetrics at UCC, a consultant obstetrician and part of the perinatal medicine team at Cork University Maternity Hospital. Her work has resulted in three patent applications relating to pregnancy biomarkers and more than 100 peer-reviewed original papers, reviews and book chapters. Professor Kenny leads the pregnancy research activity at INFANT.*

### Prof Geraldine Boylan

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*Geraldine Boylan is Professor of Neonatal Physiology at UCC. She has written dozens of peer-reviewed journal articles and conference papers, and contributed chapters to eight books. Professor Boylan leads the neonatal brain research activity at INFANT.*

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# The Insight Centre for Data Analytics (Insight)

Insight is one of the biggest data analytics centres in Europe. It undertakes high-impact research, seeks to derive value from Big Data and provides innovative technology solutions for industry and society by enabling better decision-making.



# Insight

Centre for Data Analytics



**With €88 million in funding, Insight has 400 researchers across areas such as connected health, decision analytics, social media analytics, smart cities and the semantic web.**

## Research Areas

- › Linked data
- › Semantic web
- › Machine learning and statistics
- › Media analytics and personal sensing
- › Optimisation and decision analytics
- › Recommender systems

## Industry and commercialisation

Insight offers data analytics solutions for a broad range of industry partners in ICT, healthcare, retail, finance, media and public services. Insight's expertise includes the whole data value chain, from the integration of multiple heterogeneous data sources to discovering patterns and trends in data and making sense of them.

## Research programmes

Innovative Insight solutions have included using data to:

- › Develop products and services based on matching users' short and long-term needs to a real-time picture of information and opportunities
- › Understand customer behaviour to increase customer satisfaction, experience and loyalty
- › Drive recommendations and support decision-making
- › Find optimal solutions to complex problems
- › Automate business processes

## Education and Public Engagement:

Insight, in collaboration with Science Foundation Ireland, is involved in many local and national events, including Thesis in 3, digital maker-clubs such as Coderdojos, 091Labs and Hacker-space. Insight also organises, in conjunction with the Central Statistics Office, Apps4Gaps, the first all-Ireland mobile app competition.

Insight runs and supports computer coding courses, local heritage digital archiving activities, mobile apps workshops and inter-school science debates. Researchers engage in talks on innovation, Internet Safety and Cyberbullying Awareness, and on the exciting career opportunities available in the field of data analytics. Insight is also driving a data ethics initiative, the Magna Carta for Data Project, through which the Centre actively engages with researchers around the world and with policy makers at Irish and EU level.

Industry partners include:

- › Abtran
- › Adoreboard
- › Avego
- › Aviva
- › Eagle Alpha
- › Flashpoint
- › Guiyang Municipal
- › NitroSell
- › RTÉ Community Analytics
- › RTE Content Discovery
- › RTE News360
- › Rubicoïn
- › Shimmer Research
- › Starwood
- › TreeMetrics
- › The Irish Times

Facilities

- › Software lab space
- › Environmental lab space



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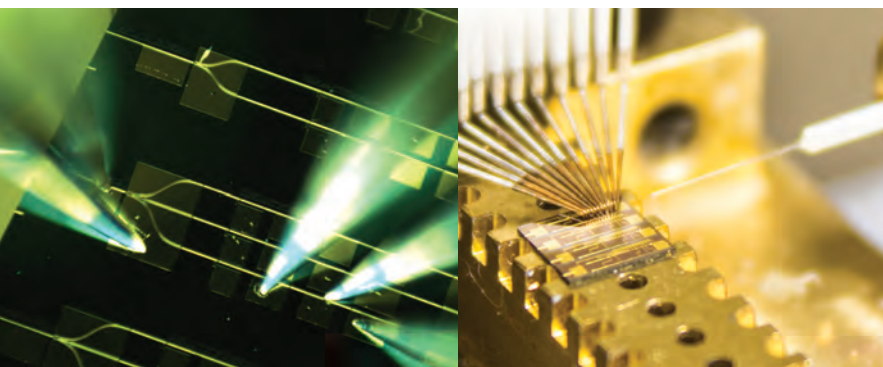


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# Irish Photonic Integration Centre (IPIC)

IPIC brings together more than 150 researchers from four institutes to develop new light-enabled technologies. Photonics is the generation, manipulation and use of light. It is a key enabling technology that underpins the internet and drives growth in diverse industries such as the ICT and MedTech sectors, as well as industrial technology which includes both manufacturing and environmental monitoring.



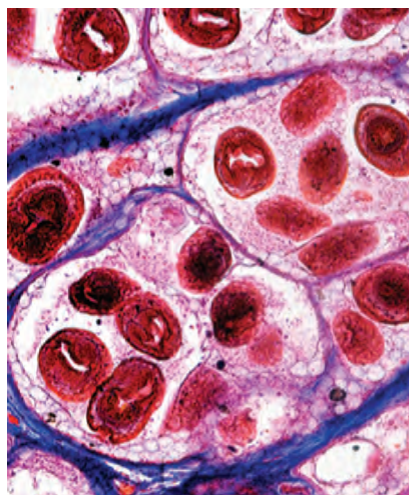
**IPIC's integrated research team has competencies in the theory of novel light-emitting materials through to the design of devices and systems. IPIC can accelerate transfer from laboratory to market by using its advanced fabrication and packaging capabilities to develop concepts and deliver low-volume manufacturing of prototypes.**

## Research Areas

- › Enabling continued growth of the internet through faster, more energy-efficient devices for information transport, storage and display
- › Delivering smart medical devices for improved treatment of disease
- › Developing highly compact instrumentation for point-of-care diagnostics
- › Developing systems for process and environmental monitoring

## Facilities

- › Modelling and design
- › Materials growth
- › Device fabrication
- › Packaging
- › Device characterisation
- › Systems testing



## Research programmes

IPIC's grand challenge is to advance and miniaturise photonic integration science and technology to produce breakthrough micro- and nanoscale optoelectronic systems, increasing device functionality, performance and energy efficiency. The Centre will achieve this through its dedicated research programmes in Optical Communications and Biophotonics. These include:

### OPTICAL COMMUNICATIONS

- › Highly energy efficient >400Gb/s transceivers for short-reach optical interconnects in data centres to address a critical bottleneck in these warehouses
- › Terabit/s communication systems for wide area networks, based on integrated photonic circuits, that allow information channels to be packed tightly to approach theoretical maximum capacities

### BIOPHOTONICS

- › Miniaturised, and potentially wearable, diagnostics systems by using the emerging science of silicon photonics, and hybrid and monolithic integration technologies
- › Surgical instruments with integrated miniaturised photonics-based sensors, including the development of flexible microLEDs for optogenetics

IPIC programmes are supported and enabled by their key technologies:

- › Packaging and Hybrid Integration
- › Monolithic and Heterogeneous Integration

## Industry and commercialisation

Targeting the ICT, medical devices and industrial technology sectors, IPIC is working with 25 industry partners to develop solutions tailored to their needs. Some 80 percent of IPIC's activity is focused on technology readiness levels 2 to 5, that is concept formulation to validation of prototypes in the relevant environment.



## Industry partners include:

- › British Telecom
- › Compact Imaging Ltd
- › Eblana
- › Epi-light Ltd
- › FazTech
- › Firecomms
- › InfiniLED
- › Intel
- › Lake Region Medical
- › Luxcel Biosciences
- › M/A-COM
- › Pilot Photonics
- › Radisens Diagnostics
- › Seagate
- › Synergia Medical
- › Stryker
- › X-Celeprint
- › Xilinx



## Education and Public Engagement:

IPIC, in collaboration with Science Foundation Ireland, is involved in many local and national events and initiatives, including Smart Futures and the BT Young Scientist Exhibition. IPIC is dedicated to training highly skilled scientists and engineers for industry, to support the next generation of scientists. The IPIC team is dedicated to showcasing the breadth and depth of career opportunities in STEM to students at all levels. Programmes include:

- › The “Secret Spectrum!” interactive workshop for primary schools, delivered to 850 primary school students in 2016
- › Photonics Explorer which provides robust experimental kits for secondary schools, allowing classes to fully experience the physics of light and optics.

*“I like using the kits with Transition Year students as it makes the topics very applicable to real life” – Teacher in Midleton College, coeducational school.*

## Key Contacts

### Prof Paul Townsend

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*Paul Townsend is Research Professor in the Department of Physics at University College Cork. He is also an Honorary Professor in the School of Engineering and Physical Sciences at Heriot-Watt University in Edinburgh and a Fellow of the Institute of Physics. Professor Townsend is widely recognised as one of the founders of the field of experimental quantum key distribution (QKD). The main focus of his current research is next-generation fibre to home networks. He has written more than 170 peer-reviewed publications, including 40 invited papers, and holds numerous granted and pending patents.*

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# Lero - The Irish Software Research Centre

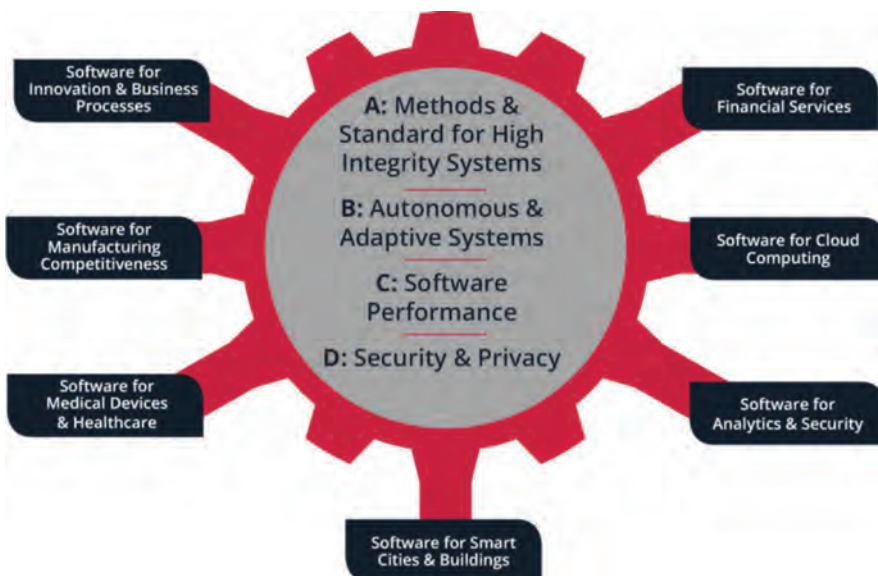


Lero brings together leading software teams from universities and institutes of technology in a co-ordinated centre of research excellence with a strong industry focus.



Ireland has a vibrant and successful software sector, with nine of the world's top 10 multinational technology companies having a significant presence in Ireland. Lero is a key pillar of that sector. Since it was founded in 2005, it has become one of the best known and most highly regarded software research centres in the world. It is home to 289 researchers and funded to the tune of €41m.

## Research programmes



## Research Areas

Lero's broad research focus is on evolving critical systems (ECS). These systems change over time ("evolving"), are strategically important to their users or owners ("critical"), and are often significantly – although not necessarily exclusively – software intensive ("systems"). ECS increasingly characterises a large proportion of software systems in development and use today, from business-critical systems (such as airline websites), to safety-critical systems (such as an automotive braking control system), to product critical systems (such as the core modules of a large software product).

## Industry and commercialisation

Lero works with a wide range of industry sectors, state agencies, educational bodies and international collaborators to deliver on its twin goals of research excellence and social and economic relevance.



**Industry partners include:**

- > ACI Worldwide
- > ADA Security Systems
- > Aerogen
- > Allstate Insurance
- > Almir Business Ltd
- > Analog Devies
- > Blu 5 Labs
- > Bluebridge Technologies Ltd
- > Comfort Keepers
- > dabl Health
- > Data Direct Networks
- > Dell
- > DMF Systems
- > Entellexi
- > Ericsson
- > European Space Agency
- > Fidelity Investments
- > Fijowave
- > Hermitage Medical Clinic
- > Horizon Globex
- > IBM
- > Information Mosaic
- > Intel
- > Logitech
- > METAFrame
- > Microsoft
- > Movidius
- > Ocuco Ltd
- > Portable Medical Technology
- > QAD
- > Rigney Dolphin Group
- > S3 Group
- > Salaso Healthcare
- > Software Quality Systems
- > STATSports
- > Storm Technology
- > sysTeam
- > Toyota
- > Tullow Oil
- > Two-Ten Health
- > United Technologies Research Centre
- > Vitalograph
- > Volkswagen
- > Vu2Vu

**Education and Public Engagement:**

Lero, in collaboration with Science Foundation Ireland, is involved in many local and national events including Smart Futures, Thesis in 3, Coder Dojo, Hour of Code, Pint of Science, Scratch Competition, and Techweek. Lero has significant involvement in introducing computer programming into the primary school curriculum.

Lero promotes awareness in technology through initiatives such as:

- > Scratch Programming in primary schools
- > The Junior Cycle Short Course in Coding
- > Summer Computing Camps

Lero is also involved in computer science at Leaving Certificate and has conducted research for the NCCA around the provision of computer science in upper second level education internationally. Lero develops and delivers CPD for teachers in computer science, in collaboration with Professional Development Service for Teachers (PDST) and Junior Cycle for Teachers (JCT).



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*Professor Brian Fitzgerald has been a Science Foundation Ireland Principal Investigator (PI) since 2002. He was one of the pioneers of research into Open Source software and is widely recognized as a global leader in the study of software development processes and methods. He was one of the founding PIs in Lero where he has been a researcher since its inception, apart from a period from 2008-2011 when he served as Vice-President Research at the University of Limerick. He has been Chief Scientist in Lero since 2013. He also holds an endowed professorship, the Frederick Krehbiel II Chair in Innovation in Business & Technology, at the University of Limerick.*

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# MaREI Centre for Marine and Renewable Energy

MaREI is the marine and renewable energy research and development Centre supported by Science Foundation Ireland. It combines the expertise of a wide range of research groups and industry partners, with the shared mission of solving the main scientific, technical and socio-economic challenges across the marine and renewable energy sectors.



## Research Areas

- › MRE technologies
- › Materials and structures
- › Observation and operations
- › Coastal and marine systems
- › Bioenergy
- › Energy policy and modelling
- › Energy management

## Research Programmes

In addition to fundamental research, the Centre provides targeted research and consulting services to a wide range of companies, which has established the Centre as a strategic research and development partner for both academic and industry partners worldwide.

MaREI has 180 researchers across six academic partner institutions, working with 46 industry partners. It is coordinated by the Environmental Research Institute (ERI) at University College Cork. MaREI has built upon the excellent track record of well-established marine and energy-based research groups across each of our academic partners, covering a range of cross-cutting topics across seven main research areas.

## Facilities

- › LIR National Ocean Test Facility – 2600m<sup>2</sup> tank hall housing four test tanks, including two ocean wave basins, a wave and current flume and a wave demonstration flume
- › Rotary and linear power take-off test rigs, electrical micro-grid test and simulation electrical integration test rigs
- › Large-scale structural testing and materials testing
- › Pilot scale anaerobic digestion reactors and 200m<sup>2</sup> aquaculture tank lab
- › Mace Head Atmospheric Research Station
- › High frequency coastal observing radar system (CODAR)
- › Galway Bay instrumented sea station platform and test site
- › Wet and dry labs, tracking and remote video systems
- › Robotic hardware, including remotely operated underwater vehicles (ROVs)
- › Limerick Dock testing and development site for MRE Robotics/Tidal Energy

## Industry and commercialisation

MaREI offers unique world class marine renewable energy testing infrastructure, state-of-the-art structural laboratories, novel prototypes and measurement equipment that allow the systematic identification and reduction of development risks through a structured 'Technology Readiness Level' (TRL) development cycle. This, combined with the technical competence of its employees, makes MaREI a preferred research and development partner for companies and research institutes across the world.

## Industry partners include:

- › Aer Lingus
- › Analog Devices International
- › ARUP Ireland Trust
- › Automsoft International
- › B9 Power
- › Brí Toinne
- › Bureau Veritas
- › CAPACITÉS
- › Commissioners of Irish Lights
- › DePuy Synthes
- › DP Energy Ireland
- › ÉireComposites
- › Enerco Energy
- › Ervia
- › ESB
- › ESRI Ireland
- › Gas Networks Ireland
- › GKinetic Energy
- › GRSI Energy
- › Henkel Ireland
- › IDS Monitoring
- › Irish Aviation Authority
- › Johns Manville
- › KOSMOS Energy Ireland
- › MAFIC Black Basalt
- › Marine Harvest Ireland
- › MYMIC
- › National Space Centre
- › NTR Foundation
- › Open Ocean Energy
- › OpenHydro
- › Pure Marine Gen
- › Qualitas Instruments
- › Resilience Energy
- › Resolve Marine
- › RPS
- › RSK Ireland
- › Shannon Foynes Port Company
- › Shell E&P Ireland
- › SkySails
- › SonarSIM
- › Technology From Ideas
- › Techworks Marine
- › Teledyne Blueview
- › Teledyne RESONeson
- › WECCA

## Education and Public Engagement:

MaREI's public engagement programme focuses on the development of a better understanding of the relevance and impact of our research on society, in collaboration with Science Foundation Ireland. Our researchers engage with schools, community groups and the general public through a programme of outreach initiatives aimed at different

audiences and by participating in events like Science Week, SeaFest, Cork Harbour Festival and FameLab.

MaREI researchers have considerable experience in stakeholder engagement, working with NGOs, industry, government bodies, local authorities, policy makers and community groups through their research projects, and are focused on communicating science to enable informed decision making.

## Key Contacts



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*Professor Jerry Murphy is Director of the MaREI Centre and Principal Investigator in Bioenergy Research. He is also the Vice Director of UCC's Environmental Research Institute and Professor of Bioenergy and Biofuels in the School of Engineering in UCC. Professor Murphy is the leader of the International Energy Agency (IEA) "Energy from Biogas" Task and has served with IEA Bioenergy since 2007. In this role he has edited a book and written several reports. Jerry's research focus is on second and third generation gaseous biofuels, including algae biofuels, power to gas concepts and life cycle analyses of various biofuel systems, on which he has published 100 peer review journal publications.*

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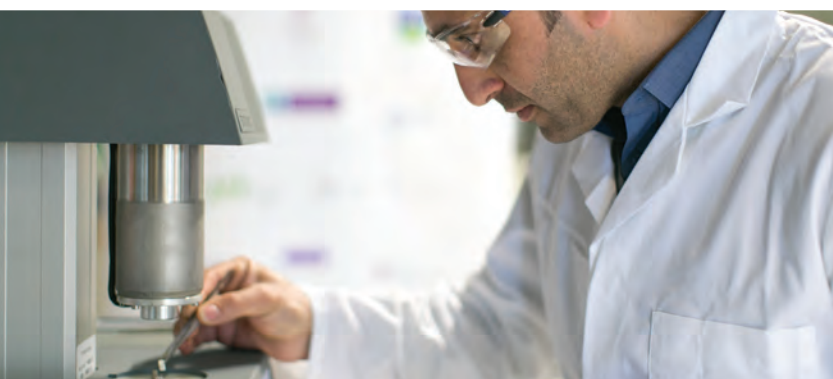
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# Synthesis and Solid State Pharmaceutical Centre (SSPC)

The Synthesis and Solid State Pharmaceutical Centre (SSPC), a global hub of pharmaceutical process innovation and advanced manufacturing, funded by Science Foundation Ireland and industry, is a unique collaboration between 24 industry partners, nine research performing organisations, and 12 international academic collaborators.



With €42 million in direct funding and a further €39 million leverage, SSPC supports a community of over 350 individual national and international active members, including 29 Investigators, 40 post-doctoral researchers and 60 PhD candidates. The SSPC leads the way for next generation drug manufacture and spans the entire pharmaceutical production chain from synthesis of the molecule, to the isolation of the material, and formulation of the medicine.

## Research Areas

- › Strand 1: New Frontiers in Pharmaceutical Synthesis
- › Strand 2: Crystal Growth and Design
- › Strand 3: Drug Product Formulation and Manufacture

## Research programmes

The SSPC community of 132 researchers is involved in 20 research projects. Recent collaborative projects include:

- › An SFI-funded SPOKES project MOMEnTUM (Modelling of Multi-Phase Transport Processes to Enable Automation in Manufacturing), a collaboration between SSPC and industry partners Johnson & Johnson Automation Centre of Excellence and Rusal AAL
- › An SFI funded US-Ireland R&D partnership and first of its kind "Centre to Centre" project to research continuous manufacturing for nano-based pharmaceutical drugs. (International collaboration)
- › Advanced biopharmaceutical technologies. SSPC works with seven industry partners and three research-performing organisations

## Facilities

- › Kilo labs
- › In-situ PAT systems
- › Labmax TM reaction vessel
- › Particle visual measurement (PVM)
- › X-ray diffraction (XRD)
- › Focused ion beam (FIB) milling system
- › Atomic force microscope (AFM)
- › SEM/Raman spectroscopy
- › SEM & TEM microscopy
- › Molecular and eEngineering modelling
- › Powder extrusion suite
- › Hot melt extrusion
- › Supercritical spray drying
- › Flow NMR
- › IR spectroscopy
- › Environmental SEM
- › In situ Raman microscopy
- › Crystallization, Isolation and Drying Technology Test Bed (CIDT<sup>2</sup>)

## Industry and commercialisation

SSPC works with 24 industry partners to deliver relevant solutions that address the manufacturing needs of pharmaceutical companies. At a corporate level, SSPC industry partners recognise the power of the collective and can facilitate unique collaborations. APC Ltd., a SSPC spin-out company, has created over 40 highly skilled jobs within the pharmaceutical sector.

SSPC's Dr Patrick Frawley and Dr Brian de Souza, worked with Pfizer Global Process Development Centre, discovering a new commercial process to deliver an innovative, improved manufacturing process for a world leading medicine.





## Industry partners include:

- Abbvie
- Johnson & Johnson  
Automation Centre of Excellence
- Alkermes
- Allergan
- Amebis
- APC Limited
- Biomarin
- Bristol Myers Squibb
- Clarochem Ireland
- Eisgen Pharma
- Eli Lilly
- FMC
- Genzyme: A Sanofi Company
- Glantreo
- GlaxoSmithKline
- Innopharma Labs
- Janssen
- Merck Sharp & Dohme
- Novartis
- Pfizer Inc
- Roche
- Rusal AAL
- Scale-Up Systems
- UCB Pharma

## Education and Public Engagement:

SSPC in collaboration with Science Foundation Ireland, is involved in many local and national events including Science Week, National Ploughing Festival, SSPC National Crystal Growing Competition, chemistry demonstration workshops and more. SSPC provides professional development training to teachers and connects post-primary students with access to scientists via the Smart Futures programme. SSPC actively supports industry partners and their research associates through industry focused upskilling and training. SSPC also provides an industrial placement programme for PhD candidates.



## Key Contacts

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*Kieran Hodnett is Professor of Chemical and Environmental Science and the former Dean of the Faculty of Science and Engineering at the University of Limerick. His current research interests are polymorphism in pharmaceutical compounds and active pharmaceutical crystallisation into excipient matrices. He has produced more than 120 peer-reviewed journal articles, which have over 2,800 ISI citations, and has supervised 30 PhD students to completion.*

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